



Personal Radiation Detectors

The Mission Support MS-PRD is a family of advanced Personal Radiation Detectors (PRDs and SPRDs) that integrate the latest technologies in sensor materials, AI-based detection algorithms, patented solutions for directional sensitivity, and wireless data networking. The units are designed to detect, locate, and identify the sources of gamma and neutron radiation, accumulate and store gamma-radiation spectra, provide fast identification of basic radionuclides, monitor exposure of personnel during operations, and alarm in case of dangerous radiation levels.

All MS-PRD PRDs have an advanced NORMs rejection algorithm, therefore sensitivity of PRDs to critical industrial isotopes does not get worse at larger NORMs background. The PRDs can also automatically adjust search thresholds to changing background, which does not require manual background re-calibration when entering/exiting buildings and areas with significantly different gamma background.

The unique feature of the MS-PRD is full spectroscopic functionality on board: all models can accumulate, display and store gamma scintillation spectra, as well as provide fast identification of the most frequently met isotopes. The MS-PRD also has an option of directional sensitivity, which doesn't require any additional operations from the wearer: the unit just points to the direction of the largest gamma-radiation level, which makes the task of locating gamma-radiation sources straightforward.

The MS-PRD PRDs have rugged shock proof housing designed for all weather operating conditions. Power is supplied from an easily replaceable in the field single AA-type battery. Units might be mounted on the vehicle deck using an additional charger/dock station, as well as worn on the belt with a protective holster. The instrument is invaluable for use by First Responders, Border and Customs services, Fire and Police brigades and similar users in cases involving release or security of gamma/neutron radioactive and nuclear materials.



FUNCTIONAL HIGHLIGHTS

- Full spectroscopy on board: may accumulate, display and store gamma-radiation spectra
- Automatic adjustment to changing background and NORM rejection algorithm
- Built-in identification of frequently met isotopes using AI algorithms
- Patented technology for directional sensitivity of gamma detector
- Gamma-neutron version of PRD based on CLYC scintillator
- <2.5% Cs-137 energy resolution option for SPRD model using LaBr crystal
- Variety of data communication interfaces including wireless reachback

POTENTIAL APPLICATIONS

- Prevention of illicit trafficking of radioactive and nuclear materials
- Search for orphan or lost radioactive sources
- Critical infrastructure protection, safety of buildings and public events
- Emergency management and response to accidents involving radioactive/nuclear materials
- Provision of public safety and security in case of nuclear terrorism
- Environmental monitoring and measurement of radioactive releases from NPPs



MS-PRD — model range



There are 4 basic models of MS-PRD Personal Radiation Detectors:

- MS-PRD: basic gamma PRD/SPRD model
- MS-PRD-01: gamma only PRD/SPRD with directional sensitivity to gamma-radiation and increased detector volume
- MS-PRD-02: gamma-neutron PRD/SPRD
- MS-PRD-03: gamma-only PRD/SPRD with improved spectroscopic resolution (LaBr)
- MS-PRD-04: gamma only PRD/SPRD with extended dose rate range

Every model of MS-PRD can be equipped with an additional detector based on tissue-equivalent plastic scintillator for measurement of personnel exposure in large gamma-radiation fields of up to 10 Sv/h.

Basic gamma PRD/SPRD model MS-PRD. Compliant with ANSI N42.32 and equipped with a single CsI(Tl) scintillation crystal. Suitable for performing basic operations for prevention of accidents with sources of gamma radiation and response in case of emergency. The MS-PRD-04 model is similar to the basic MS-PRD, but equipped with an additional high dose rate (up to 10 Sv/h) detector.

Directional gamma PRD/SPRD model MS-PRD-01. The only PRD on the market with true directional capability that can detect the direction to the source of ionizing radiation using self-sensitivity (does not use any external moderators or complicated location procedures).

Directional features offer an intuitive search experience as users in shipyards or large customs ports are able to identify the location of the alarming radiation quickly and with precision. For luggage or shipping inspections, directional support ensures a clear scenario is reported to management and any threats can be isolated expeditiously. The detector array which supports the directional algorithm uses state-of-the-art isolation techniques and thereby eliminates the need for heavy collimators, making the MS-PRD the most capable and compact PRD/SPRD available today.

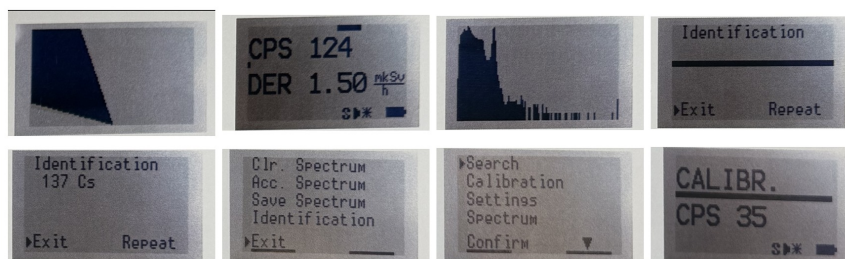
Gamma-neutron PRD/SPRD model MS-PRD-02. Dual-mode gamma-neutron PRD/SPRD based on CLYC crystal with SiPM readout. Features outstanding sensitivity to fast and thermal neutrons due to Cl and Li components of detector material, optionally capable for fast neutron spectroscopy. The CLYC-based detector also has better spectroscopic resolution (typically <5% at 662 keV) which makes the ID algorithm running on the MS-PRD faster and more accurate.

High-resolution spectroscopic PRD/SPRD MS-PRD-03. Compliant with ANSI N42.48 and equipped with LaBr-based scintillator crystal coupled with SiPM array readout. Provides better than 3% Cs-137 resolution in a wide temperature range.

The instrument can automatically characterize the isotope in case of alarm to the basic groups of interest: NORM, INDUSTRIAL, MEDICAL or SNM, and identify user-selected isotopes of interest. Most alarms at large events are driven by medical treatments, so the MS-PRD-03 offers a convenient MEDICAL/NOT MEDICAL indicator. This allows fast verification of the alarm incident and a fast and proper response by the first-line operator.



MS-PRD — key technologies



MS-PRD LCD screen captures: directional bar, CPS/DER readout, spectrum plot, identification and settings screens

Patented technology for directional sensitivity of gamma detector

Locating the source of gamma radiation after an alarm goes off can be one of the most challenging and time-consuming tasks when using PRDs in the field. Typically, this requires specialized techniques and additional training to perform effectively. But with the MS-PRD, finding the radiation source has never been easier. When the alarm activates, the MS-PRD shows the direction to the radiation source on the top bar of the LCD screen.

For even greater accuracy, simply double-press the operation button to enter Compass Mode. The MS-PRD's directional arrow will point you straight to the source. If the arrow points right, turn right. If it points left, turn left. It's that simple.

Full spectroscopy in every unit

Each MS-PRD device is equipped with a 1024-channel spectroscopic gamma detector. In the event of an alarm, the user can initiate the gamma spectrum acquisition, display it on the LCD screen, and store it in non-volatile memory for future reference. For CsI(Tl) detectors, the average energy resolution is approximately 7.5% at the 0.662 MeV energy of Cs-137, which is sufficient for detecting most industrial isotopes encountered in the field. The procedure is straightforward: select "Spectra" from the instrument's menu, clear any existing spectra, and the MS-PRD will automatically begin accumulating new spectral data. Once the accumulation is complete, the "Save" and "Identify" options will become available.

Built-in identification of frequently met isotopes using AI algorithms

The MS-PRD employs a suite of algorithms designed for the rapid identification of commonly encountered isotopes, including industrial isotopes such as Cs-137 and Co-60; naturally occurring radioactive materials (NORM) such as Th-232, Th-228, and K-40; nuclear isotopes like Am-241; and medical isotopes such as I-131. Once the spectral data has been accumulated, users can initiate the "Identification" process to obtain results.

In cases where no isotopes are identified, users have the option to either continue spectral accumulation and attempt identification again or save the spectral data for subsequent analysis. The saved spectra can be processed later using the provided ID software or any industry-standard software package, as the files are stored in standard formats (IAEA *.spe or ANSI N42.42), ensuring compatibility with the majority of available software solutions.

Automatic adjustment to changing background and NORM rejection algorithm

The standard PRD adapts to changing background radiation by recalculating the alarm threshold based on environmental conditions. This process typically requires manual updates by the operator whenever radiation levels change significantly. The MS-PRD takes this a step further with its automatic background update feature, ensuring seamless operation by adjusting automatically when transitioning from high to low radiation levels, such as when exiting a building.

Moreover, in environments with high background radiation from Naturally Occurring Radioactive Materials (NORMs), detecting Industrial (IND) or other isotopes of interest can become challenging. To overcome this, the MS-PRD is equipped with an intelligent, AI-driven algorithm that detects artificial isotopes even in high-NORM environments, providing superior performance and detection (select Adaptive Search Mode from the menu).



Types of Monitors

Model	gamma-channel	neutron-channel	high-range gamma detector (optional)
MS-PRD, -04	CsI(Tl)	—	tissue-equivalent plastic scintillator with up to 10 Sv/h exposure rate measurement
MS-PRD-01	dual CsI(Tl) with directional sensitivity	—	
MS-PRD-02	CLYC (<5% 0.662 keV resolution)	CLYC (fast and thermal neutrons)	
MS-PRD-03	LaBr (2.5% 0.662 keV resolution)	—	

Specifications

Gamma detector: MS-PRD, MS-PRD-01, MS-PRD-04

Type	CsI(Tl)+SiPM
Energy range	from 50 keV to 3 MeV
Gamma sensitivity	100 cps/μSv/h (Cs-137); 800 cps/μSv/h (Am-241)
Response time	< 2 sec (ANSI N42.32 compliant)
Dose Rate range	0,1 - 100 μSv/h
Accuracy	±20%
Typical energy resolution	7.5% (at 0,662 keV Cs-137)

Gamma-neutron detector: MS-PRD-02

Type	CLYC+SiPM
Energy range	from 50 keV to 3 MeV
Gamma sensitivity	90 cps/μSv/h (Cs-137); 800 cps/μSv/h (Am-241)
Response time	< 2 sec (ANSI N42.32 compliant)
Dose Rate range	0,1 - 100 μSv/h
Accuracy	±20%
Typical energy resolution	5% (at 0,662 keV Cs-137)

Gamma detector: MS-PRD-03

Type	LaBr+SiPM
Energy range	from 50 keV to 3 MeV
Gamma sensitivity	100 cps/μSv/h (Cs-137); 800 cps/μSv/h (Am-241)
Response time	< 2 sec (ANSI N42.32 compliant)
Dose Rate range	0,1 - 100 μSv/h
Accuracy	±20%
Typical energy resolution	2.5% (at 0,662 keV Cs-137)

MS-PRD-04: High-range gamma detector

Type	Plastic scintillator
Energy range	from 50 keV to 7 MeV
Dose Rate range	from 0,1 μSv/h to 10 Sv/h
Accuracy	±20%

Operating modes

Gamma/neutron radioactive sources search and measurement mode

Gamma spectra accumulation mode. Fast identification of selected isotopes

Direction to the gamma-radiation source mode (MS-PRD-01 model)

Functional

Spectra format	1024 channels
Number of spectra stored in memory, spectra format	50 spectra, IAEA *.spe format or ANSI N42.42
Data interfaces	USB; Bluetooth LTE (optional)
Internal memory	up to 1000 data events
Type of alarms	sound, vibration, light
Accessories (optional)	protective holster, car dashboard mount, dock/charger station
Power supply	1 AA-type battery
Battery lifetime	up to 700 hours at normal use
Cleaning	housing easy to decontaminate

Environmental and mechanical

Temperature	from -40 to +50 °C
Humidity	up to 98% at +35 °C
Atmospheric pressure	from 84 to 106,7 kPa
Ingress protection	IP65
Size, mm	39×68×96
Weight, g	200

Specifications are subject to change without notice.

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