ROTEM INDUSTRIES LTD

Totem Plus
Advanced Spectroscopic Portals

The RMDS Series

ADVANCED SPECTROSCOPIC RADIATION DETECTION PORTALS

- **ISOTOPE IDENTIFICATION**
- **NEUTRONS DETECTION**
- **DESIGNED TO MEET ANSI 42.38**

The RMDS Portal series is a complete vehicle/ pedestrian radiation monitoring system used for the rapid detection of unknown hidden radioactive moving sources. The system, in various configurations, is suitable for containers, trucks, trains, conveyors and pedestrians. This advanced and sophisticated portal monitoring system has been designed specifically for Homeland Security Applications, taking into consideration the rigorous and challenging needs of this evolving market.

The RMDS Portal series integrates innovative technologies, unique know-how and vast experience in the Radiation Detection and monitoring industry. The portals are primarily intended to be positioned at border crossings, maritime ports, airports, critical facilities and highly populated areas.

KEY FEATURES

- Drive through operation - speed up to 8 km/h (5 MPH).
- Easy to use and maintain by the “non-professional” operator.
- System output: Audiovisual alarms, Isotope identification, Sources location.
- Integrative portal monitor system (Remote internet control & communications).
- Integrated into two pillars with shielded and collimated detectors.
- NaI(Tl) 3” X 3”’ detectors for Gamma detection.
- He-3 Neutron detection system.
- Isotope identification - MCA based.
- Automatic spectrum drifts compensation.

- Energy range between 25 keV to 3.0 MeV.
- Low false alarm rates
- Functional in high background fluctuations
- Operational temperature: -30°C to +50°C.
- High sensitivity, reliability and precision.

Health Physics Instrumentation Dept. P.O.Box 9046, Beer Sheva 84190, ISRAEL
Tel. +972-8-6564781, Fax. +972-8-6568005, E-mail. sales@rotemi.co.il, Web: www.rotemi.co.il

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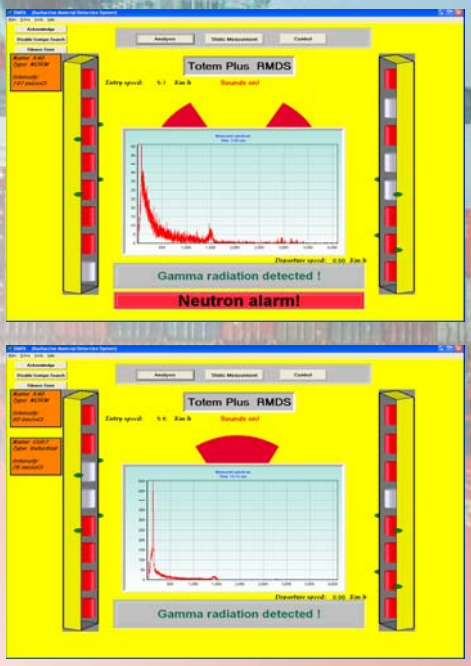
ISOTOPE IDENTIFICATION

The system is capable of identifying and distinguishing between different radioactive isotopes whether they are detected individually, or in a combination of more than one isotope. Identifying the radiating source's material is crucial for effective system operation, since it reduces drastically the innocent alarm rate. In systems without isotope identification capabilities, radiation alarms often occur while detecting benign sources, such as NORM (Normally Occurring Radioactive Materials) radiation from medical and industrial materials. The large number of false alarms in such systems sometimes causes the operator to increase the radiation alarm threshold, thus increasing the chance for illicit sources to be undetected.

The current system allows keeping the alarm threshold at a low level, but nevertheless avoids false alarms. Benign sources (such as NORM) are not ignored, when the system detects such a material, it produces a silent alarm, notifying the operator of the radiation presence, radiating isotope, and the isotope's category (natural/ medical/ industrial). The system meets the requirements of Spectroscopy-Based Monitors used for Homeland Security (American National Standard ANSI N42.38).



SPECTRAL SIGNATURE

Every radioactive material emits a unique energy spectrum, which is detected by the system. By comparing the detected spectral signature to the system's built in signature library, isotope identification can be achieved with a high level of confidence. Furthermore, the system is capable of identifying and distinguishing individual radiation sources even when they are combined. This makes it possible to detect illicit nuclear materials even in the presence of non-threatening isotopes, thus making it virtually impossible to hide dangerous radioactive materials under the cover of radiation from a benign source. By utilizing a MCA-based solution, this computationally intensive process (for example deconvolution of detector response from measured spectrum prior to spectrum analysis) is made possible. The system maintains a comprehensive library of energy spectrums for various isotopes, which can be updated and expanded as necessary. By comparing the measured and expected intensities of peaks (when more than one isotope is identified) after subtracting the detector response, the system can determine whether radiation shielding is being used.

Radionuclide	*Activity (µCi) Unshielded*	*Activity (µCi) Steel Shielded (3 cm)*	*Activity (µCi) Poly Shielded* [5]
^{241}Am	47	--	--
^{133}Ba(i)	9	148	--
^{133}Ba(g)	3	--	--
^{57}Co(i)	15	--	--
^{57}Co(g)	5	--	--
^{60}Co	7	25	--
^{137}Cs	16	85	--
DU [4]	4.5 kg (46 cm^2)	--	--
^{67}Ga	16	--	94
HEU[4]	237 g (6.5 cm^2)	--	--
^{131}I	10	--	23
^{192}Ir	6	61	--
^{40}K	128	--	--
^{237}Np [4]	90 mg with 1 cm Fe shielding	--	--
^{99m}Tc	16	--	127
^{201}Tl	10	--	88
^{226}Ra	8	--	--
^{232}Th	14	--	--
RGPu [4]	1.4 g with 1 cm Fe shielding	--	--
WGPu [4]	15 g with 1 cm Fe shielding	--	--
^{252}Cf [3]	2×10^4 n/s ± 20%	--	--

NEUTRON DETECTION

The system incorporates He3 Neutron detectors, which assist in the detection of SNM (Special Nuclear Materials). Standard Gamma detectors may be "blind" to a radiation source if the source is shielded (by lead for example), which could block most of the emitted gamma radiation. SNM materials emit neutrons, which are not blocked by this type of shielding, and thus can be detected by the He3 Neutron detectors.

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