

Mobile Pedestrian Radiation Portal Monitor	 <b>IAEA</b> International Atomic Energy Agency	IAEA Specification  Dated 2023-11-27
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## SPECIFICATION

### Mobile Pedestrian Radiation Portal Monitor

#### 1. Scope

This specification describes the requirements for a Mobile Pedestrian Radiation Portal Monitor, hereafter referred to as "the RPM". The RPM is a mobile radiation detection system designed for automated screening of personnel or pedestrians with personal belongings passing through the detection zone of the RPM for the presence of gamma and neutron radiation. The RPM alerts the security officer to the presence of radioactive and nuclear material and provides additional alarm-associated information, including the type of alarm (gamma, neutron, or both) and the relative magnitude of the alarm.

#### 2. Definitions, Acronyms, and Abbreviations

The following definitions, acronyms, and abbreviations shall apply throughout this Specification unless defined otherwise hereinafter:

RPM: Pedestrian Radiation Portal Monitor

FLO: Front Line Officer

CAS: Central Alarm Station

USB: Universal Serial Bus

UPS: Uninterruptible Power Supply

TB: Terabyte

LAN: Local Area Network

TCP/IP: Transmission Control Protocol/Internet Protocol

IP: Ingress Protection

#### 3. Essential Features Requirements

##### 3.1. System Configuration Requirements

The RPM shall:

3.1.1. Consist of one (1) vertical pillar, occupancy sensor (s), on-pillar alarm indicator and control room equipment and associated software; and

3.1.2. Be vandal and impact protected. External cables and unprotected fragile optical elements shall be avoided.

##### 3.2. RPM Features Requirements

The RPM shall have the following features:



- 3.2.1. Audible and visual alarm indication both on the monitor pillar and at local alarm station. Visual and desirably audible alarm indication shall be different for neutron and gamma alarms;
- 3.2.2. Support of walk-through and wait-in (up to 30 seconds) modes of operation; and
- 3.2.3. In addition to the on-pillar alarm indicator, the RPM shall have an on-pillar gamma alarm indicators, showing relative intensity of gamma radiation and thereby allowing the FLO to associate the passing by object with the presence of the radioactive material in the detection zone of the RPM. This indicator shall have one (1) green and a minimum of four (4) red segments, indicating prompt intensity of gamma rays. The algorithm of segment operation shall be adjustable from the CAS.

### 3.3. RPM Software Requirements

- 3.3.1. In addition to its main function i.e. data acquisition and analysis in order to detect presence of radioactive material, the RPM software shall support a method for automated adjustment of the gamma ray and neutron alarm thresholds without interfering with ongoing operation and provide monitoring of the status of health of all subsystems (gamma and neutron detectors, occupancy and tamper sensors, on-pillar alarm indicators, temperature inside the housings, climate control, remote link and power supply);
- 3.3.2. The CAS software shall provide the following functionality:
  - i. Recording, storing and processing information from the RPM;
  - ii. Recording, storing, and processing information from video systems; video sequences shall show the detection zone, shall have sufficient memory buffer and shall have a sufficient quality to identify a person by his face;
  - iii. Data retrieval from archive and review;
  - iv. Log alarms;
  - v. Indication of count rate for individual detector in the RPM;
  - vi. Visualization of RPM system performance;
  - vii. Support of LAN and TCP/IP connection;
  - viii. Password protected setup of critical system parameters;
  - ix. Automatic shutdown and start up after loss of power;
  - x. Provision of horizontal scanning profiles for neutrons and gamma in case of alarm for each detector;
  - xi. Documentation of the radiation alarm, including entering the results of secondary screening assessment; and
  - xii. Indication of remaining memory capacity on the hard disc to record alarm associated information.



### 3.4. CAS Equipment

The CAS equipment shall consist of:

- 3.4.1. One (1) industrial grade computer, including Windows 7 operating system, hard disc of not less than 1 TB, a monitor of not less than 19-inch screen size, keyboard and, mouse;
- 3.4.2. Industrial USB and power manager;
- 3.4.3. Communication equipment to enable INSN Industrial video server;
- 3.4.4. UPS;
- 3.4.5. Server;
- 3.4.6. Workstation;
- 3.4.7. Modem; and
- 3.4.8. An RPM remote console for alarm indication. shall be installed in an industrial cabinet, to improve environmental protection, next to the RPM remote console for alarm indication, screen, a keyboard, and mouse.

## 4. General Requirements

### 4.1. Safety Requirements

The RPM shall meet safety requirements of IEC 61508 -1, IEC 61508 -2 and IEC 61508 -3 and be safe for intended operation.

### 4.2. Design Requirements

The RPM shall meet the following design requirements:

- 4.2.1. Upon start up, diagnostic messages displaying proper functioning, date and time, battery status if applicable, hardware and software version and instrument serial number;
- 4.2.2. Rugged design for outdoor use in a wide temperature and humidity range; and
- 4.2.3. Easy decontamination (smooth surface, not absorbent or retentive of radioactive material).

### 4.3. Environmental Requirements

#### 4.3.1. Ambient temperature

In its transport case, the RPM shall be resistant to ambient temperature from -30 to +50°C. The range of temperature during operation shall be at least from 0 to +45°C. The RPM shall be resistant and tolerant to rapid temperature changes within the operating temperature range.

#### 4.3.2. Relative humidity

In its transport case, the RPM shall withstand relative humidity up to 100% at 40°C with condensation. The RPM shall remain fully functioning and tolerant to relative humidity up to 90% at 35°C.

#### 4.3.3. Degree of protection – ingress rating

The housing of the RPM and associated parts (remote console, alarm indicators, occupancy sensors and video surveillance systems) shall meet

IP54 requirements, i.e. be protected against low pressure jets of water from all directions and against dust (no harmful deposit).

#### 4.4. Mechanical Requirements

##### 4.4.1. Vibration during transportation

When packed for transport, the RPM shall be resistant to harmonic loadings corresponding to conditions of transportation, i.e. to acceleration of 2 g in the frequency range 10–33 Hz.

#### 5. Marking

The RPM shall have all safety markings in English language.

#### 6. Packing

The RPM, for the shipment to the End-User, shall be packed in accordance with international standards that are applicable for the shipment of this kind of equipment.

#### 7. Quality Requirements

7.1. The RPM shall be manufactured, shipped and installed in accordance with the Contractor's ISO quality assurance system or an equivalent quality assurance system.

7.2. The Contractor shall document the compliance with this quality assurance system.

#### 8. Testing and Acceptance

The RPM, prior to shipment, shall be tested for conformance of the System with manufacturer's performance specifications and the minimum requirements specified herein.

The RPM, after installation, shall be tested by the Contractor together with the End-User to demonstrate that the performance meets the manufacturer's performance specifications and the minimum requirements specified herein as determined by the IAEA and the End-User.

The results of the testing of the RPM shall be documented by the Contractor in an acceptance protocol that shall be signed by the End-User.

#### 9. Training

The Contractor shall provide one day training for up to three staff of the End-User in the operation and maintenance of the RPM.



## 10. Deliverable Data Items

The Contractor shall provide two complete sets of operation and servicing manuals and technical drawings in the English language.

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