

## PM12

Personnel Gamma  
Portal Monitor



The PM12 breaks new ground in personnel monitoring. It provides a major improvement in sensitivity over similar instruments, thus leading to faster monitoring.

## PM12 - Personnel Gamma Portal Monitor

Carefully shielded large area scintillation detectors provide complete gamma coverage for users passing through the portal. Highlight features include:

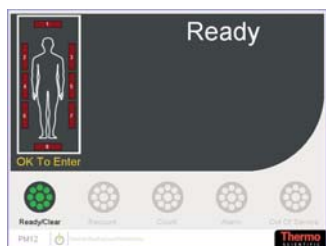
- Reduced time to count (Quickscan)
- PC controlled, with embedded Windows XP operating system
- All results logged to internal database
- Achieves measurements of 370 Bq (10 nCi) of <sup>60</sup>Co
- Five modes of operation: walk through, one step, two step, three step or stand and turn
- Two types of high level alarm, as well as an optimized <sup>60</sup>Co alarm
- Ability to check for changing background during the measurement
- Optional large touch-screen color LCD display - no keyboard required
- Automated calibration and checking routines
- Easy upload and download via USB
- Viewpoint compatibility

The PM12 utilizes eight identical large gamma-sensitive plastic scintillation detectors to monitor personnel passing through the portal. Traffic flow can be either direction. Three detector assemblies are located in each side of the portal, with additional detectors to monitor the head and feet.

The PM12 maintains the simple operation of its predecessor the PM7. In its basic form no keypads or complicated displays are necessary. The only user control is an alarm acknowledge switch, which is used to silence the audible alarm after contamination has been detected. The operational status of the portal is clearly indicated by a set of vertical system indicator lights located on both sides of the portal frame.

The System Indicator Lights are as follows:

- Contaminated: A red light indicating the presence of contamination
- Ready: A green light indicating that the PM12 is ready to use and is measuring background
- Count: A yellow light indicating that the portal is monitoring a user for contamination
- Re-count: A white light indicating that the user left the monitoring position before the count interval was complete
- Out of service: A blue light indicating that the personnel monitor is undertaking internal checks or has a failed component



Along with these indicators, a human silhouette, located on the right hand side of the portal frame, indicates which of the eight detector zones are “contaminated” thus aiding in localizing the contamination on an individual. The monitor utilizes double detector and triple detector sum-zones for monitoring of low level distributed activity. Voice commands may be utilized to help with the positioning of the user.



The PM12 may operate in either minimum count time or maximum sensitivity mode. The user enters the desired alarm level in terms of activity located in the centre of the monitor, or activity located adjacent to a detector (or both) and the personnel monitor determines the appropriate alarm level and minimum necessary count time to achieve these levels. The typical MDA for activity on the surface of the body is 200 Bq (6 nCi) of <sup>60</sup>Co.



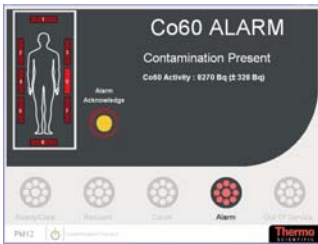
An optional touch screen LCD is provided which gives additional instructions to the users, and display monitoring results. The LCD is used for the calibration and configuration of the portal, and also may be used for retrieving measurement and calibration data from the portal’s database. The portal may also be calibrated using a laptop PC connected to the portal’s Ethernet port. The software provided by Thermo Fisher Scientific is highly intuitive and provides detailed high voltage scanning, calibration and report generation.

**Features**

- The monitor may be used in five modes: walk-through, one step, two step, three step, stand and turn. The two step mode is the most sensitive for contamination on the body. The three-step mode is a combination of one step and two step
- The software allows both an activity alarm and a high activity alarm
- An alarm may be set on each individual detector, as well as double detector sum zones and triple detector sum zones, and gross sum (8 detector) zone.
- Quickscan may be used, which significantly reduces the counting time, without compromising the statistical probabilities of detection or false alarm.
- A low energy check may be used if a user is contaminated with contamination from medical radionuclides
- An additional <sup>60</sup>Co alarm will monitor for the presence of <sup>60</sup>Co, with greater sensitivity than the standard alarm
- A changing background indication will indicate significant changes in background radiation
- A changing conditions alarm will indicate if there is a significant change in the count rate during the monitoring period, which would invalidate the measurement
- Rapid recovery from background changes with a dynamic background counting time
- All background, measurement, source checking, event log, voltage scanning is stored to an SQL database within the monitor
- Set-up and configuration and diagnostic information is accessed via a touchscreen LCD, or an optional external PC
- User screens and voice prompts in a wide range of user-selectable languages
- When used with user identification, may be used to monitor lung burden trends on individuals over a period of time
- Dongle security, with three security levels
- Battery and sensor diagnostics
- Calibration integrity checking
- Video camera, barcode reader and EPD reader options



The PM12C version includes an electrically controlled inlet barrier and exit folding door. This variant may be used in applications where the PM 12 is located at a radiological or designated boundary.



**Mechanical Specification**

External dimensions:	219 H x 94 W x 61 D cm {+ LCD 31 cm} (86" H x 37" W x 24" D + LCD 12")
Internal passage:	204 H x 71 W cm (80" H x 28" W)
Weight with lead:	12.5 mm (0.5") lead:820 kg (1800 lb) 25 mm (1") lead: 1000 kg (2200 lb)
Detectors:	8 off BC412 equivalent plastic scintillators – 3 on each side, 1 overhead & 1 in foot plinth
Detection area:	56 x 31 cm each ( 22" x 12")
Detection volume (total):	69,440 cm <sup>3</sup> (4235 in <sup>3</sup> )
Lead shielding:	12.5 mm or 25 mm (0.5" or 1") may be specified at time of ordering
Switches:	Two push-buttons to acknowledge user instructions

**Electronic Specification**

Power:	Integral 12 V power pack, 8 hours operation if AC supplies are lost. Integral continuous dual state float charger, 85 to 264 VAC, 47 to 63 Hz, 65 VA
Display:	Colour LCD with 31cm (12") diagonal viewing area and touch sensitive overlay
EMC & LVD:	EMC compliances - EN61326, EN55022 (emissions), EN61000-4 (immunity) LVD compliances - EN61010
Digital I/O connections:	Ethernet and 2 USB ( under LCD display) and 2 USB (on 5664A pcb)
Pulse Height Thresholds:	Five settings used for calibration and cobalt window and for HV scan optimum working voltages

<b>Radiological Specification</b>				
<b>Position</b>	<b><sup>60</sup>Co 1173 &amp; 1332 keV</b>	<b><sup>137</sup>Cs 662 keV</b>	<b><sup>57</sup>Co 122 keV</b>	<b>Typical background count rate in 0.1 μSv h<sup>-1</sup> (10 μR/h)</b>
Centroid Efficiency (4 π)	17.1 %	8.6 %	4.6 %	6000 cps
Body average IEC61098	5.4 %	3.4 %	2.6 %	6000 cps
Head (contact)	35.7 %	17.3 %	6.2 %	750 cps
Foot (contact)	35.9 %	18.9 %	13.8 %	950 cps
Body (@ 5 cm) IEC61098	26.5 %	13.5 %	8 %	850 cps per detector
Body (@ 3")	21 %	11 %	6.5 %	850 cps per detector

<b>Environmental Specification</b>	
Operational temperature:	0°C to +45°C
Storage temperature:	-10°C to +50°C
Humidity:	Up to 95 % RH non condensing
IP rating:	IP 50

<b>Parameters Settings</b>	
Units:	pCi, nCi, μCi, Bq, dpm
Monitoring time:	3 to 300 s
Probability of False Alarm:	0.1 to 10 sigma
Probability of Detection:	0 to 10 sigma

<b>User Options</b>	
Language:	Various languages available
Mode of operation:	One of 5 possible monitoring processes
Quickscan:	Faster monitoring for users who are either clearly clean or clearly contaminated
Cobalt 60 alarm:	Enables the higher energy window
Show low energy:	Indicates low energy on results displayed
Changing background:	Minimum sigma that will trigger a reassessment of the background count rate
Changing conditions:	Minimum sigma that will halt monitoring and trigger a reassessment of the background
Residual contamination check:	A Residual contamination check may be undertaken after a contaminated article is removed from monitor
Sum zone selection:	Centroid selection, or 2 or 3 detector sum zone may be enabled

<b>Order Codes</b>	
PM12A-05L-E	LCD and 0.5" of lead shielding
PM12A-10L-E	LCD and 1" of lead shielding
PM12B-05L-E	No LCD and 0.5" of lead shielding
PM12B-10L-E	No LCD and 1" of lead shielding
PM12C-05L-C	LCD and 0.5" of lead shielding with inlet barrier & outlet folding door (Chinese language)
PM12C-05L-E	LCD and 0.5" of lead shielding with inlet barrier & outlet folding door (English language)

<b>Accessories</b>	
AE0215A	Calibration jig – PM12 (excluding source)
AE0216A	Camera kit – PM12
PM12 LEAD WINGS	Additional edge shielding kit
PM12 LEAD ADDIT	Extra lead kit to convert shielding from 0.5" to 1"
PM12 LEAD TOP	Extra lead shielding kit for overhead detector
A92169/C	Dongle programmed for PM12

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