

Model 53B

Personnel Beta/Gamma Portal Monitor



Ludlum Measurements, Inc.

Features

- Large plastic scintillator detectors for optimized detection efficiency
- Able to detect beta radiation on top and both sides of portal
- Fast Alarm/Fast Clean counting technology for shorter counting cycles
- Customized voice prompts - user adjusted
- Three counting modes to maximize throughput, maximize sensitivity, or fix the count time
- Four user modes: Walk-Thru, Pause, Pause-and-Turn, Front-and-Back
- Automatic background updating
- Recount and contaminated detector check options
- Individual detector and sum channel alarms
- Informative 9 in. color LCDs at ingress and egress
- PIR (Passive Infrared) sensor to sense personnel approach
- Two levels of password security
- 2.5 cm thick lead shielding (option for 5.1 cm)
- Single Board Computer (SBC) running Windows™ Operating System
- Additional USB (Universal Serial Bus) connectors to transfer information from the system, or for input of user ID etc.
- Ethernet connectivity
- Option for implementing transmission factors according to user's weight



Part Number: 48-3925

Introduction

The newly designed Model 53B Beta/Gamma Personnel Portal is used to detect beta/gamma radiation in or on personnel passing through the portal from either direction. This highly sensitive portal utilizes eight large plastic scintillation detectors and is shielded with either 2.5 cm (1 in.) (standard) or 5.1 cm (2 in.) of lead. The user-friendly interface guides personnel through the monitor via its automated voice prompts, and is accompanied with 22.9 cm (9 in.) color LCD articulating screens presenting the instrument readiness and status at the ingress and egress to the portal. Alarms are manifested audibly and visually, and can be silenced and acknowledged via control buttons located on either side of the instrument.

There are three statistical counting modes to maximize throughput, maximize sensitivity, or to fix the count time. Several parameters can be modified to adjust the alarm set point, including the false alarm probability, detection probability, background sigma coefficient (K_b), and the composite sigma coefficient (K_{S+B}). Fast alarm and clean options provide the ability to quickly determine if personnel are contaminated or clean before the entire count cycle has ended.

There are also four user modes to choose from that include a walk-through mode, a pause mode, a pause-and-turn mode, and a front-and-back mode. Voice prompts may be customized in any language for each of these modes. These prompts can, for example, dictate in-house procedures to follow. Instrument technicians have password-protected access to set up the instrument, as well as to advanced automated routines for calibrating and verifying operation.

Easily accessible USB ports facilitate connecting a keyboard to implement changes, input user ID, or upload revised software. The system additionally includes an Ethernet link. Ludlum's optional Universal network software can be used to log instrument status, user activity, and other information from one or more instruments connected to the network. This software additionally broadcasts emails whenever radiological alarms or instrument failures occur, and has the ability to capture images from network cameras that can be stored along with the user ID (if implemented).

A unique feature is an optional weight scale that assesses the weight of the individual passing through the portal and assigns an appropriate transmission factor for a more accurate beta/gamma measurement. Other options include a second 2.5 cm (1 inch) of lead shielding, a second alarm/light stack, and the Universal network software. The Model 53B detects beta radiation in addition to gamma. The detector access doors on the sides and on top have openings with metalized polyester windows to permit beta transmission. The window thickness is 1.2 mg/cm². Beta efficiency for ⁹⁰Sr/Y is ≥7% at 7.6 cm (3 in.) from the side and top detectors. It is 0% on the foot detectors where there are no openings.

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Note: specifications subject to change without notification. We are not responsible for errors or omissions.

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Specifications

INDICATED USE: beta/gamma personnel monitoring

DETECTORS: 8 identically sized plastic scintillators (3 on each side, one overhead, one under feet)

- Scintillator Type: EJ-200
- Size: 48.26 x 48.26 x 5.08 cm (19 x 19 x 2 in.) (H x W x D)
- Volume: 92668 cm³ total (5655 in³)
- Shielding: 2.5 cm (1 in.) standard, 5.1 cm (2 in.) optional

SENSITIVITY: detects 10 nCi of ¹³⁷Cs in 17 seconds and 10 nCi of ⁶⁰Co in 8 seconds (front-and-back mode) and 53 nCi of ¹³⁷Cs in a 2-second count (*static mode*). Beta efficiency for ⁹⁰Sr/Y is ≥ 7% at 7.6 cm (3 in.) from the side and top detectors. It is 0% on the foot detectors where there are no openings.

OPERATION: bi-directional

- Operating Modes: Walk-Thru, Pause, Pause-and-Turn, Front-and-Back
- Counting Modes: maximized throughput, maximized sensitivity, or fixed count time
- Status Conditions: ready, door open, clean, counting, alarm, high alarm, failure, updating background, extending background, initializing, contamination check, contaminated
- Voice Commands: can be customized to any language and in-house procedure

CONTROLS/DISPLAYS

- Displays: dual 22.9 cm (9 in.) color screen LCDs mounted to an articulating arm for optimized viewing, one on ingress, the other on the egress side
- Alarm Acknowledge: single button on the ingress/egress sides that silence and clear any alarm
- Portable Keyboard: USB plug-in keyboard with convenient mounting bracket to facilitate setup, parameter editing and calibration functions, included with instrument
- Light Stack/Audio Annunciator: green (operational), yellow (warning), red (alarm) lights display instrument status, audio output is 70–85 dB at 1 meter, mounted to either the ingress or egress sides (egress standard), a second light stack is available as an option

ELECTRONICS:

- Central Processor: Single Board Computer (SBC) running Windows™ Operating System
- Detector Signal Conditioning: Ludlum's single detector board technology located on each detector assembly
- Proximity Sensors:
 - PIR (Passive Infrared) sensor to sense personnel approach
 - Photoelectric sensor to detect personnel presence
- Interfaces:
 - USB Ports: 2 per side (ingress/egress) for connecting plug-in keyboard or user ID devices
 - Ethernet connection: supports centralized and distributed viewing of instrument operation. Optional Ludlum Universal network software connects several Ludlum instruments (including different types) to a common radiological network for performing data logging, remote alarm notification, email notification, and image capturing upon an alarm.

TEMPERATURE RANGE: 0 to 50 °C (32 to 122 °F)

POWER: 85–250 Vac, 50–60 Hz

MECHANICAL

- Construction: aluminum construction with ivory and brown powder coat
- External Dimensions: 206 x 87 x 76 cm (81 x 34.3 x 30 in.) (H x W x L), ramp extends 43.2 cm (17 in.) per side, LCD monitors protrude 12.7 cm (5 in.) per side
- Portal Inside Dimensions: 196 x 61 cm (77 x 24 in.) (H x W)
- Portal Step: 10.2 cm high (4 in.)
- Detector Doors/Covers: 15.2 mm (0.060 in.) aluminum
- Weight:
 - less lead shielding: 288 kg (635 lb)
 - 2.5 cm (1.0 in.) Pb: additional 726 kg (1600 lb)
 - 5.1 cm (2.0 in.) Pb: additional 1270 kg (2800 lb)

ALSO AVAILABLE

- Model 53: similar to Model 53B but with a foot detector, and detects gamma only (48-3784)
- Model 53-1: identical to Model 53B but with no foot detector, and detects gamma only (Part No. 48-3150)

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