



MDN455EPA/MDNR455EPA Beta/Gamma Scintillation Detector/Preamplifier Set



*MDN455EPA Scintillation
Detector/preamplifier assembly
(Calibrated, matched pair)*

FEATURES

- Automatic gain stabilization using built in LED
- Operates in pulse mode and extended range current mode
- Linear over 8+ decades
- Calibration cycles of up to two years
- Detectors are packaged in a water resistant O-ring sealed cylinder with a mu-metal shield
- Includes calibrated and matched pair PA300E preamplifier with three single channel analyzer channels

The MDN455EPA/MDNR455EPA matched pairs consist of a beta/gamma scintillation detector coupled to a PA300E preamplifier. While the MDN455EPA model utilizes a straight cable connection at the back of the detector, the MDNR455EPA utilizes a right angle connection for use in tight spaces. These factory matched and calibrated detector pairs simplify deployment in new or existing systems by eliminating the need for calibration/matching during installation.

The MDN455E beta scintillation detector consists of a plastic beta scintillator and a non-hygroscopic gamma scintillator optically coupled to a photomultiplier (PM) tube via a Lucite light pipe. A reference Light Emitting Diode (LED) and a temperature sensor are imbedded in the Lucite pipe.

This detector operates with a unique gain stabilization circuitry for temperature-compensated drift-free operation, resulting in improved accuracy and extended calibration cycles.

This detector operates in conjunction with a preamplifier, Model PA300E. The preamplifier contains circuitry that compares the LED pulses with a reference to provide closed loop feedback for automatic gain compensation. The PA300E also amplifies and shapes the detector output signal in order to provide digital pulses to the remotely located ratemeter. Procurement of matched detector/preamplifier sets is recommended to simplify field maintenance and system support. See ordering information for details.

The MDN455EPA/MDNR455EPA can be connected to multifunction control and display unit such as iR7040, ADM606, and ADM616.

MDN455EPA/MDNR455EPA Beta/Gamma Scintillation Detector/Preamplifier Set

DETECTOR

- Scintillator Type and Size –
 - Beta: Plastic – 50.8 x 0.25 mm (2 x 0.01 in.)
 - Gamma: BGO – 6.35 mm cube (1/4 in. cube)
- Nominal Detector Sensitivities –
 - In CANBERRA Particulate Sampler MAP35:
12.1 cpm/Bq (4.5×10^5 cpm/ μ Ci) for ^{137}Cs 2 in. dia. Filter paper standard source
 - In CANBERRA Noble Gas Sampler MG4A:
 7.94×10^{-4} cpm/(Bq/m³) (2.94×10^7 cpm/(μ Ci/cc))
 - In CANBERRA Reference Geometry RG-1:
21 cpm/Bq (7.8×10^5 cpm/ μ Ci) for ^{36}Cl 1 in. dia. disc source;
37.8 cpm/Bq (1.4×10^6 cpm/ μ Ci) for ^{90}Sr 1 in. dia. disc source
- Detector Effective Range –
 - Particulate: 1×10^{-1} to 1.1×10^6 Bq/m³ (2.7×10^{-12} to 2.9×10^{-5} μ Ci/cc) for ^{137}Cs
 - Noble Gas: 2×10^3 to 3.5×10^9 Bq/m³ (5.8×10^{-8} to 9×10^{-2} μ Ci/cc) for ^{133}Xe
 - Count Rate Range:
 1×10^1 to 7×10^6 cpm – Beta
 1×10^1 to 2×10^9 cpm – Gamma
- Energy Range: Above 50 keV average beta energy
- Natural Background (100 nGy/hr) in 2-inch shielding –
 - Beta: 60 cpm typical (0.1-2.5 MeV)
 - Gamma: 20 cpm typical (0.2 to 2.5 MeV)
- Photomultiplier Tube: Electron Tubes 9266B
- Detector Window Assembly: Less than 8 mg/cm²
- Detector Output: Negative Pulse
- Accuracy under Reference conditions: $\leq \pm 10\%$
- Linearity under Reference conditions: $\leq \pm 15\%$ over measurement range
- Detector Cable Assembly: Integral pigtail cable
- Typical Applications: Beta Noble Gas in Air with Gamma compensation

PHYSICAL

- Housing: Sealed Stainless Steel
- Size: 63.5 x 205 mm (2.5 x 8.08 in.) (dia. x L) straight; 63.5 x 217 mm (2.5 x 8.54 in.) (dia. x L) right angle
- Weight: 1.42 kg (3.6 lb) straight; 1.58 kg (4.0 lb) right angle

ENVIRONMENTAL

- Operating High Voltage: -700 to -1000 V Typical
- Nominal LED Background: 10 to 15 cpm
- Operating Temperature Range: -10 °C to +60 °C (+14 °F to +140 °F)
- Operating Humidity: 0 to 98% non-condensing

SPECIFICATIONS FOR PA300E

- Input Impedance: 9.1 K
- Voltage Gain: 16
- Gamma Energy Sensitivity: Approx. 1 mV per keV
- MCA Output: Positive or negative, adjustable amplitude
- Digital Output: Differential
- Operating Temperature Range: -10 °C to +55 °C (+14 °F to +131 °F)
- Energy Low Range: 50 keV to 2.55 MeV
- Housing: Sealed stainless steel box
- Size: 152.4 x 152.4 x 101.6 mm (6 x 6 x 4 in.) (L x W x H)
- Weight: 2.0 kg (4.4 lb)
- Power: ± 15 V dc
- Placement from Detector: Up to 1.8 m (6 ft)
- Placement to Ratemeter: Up to 304 m (1000 ft)

ORDERING INFORMATION

- MDN455EPA – Beta/Gamma Scintillation Detector with straight connector, matched and calibrated with PA300E Preamplifier
- MDNR455EPA – Beta/Gamma Scintillation Detector with right angle connector, matched and calibrated with PA300E Preamplifier
- MDN455E – Beta/Gamma Scintillation Detector, straight connector
- MDNR455E – Beta/Gamma Scintillation Detector, right angle connector
- PA300E – Assembly Preamplifier (Needs match-pair calibration in field)



SafePoint is a trademark and/or registered trademark of Mirion Technologies, Inc. and/or its affiliates in the United States and/or other countries.

All other trademarks are the property of their respective owners.

©2017 Mirion Technologies (Canberra), Inc. All rights reserved.

Copyright ©2017 Mirion Technologies, Inc. or its affiliates. All rights reserved. Mirion, the Mirion logo, and other trade names of Mirion products listed herein are registered trademarks or trademarks of Mirion Technologies, Inc. or its affiliates in the United States and other countries. Third party trademarks mentioned are the property of their respective owners.

CANBERRA