MIRION TECHNOLOGIES

MDN455V6PA/MDNR455V6PA Beta/Gamma Scintillation Detector/Preamplifier Set

MDN455V6PA Scintillation Detector/preamplifier assembly (Calibrated, matched pair)

FEATURES

- Automatic gain stabilization using built in LED
- Linear over 5+ decades
- Separate crystals for beta and gamma channels
- Calibration cycles of up to two years
- Detectors are packaged in a water resistant O-ring sealed cylinder with a mu-metal shield
- Operated with PA300E preamplifier with three single channel analyzer channels

The MDN455V6PA/MDNR455V6PA matched pairs consist of a beta/gamma scintillation detector coupled to a PA300E preamplifier. While the MDN455V6PA model utilizes a straight cable connection at the back of the detector, the MDNR455V6PA 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. See ordering information for details.

The MDN455V6/MDNR455V6 beta/gamma scintillation detector is composed of two scintillation crystals (BGO for gamma and plastic scintillator for beta) 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.

The MDN455V6 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 amplifies and shapes the detector output signal in order to provide digital pulses to the remotely located ratemeter. The PA300E also separates gamma and beta pulses from the composite signal by pulse shape discrimination. Procurement of matched detector/preamplifier set is recommended to simplify field maintenance and system support.

Together with its preamplifier, the MDN455V6/MDNR455V6 can be connected to multifunction control and display unit such as iR7040, ADM606 and ADM616.

MDN455V6PA/MDNR455V6PA Beta/Gamma Scintillation Detector/Preamplifier Set

DETECTOR

- Scintillator Type and Size (dia. x L) –
  - Beta: Plastic – 50.8 x 0.25 mm (2 x 0.01 in.)
  - Gamma: BGO – 47.2 x 7.87 mm (1.86 x 0.31 in.)
- Nominal Detector Sensitivities –
  - In CANBERRA Reference Geometry RG-1:
    Beta: 21 cpm/Bq (7.8 x 10^5 cpm/µCi) for ^{36}Cl 1 in. dia. disc source;
    37.8 cpm/Bq (1.4 x 10^6 cpm/µCi) for ^{90}Sr 1 in. dia. disc source
    Gamma: 5.3 cpm/Bq (2 x 10^5 cpm/µCi) for ^{133}Ba 1 in. dia. disc source
- Detector Effective Range –
  - Count Rate Range: Beta: 1 x 10^1 to 7 x 10^6 cpm; Gamma: 1 x 10^0 to 2 x 10^6 cpm
- Energy Range –
  - Beta: Above 45 keV average
  - Gamma: Above 50 keV
- Natural Background (100 ηGy/hr) with 2-inch shielding –
  - Beta: 25 cpm typical (0.1-2.5 MeV)
  - Gamma: 75 cpm typical (0.2 to 2.5 MeV)
- Photomultiplier Tube: Electron Tubes 9266B
- Detector Window Assembly: Less than 8 mg/cm^2
- Detector Output: Negative Pulse
- Accuracy under Reference conditions: ≤±10%
- Linearity under Reference conditions –
  - Beta: ≤±15% over measurement range
  - Gamma: ≤±10% over measurement range
- Detector Cable Assembly: Integral; pigtail cable
- Typical Application: Beta Particulate and/or Iodine for Air or Vent Duct

MDN455V6 detector

PHYSICAL

- Housing: Sealed Stainless Steel
- Size: 63.5 x 205 mm (2.5 x 8.1 in.) (dia. x L) straight; 63.5 x 217 mm (2.5 x 8.5 in.) (dia. x L) right angle
- Weight: 1.45 kg (3.19 lb) straight; 1.62 kg (4.11 lb) right angle

ENVIRONMENTAL

- Operating High Voltage: +500 to +800 V Typical
- Nominal LED Background: 10 to 15 cpm
- Operating Temperature Range: From -10 °C to +50 °C (+14 °F to +122 °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

- MDN455V6PA – Beta/Gamma Scintillation Detector with straight connector, matched and calibrated with PA300E Preamplifier
- MDNR455V6PA – Beta/Gamma Scintillation Detector with right angle connector, matched and calibrated with PA300E Preamplifier
- MDN455V6 – Beta/Gamma Scintillation Detector, straight connector
- MDNR455V6 – Beta/Gamma Scintillation Detector, right angle connector
- PA300E – Assembly Preamplifier (Needs match-pair calibration in field)

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