

## SD-Series Scintillation Detectors/Analyzer

**Gain Stabilized / Drift Free**

**.Net Ready**

### SD201P



The Apantec SD series detectors are scintillation based radiological detectors primarily used for process and environmental radiation monitoring systems in nuclear power plants. A separate single-channel analyzer (SCA) model SDA3E is used for pulse height analysis and biasing voltages. The detectors include a gain stabilization circuit for drift free operation. The SD series detectors include a scintillator, photomultiplier tube, mu-metal shield, and dynode chain in a cylindrical enclosure. A light emitting diode (LED) is located in the detector enclosure for automatic gain control. A temperature sensor also located within the detector provides a temperature signal for temperature compensation. The scintillation material is selected based on the process conditions and required sensitivity.

### Features

- **“Smart” probe permits rapid deployment**
- **Automatic gain stabilization for accurate readings and extended calibration cycles**
- **Mu-metal shield for protection vs. stray magnetic fields**
- **Sealed cylindrical enclosure for environmental protection**
- **Optional high temperature versions available for specialized applications**

A separate spectrum/analyzer enclosure (Model SDA3E) is located in proximity to the detector and is used to perform several functions. A closed-loop feedback control circuit in the analyzer provides automatic gain stabilization of the scintillation detector and corrects for variations in gain due to temperature, aging, and power supply drift.

The spectrum/analyzer enclosure includes controls for the SCA circuits and can be set to integrate up to three specific regions of interest when used for gamma applications, or set to operate in gross counting mode. Software algorithms are included to provide user adjustable filter time to integrate the count rate data from each ROI. The spectrum/analyzer enclosure is provided with a NEMA4 rating and is designed for mounting to a flat surface. The detector is interconnected to the SDA/analyzer enclosure using a one meter (nominal) cable.

Serial communication is used for interconnection between the SDA3E and a remote display and control unit. The interconnection cables are provided fully assembled and tested. All SD series detectors are provided fully calibrated to NIST standards.

### Gain Stabilization Benefits

The SD/SDA-series operates with a unique gain stabilization circuitry for temperature compensated drift-free operation (< 5% per year), resulting in improved accuracy and an extended 18 month calibration cycle. Inside the detector is a light emitting diode (LED) that is optically coupled to the light pipe assembly. The LED is pulsed at a known low pulse repetition rate with a known pulse width and amplitude to provide a reference signal.



The SDA3E contains circuitry that compares the LED pulses with a reference to provide closed loop feedback for automatic gain compensation, thus offsetting the effects of thermal drift and aging. A thermally compensated LED, "gain stabilization" provides distinct advantages over designs based upon the use of radioactive seeds. Radioactive seed type of scintillation detectors have more expensive crystals and must deal with disposal issues when the crystal is no longer usable. In addition, isotopes gain shift differently and are not uniform from isotope to isotope, thereby causing inaccuracies of measurement. Also, the statistical nature of the reference signal from the radioactive seed does not allow use of low count rates.

## SD-Series Detector Specifications

**Dynamic Range:** 1E+0 to 1E+7 CPM  
**Detector Accuracy:** ±15% of true field intensity.  
**Detector Linearity:** ±5%.  
**Operating Voltage:** 500 to 1500 V.  
**LED Background:** 10–15 CPM.  
**Operating Humidity:** 0–95% non-condensing.  
**Housing:** Moisture Proof  
**Weight:** 2.7 kg (5 lb).  
**Dimensions:** 2.5" dia x 12.5" length

- Automatic Gain Control
- No Radioactive Source Required
- Thermistor for Automatic Temperature Compensation
- Light Emitting Diode (LED)
- Overcomes Crystal Discoloration
- Solid State Check Source
- Extends Calibration Frequency

<u>Model</u>	<u>Crystal</u>	<u>Size</u>	<u>Radiation</u>	<u>Temperature</u>
SD201A	ZnS	2" x 0.1"	Alpha	-10 C to +50 C
SD115N	NaI	1" x 1.5"	Gamma	-10 C to +50 C
SD115L	LaBr3	1.5" x 1.5"	Gamma	-10 C to +50 C
SD220N	NaI	2" x 2"	Gamma	-10 C to +50 C
SD115NH	NaI	1" x 1.5"	Gamma	-10 C to +90 C
SD220BH	NaI	2" x 2"	Gamma	-10 C to +150 C
SD201P	NE102 plastic		Beta	-10 C to +50 C
SD201PB	NE102 plastic		Beta	-10 C to +50 C
	BGO	¼" cube	Beta/Gamma	

*Note: Other crystal sizes, crystal combinations, temperature ratings and extended range detectors are available. Please consult the factory.*

## SDA3E Specifications

### Power Requirements

Power requirements: max. 250 mA, +/-15 VDC

### SCA parameters

**Energy Range:** 100 keV to 4.00 MeV variable  
 In steps of 10 keV from keypad

**Energy Sensitivity:** 100 mV to 4.00 V approx.  
 corresponding to energy range.

**Mode:** Integral or Differential

**Window Width:** +/- 1% to +/- 90% around center Energy.

**Output Signal:** Positive pulses, 0.5 usec wide  
 Capable of driving 500 ft of cable

**Energy Nonlinearity:** +/-1% of full scale

**Accuracy:** +/-0.5% of energy setting

### LED Test Signal

**Equivalent Energy:** 6 MeV

**Background Rate:** 10 to 15 CPM

### Environmental

**Temperature:** 0 to 50 °C,

**Dimensions:** 6.25" W x 7.5" H x 5.03" D

**Weight:** 2 lbs. nominal