

Boron-10 Proportional Counter
RS-P7-0812-117

fact sheet

Fuel and Waste Assay

Advantages of the Reuter-Stokes Boron-10 proportional counter include:

- High temperature capabilities
- The low operating voltage makes a 10^8 lined counter a good choice for neutron survey meters
- High gamma flux operation with reasonable neutron sensitivity

With the correct choice of electronics, this detector is operable in a gamma flux of 10^3 R/hr with about 50% loss in neutron sensitivity. This sensitivity loss is due to the higher discriminator setting that is necessary to cut out the piled-up gamma pulses. This also cuts out the smaller neutron pulses.

Product Configurations

The detector has a sensitive length of 29.5 cm. The inner wall of the volume is coated with 10^8 as the neutron sensitive material and fill gas is selected for optimum pulse characteristics. Boron coating absorption of the reaction products limits the effective thickness of the coating, thus the neutron sensitivity. By increasing the sensitive length of the counter, the neutron sensitivity is increased.

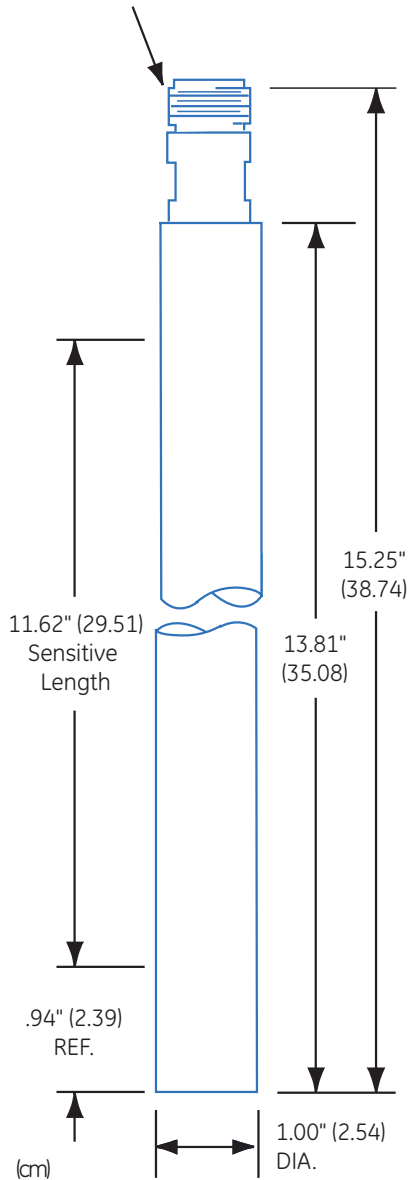
Sample Specifications

This proportional counter is a sample of one of over 10,000 neutron counter designs we have manufactured. Please contact us if your application requires modification of the specifications given here.

Typical Counting Arrangement



HN jack mates with any series HN plug such as MIL UG-59A/U



Specifications

Mechanical

- Maximum diameter: 2.62 cm
- Maximum overall length (see note 1): 39.04 cm
- Connector type: HN female
- Net weight: 0.15 kg

Material

- Outer shell 1100 Aluminum
- Connector Aluminum
- Insulation:
 - Detector: Alumina ceramic
 - Connector: Alumina ceramic
- Neutron sensitive material: Boron enriched to 92% in ^{10}B
- Fill gas:
 - Mixture: Argon – CO_2
 - Pressure: 20 cm Hg

Capacitance

- 7 pf

Resistance @ 25°C

- 10^{12} ohms (minimum)

Maximum Ratings

- Voltage: 2000 V
- Temperature: 200°C
- Operating gamma flux: 10^5 R/hr

Typical Operating Characteristics

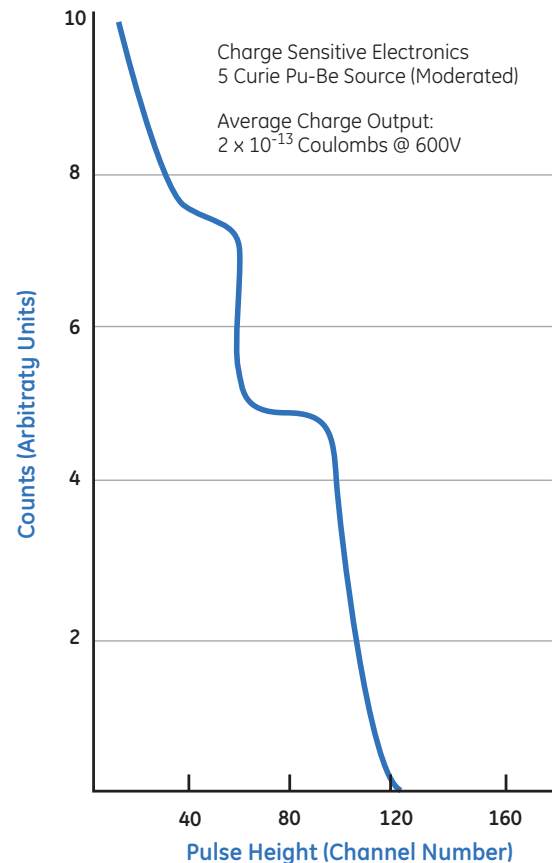
- Thermal neutron sensitivity (unperturbed)
 - in 0 R/hr: 4 cps/nv \pm 20%
 - in 103 R/hr (see note 2): \sim 2 cps/nv
- Voltage range: See plateau curve
- Charge output (average): 2×10^{-13} coulombs @ 600V

Note 1: Other sensitive lengths are available between 7 cm and 91 cm.

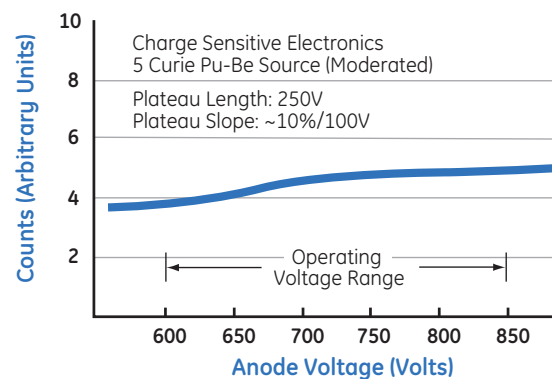
Note 2: Thermal neutron sensitivity in a gamma radiation field is dependent on clipping times used in the preamplifier and amplifier. With short clipping times, gamma discrimination is possible, although some loss of neutron sensitivity may occur.



Typical Differential Pulse Height Spectrum



Typical Plateau Curve



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