

# Boron-10 Proportional Counter

RS-B1-0824-101

## General Purpose Neutron Detector

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

- Improved Neutron Sensitivity
- The low operating voltage makes a  $^{10}\text{B}$  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 R/hr with about 10% 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.

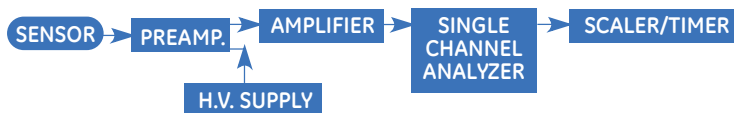
### Product Configurations

The detector has a sensitive length of 61 cm. The inner wall of the volume is coated with  $^{10}\text{B}$  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.

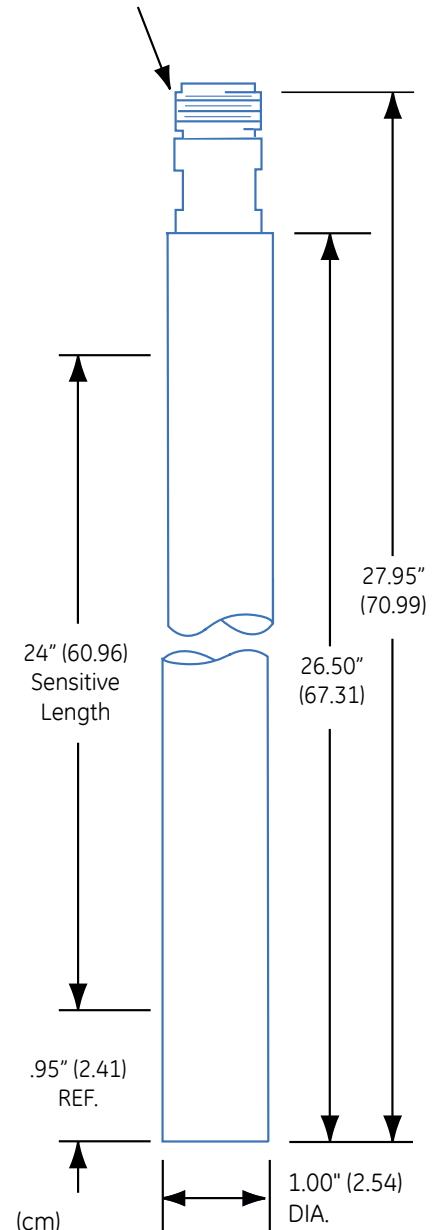
### Sample Specifications

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): 71.30 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 >90% in  $^{10}\text{B}$
- Fill gas:
  - Mixture: Argon –  $\text{CO}_2$
  - Pressure: < 1 atmosphere

## Capacitance

- 7 pf

## Resistance @ 25°C

- $10^{12}$  ohms (minimum)

## Maximum Ratings

- Voltage: 800 V
- Temperature: 55°C
- Operating gamma flux:  $10^2$  R/hr

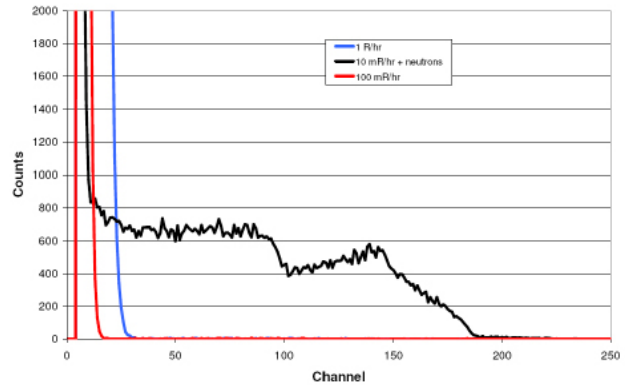
## Typical Operating Characteristics

- Thermal neutron sensitivity (unperturbed)
  - in 0 R/hr: 15.6 cps/nv  $\pm$  15%
- Voltage range: See plateau curve
- Charge output (average):  $2 \times 10^{-13}$  coulombs @ 600V

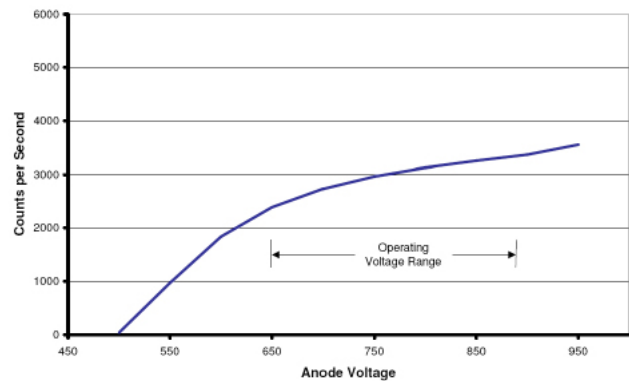
**Note 1:** Other sensitive lengths are available between 7 cm and 91 cm.

**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.

B10 Detector Gamma Ray and Mixed Neutron - Gamma Spectra



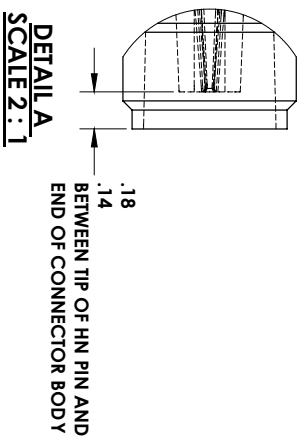
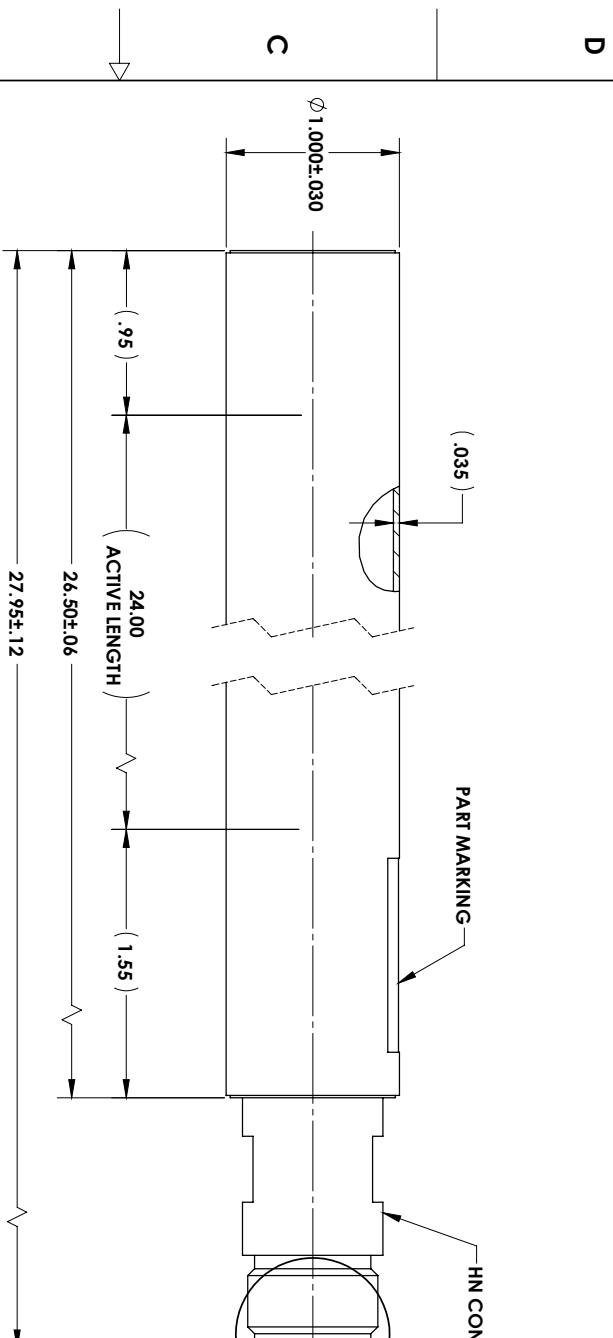
Typical Plateau Curve



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REVISIONS		APPROVED
REV.	DESCRIPTION	
NC	ECN 43840277K	.LUOMA 10/7/10



LIST OF MATERIAL OR PARTS

CONFORMING ASME Y14.5M-1994/ISO UNLESS OTHERWISE SPECIFIED	APPLIED PRACTICES	
DIMENSIONAL TOLERANCES		
X DECIMAL ± .1XXXX	.002	PREPARED
XX DECIMAL ± .01XXXX	± .0005	K.LUOMA 10/7/10
ANGULAR ± 2 SURFACE FINISH	6.3	APPROVED
FILLET	CHAMFER	
DIMENSIONS ARE IN INCHES	APPROVED	
MATERIAL		THIRD ANGLE PROJECTION
ALUMINUM CONSTRUCTION		
B-10 UNED PROPORTIONAL COUNTER		SIZE
		B
		DWG NO
		RS-B1-0824-101
		SCALE
		3:2
		REV
		NC
		SHEET
		1 OF 1

NOTES:  
1. DIMENSIONS IN PARENTHESES ARE REFERENCE AND WILL NOT BE INSPECTED AT THIS LEVEL

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# Sales Specifications

Model Number: SA- B1-0824-101

REV:

B-10 lined neutron counter

## Mechanical

Maximum diameter: ..... SEE DRAWING  
Maximum overall length: ..... SEE DRAWING  
connector Type: ..... HN

## Material

Body Material: ..... Al 1100  
Connector Material:  
Connector Insulator: .....  
Internal Insulator: ..... ALUMINA CERAMIC  
Coating Material: ..... B-10  
Primay Gas: ..... Ar  
Total Pressure: ..... 5.2 psia (0.04 MPa)

## Electrical

Resistance: ..... 1.00E+12 ohms  
Capacitance: ..... 20 pF±20%

## Maximum Ratings

Maximum Voltage: ..... 1500 volts  
Maximum Temperature: ..... 55 °C

## Operating Characteristics

Thermal neutron flux range: ..... 6.20E-03 to 3.21E+03 nv  
Thermal neutron sensitivity: ..... 15.6 cps/nv ± 15%  
Voltage Range: ..... 500 to 950 volts  
Resolution (FWHM): ..... < %  
Temperature range: ..... -40°C to 55°C

**GE**

**Measurement & Control**

8499 Darrow Road,  
Twinsburg, OH 44087



[www.ge-mcs.com](http://www.ge-mcs.com)

920-611A