Reuter-Stokes
a Baker Hughes business

Fission Counters

RS-P6-1608-110

For reactor control (source range)

The RS-P6-1608-110 is a fission counter for use in a mixed neutron and gamma flux.

It has special advantages over other source range neutron counters (BF_3 and B_{10}) in applications where the detector must operate while exposed to high gamma flux (>10^3 R/hr).

In such cases, the very large fission pulses permit discrimination against gamma pulses and pulse pile-up because of the high neutron-to-gamma signal ratio. B_{10} and BF_3 counters would experience gamma pulse pile-up to the extent that they cannot be operated satisfactorily.

An additional advantage of a fission counter in source range application is that it does not suffer the rapid lifetime degradation common to B_{10} and BF_3 counters.

In all potential applications the inherent low sensitivity (0.95 cps/nv in 0 R/hr) must be weighed against the advantage of satisfactory performance (with reduced neutron sensitivity) in a high gamma environment. In all cases of operation in a high gamma flux, performance is greatly dependent on associated electronics. High count-rate electronics are required for optimum performance.

The unit is constructed of aluminum alloy for minimum neutron absorption and residual activity. All seals are ceramic-to-metal. Insulators are high purity alumina.

Specifications

Mechanical

- Maximum diameter: 5.16 cm
- Maximum overall length: 30.66 cm
- Connectors: Type HN
- Net weight: 0.8 kg

Material

- Outer shell and inner electrodes: Aluminum
- Connector: Magnesium
- Insulation:
  - Detector: Alumina ceramic
  - Connector: Alumina ceramic
- Neutron sensitive material: Uranium enriched >93% in U-235. Total quantity U-235: 1.8 gm
- Fill gas: 76 cm Hg - Argon/Nitrogen

Capacitance 140 pf

Resistance @ 25°C: 10^9 ohms (minimum)

Maximum ratings

- Voltage: 800 volts
- Temperature: 300°C
- Burn-up life:
  For 10% decrease in sensitivity: 1.6 x 10^{20} nvt (thermal)

Specifications continued

Typical operating characteristics

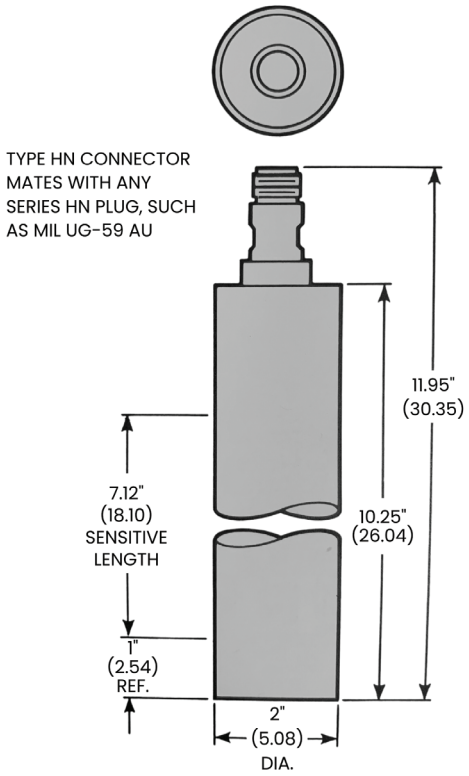
- Thermal neutron sensitivity (unperturbed): 0.95 cps/nv minimum ± 20%
- Thermal neutron flux range: to 10^{10} nv
- Voltage range: 300 to 800 Volts
- Output pulse characteristics (average):
  - Charge output: 7×10^{-14} coulombs
  - Collection time: <200 nanoseconds

NOTE: The sensitivity is measured with alpha background count rate from uranium plating <1 cps.

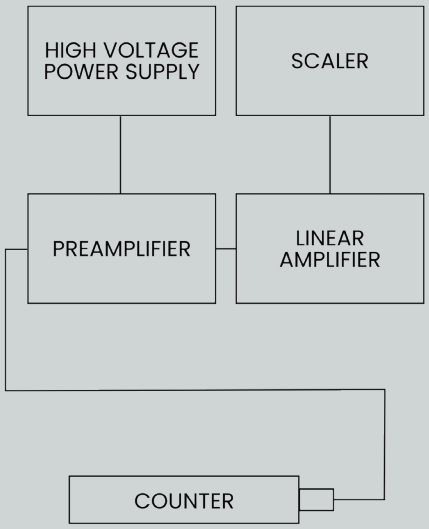
Customizable solutions

Reuter-Stokes is dedicated to providing high quality, high reliability equipment to our customers. We specialize in customizing detectors and detector assemblies to meet your specific application. This can involve dimensional, material, or performance adjustments to suit your needs.

Fission counter dimensions

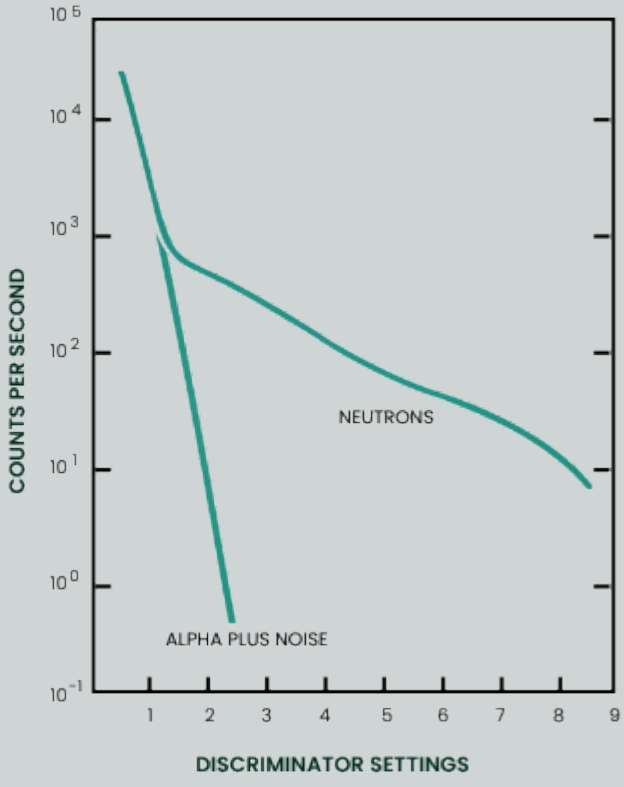


Typical connection diagram



CABLE: LOW-NOISE COAX

Integral bias curve (voltage 800 vdc)



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