

Uncompensated Ionization Chambers with Integral Cable

RS-C2B-0808-129

For reactor control (power range)

The RS-C2B-0808-129 is a boron-10 lined thermal neutron detector for reactor physics experiments and reactor control over the range 10^4 to 10^{11} nv. It is a convenient-sized detector with relatively high sensitivity.

The chamber has integral coaxial cables which position the connectors out of the high radiation/temperature/humidity environment. The chamber portion of the assembly is 1100 aluminum with ceramic-metal seals and ceramic insulators. All parts are custom fitted and the chamber is hermetically sealed.

The cable portion of the assembly consists of two 1/8-inch ceramic insulated coaxial cables, each of which terminates in a ceramic-metal seal. Cable bend radius is 45.72 centimeters and can be provided in lengths up to 30.48 meters.

After bonding, the chamber-cable assembly is vacuum baked at high temperature to assure high resistance will be obtained and maintained throughout the life of the assembly.

Because cables terminate in a vacuum-tight seal, the connectors have been designed for press fit and are removable. This simplifies the problems of reactor vessel penetration since cables can be fed out from the reactor through the shielding.

It is possible to compensate for gamma current by using two assemblies: one chamber coated and sensitive to neutrons as well as gamma rays; the other uncoated and sensitive to gamma rays only. By bucking the two output currents, neutron flux alone can be measured. The gamma sensitive model is designated RS-C2-0808-102.

Specifications

Mechanical

- Maximum chamber diameter: 2.62 cm
- Maximum chamber length: 23.09 cm
- Overall length (Note 1): 76.27 cm
- Connectors: Type MHV
- Net weight: 0.3 kg

Material

- Chamber: 1100 Aluminum
- Cables: 304 Stainless steel
- Connectors: Brass, silver plated
- Insulation:
 - Chamber: Alumina ceramic
 - Cable: Alumina ceramic
 - Connectors: Teflon
- Neutron sensitive material: Boron enriched >95% B-10
- Fill gas: 76 cm Hg - Nitrogen

Capacitance (See Note 2)

- High voltage electrode: 240 pf
- Signal electrode: 130 pf
- Per each additional foot of cable over standard length: 67 pf

Resistance @ 25°C

- High voltage electrode to shell: 10^{12} ohms (minimum)
- Signal electrode to shell: 10^{13} ohms (minimum)

Specifications continued

Maximum ratings

- Inter-electrode voltage: 1100 Volts
- Temperature (excluding connectors): 200°C
- Burn-up life:
 - or 10% decrease in sensitivity: 2.7×10^{19} nvt (thermal)
- Humidity (excluding connectors): 100%

Typical operating characteristics

- Thermal neutron sensitivity (unperturbed): 1.70×10^{-14} amps/nv $\pm 20\%$
- Gamma sensitivity: 4×10^{-12} amp/R/hr $\pm 20\%$
- Thermal neutron flux range: 10^4 to 10^{11} nv
- Voltage range: 100 to 1100 Volts

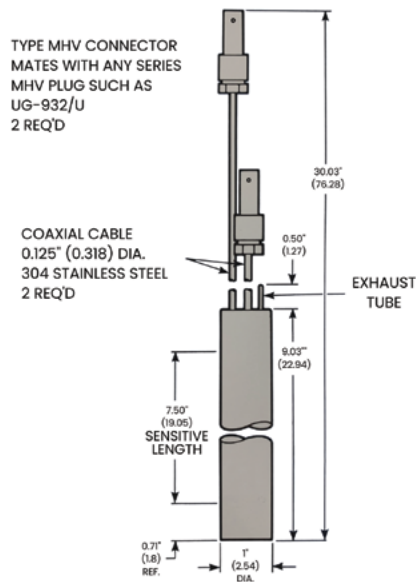
NOTE 1: Available with cable lengths to 30.5 meters.

NOTE 2: With other electrode grounded.

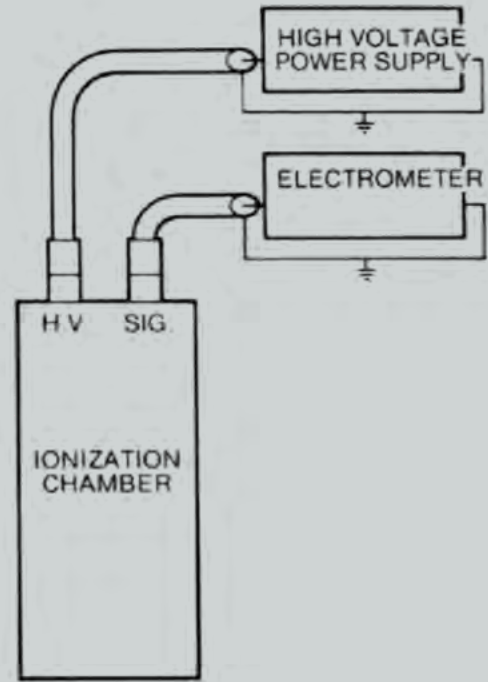
Customizable solutions

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.

Ionization chamber dimensions



Typical connection diagram



Typical saturation characteristics

