

Compensated Ionization Chambers with Integral Cable

RS-C1B-1210-135

For reactor control (intermediate/power range)

The RS-C1B-1210-135 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 high neutron sensitivity.

The chamber is of a fixed compensation design capable of achieving >97% gamma compensation.

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. The chamber is hermetically sealed.

The cable portion of the assembly consists of three 1/8-inch ceramic insulated coaxial cables, each of which terminates in a ceramic-metal seal. Cable bend radius is 6 inches and can be provided in lengths up to 50 feet.

After bonding, the chamber-cable assembly is vacuum baked at high temperature to assure that 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.

Specifications

Mechanical

- Maximum diameter (detector): 3.89 cm
- Maximum body length: 34.45 cm
- Connectors: Type MHV
- Overall length (Note 1): 462.28 cm standard
- Net weight: 2.27 kg

Material

- Outer shell: 1100 Aluminum
- Inner electrodes: 1100 Aluminum
- Inner insulation: Alumina ceramic
- Connector: Brass, silver plated
- Connector insulation: Teflon
- Cable outer sheath & center conductor: Stainless steel
- Cable insulation: Alumina ceramic
- Neutron sensitive material: Boron enriched >95% B-10
- Fill gas: 76 cm Hg - Nitrogen

Capacitance (See Note 1)

- High voltage electrode: 1100 pf
- Signal electrode: 1000 pf
- Compensating electrode: 950 pf

Resistance @ 25°C

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

Specifications continued

Maximum ratings

- Inter-electrode voltage: 800 Volts
- Temperature: 200°C
- Burn-up life:
 - for 10% decrease in sensitivity: 2.7×10^{19} nvt
- Humidity (excluding connectors): 100%

Typical operating characteristics

- Thermal neutron sensitivity (unperturbed): 3.6×10^{-14} amp/nv
- Gamma sensitivity (uncompensated): $< 5.3 \times 10^{-12}$ amp/R/hr
- Thermal neutron flux range: 10^4 to 10^{11} nv
- Voltage range: 200 to 800 Volts
- Compensating voltage range: -150 to -300 Volts

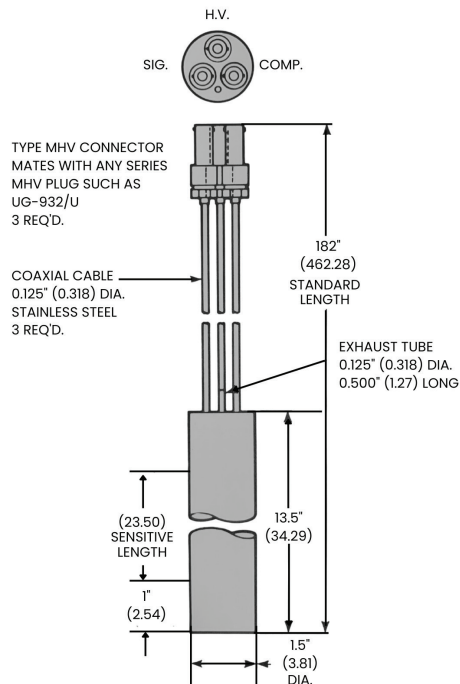
NOTE 1: Other cable lengths up to 15.2 meters are available.

NOTE 2: With other electrode grounded and with standard cable length. Capacitance of integral cable is ~200 pF/m.

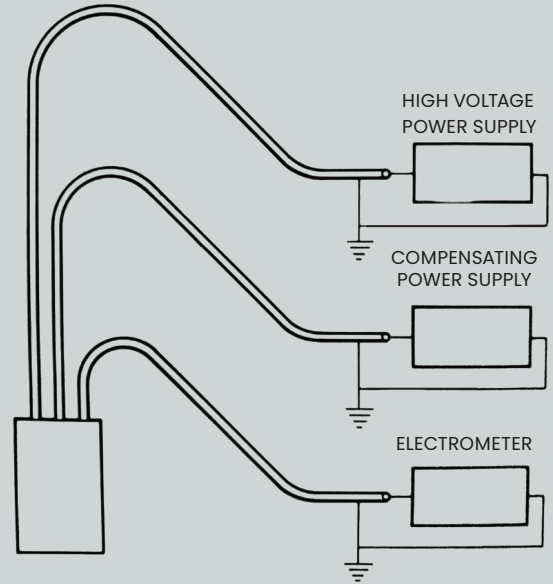
Customizable solutions

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 compensation curve

