



Fission chamber for out-of-core use

Application

- Detection of thermal neutrons in a flux range of 10 to 10¹¹ n.cm⁻².s⁻¹

Features

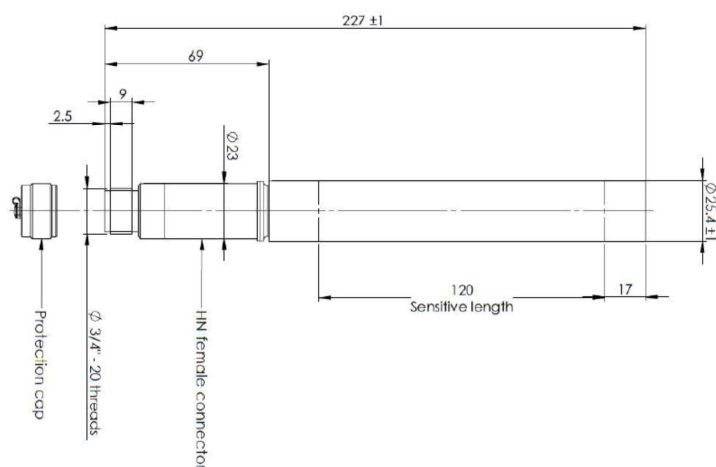
- High safety of use
- Watertight HN connector

| Nuclear characteristic | | | |
|--|-------------------------------|--------------------------------------|---|
| Sensitivity to thermal neutrons ¹ | Pulse mode | 10 ⁻¹ | c.s ⁻¹ /n.cm ⁻² .s ⁻¹ |
| | Fluctuation mode | 4x10 ⁻²⁷ | A ² .Hz ⁻¹ /n.cm ⁻² .s ⁻¹ |
| | Current mode | 10 ⁻¹⁴ | A/n.cm ⁻² .s ⁻¹ |
| Neutron flux ranges | Pulse mode ² | 10 – 10 ⁷ | n.cm ⁻² .s ⁻¹ |
| | Fluctuation mode ³ | 10 ⁵ – 3x10 ¹⁰ | n.cm ⁻² .s ⁻¹ |
| | Current mode ⁴ | 10 ⁷ - 10 ¹¹ | n.cm ⁻² .s ⁻¹ |
| Gamma sensitivity | | 10 ⁻⁹ | A/Gy.h ⁻¹ |
| Exposure limits | Thermal neutrons ⁵ | max 2x10 ¹⁹ | n.cm ⁻² |
| | Gamma exposure | max 10 ⁹ | Gy |
| | Gamma dose rate | max 10 ⁴ | Gy.h ⁻¹ |

| Electrical characteristics | | | |
|---|-------------------------|----------------------|-----|
| Insulating resistance at 600 VDC ⁶ | | min 10 ¹² | Ohm |
| Operating voltage | Nominal up to 250°C | 600 | VDC |
| | Maximum at 20°C | 800 | VDC |
| | Limit with no radiation | 1300 | VDC |
| Charge collection time ⁷ | | 50 | ns |
| Detector capacitance | | 70 | pF |

| Mechanical and physical characteristics | | |
|---|--------------------------|--------------------------------------|
| Detector | Case, electrodes | Aluminum |
| | Insulators | Al ₂ O ₃ |
| | Sensitive layer | U > 90% enriched in ²³⁵ U |
| | Filling gas ⁸ | Ar + 4% N ₂ at 250 kPa |
| Connector | Type ¹⁰ | Aluminum, watertight HN |
| | Insulator | Al ₂ O ₃ |

Outline



Notes.

- Values depending on the characteristics and the calibration of the measurement equipment. The pulse sensitivity is calculated from the (alpha, neutron) discrimination curve for a discriminating threshold corresponding to a counting rate of 0.1 c.s⁻¹.
- Pulse mode operating range for a measurement equipment with a resolution shorter than the collection time of the detector.
- Fluctuation operating range measured on equipment with a 1 to 30 kHz band pass.
- Current mode operating range: The lower limit of the current mode operating range depends on the electronics (especially on the input amplifier) and on the signal / parasitic current ratio (parasitic current = leakage current + gamma current + α -current). The upper limit is depending both on the detector and electronics (loss of linearity).
- Flux corresponding to a 1% sensitivity loss of the detector.
- For sensible fission chambers ($s > 0.1$ c.s⁻¹/n.cm⁻².s⁻¹), the α -current is predominant in relation to the leakage current from the insulators. The insulating resistance is then measured by the ratio $\Delta U/\Delta I$ of the I=f(U) curve determined without any ionizing radiation.
- Charge collection time: the measured value depends on the electronics and on the cable capacitance.
- The use of a gas mixture (Ar + N₂) increases the electron velocity and therefore favours a short collection time.
- In order to avoid humidity penetration during storage, the connector is closed with a cap to be removed just before use. As a general rule, prevent any humidity penetration at the connection level (refer to "Instructions for use and handling" in the package). Other connector types are possible on special request.

Max operating temperature of detector and cable: 250 °C

Unless otherwise stated, all characteristics are given at 20°C and dimensions in mm.