UNCOMPENSATED IONIZATION CHAMBER TYPE 8075

The 8075 is a guard-ring ionization chamber designed to detect thermal neutrons in the range from $2.5 \times 10^3$ to $2.5 \times 10^{10}$ neutrons/cm$^2$/second. The guard-ring construction combined with the use of high-purity alumina ceramics provides a design which minimizes leakage currents usually detrimental to low current operation. The detector is extremely rugged and the high alumina insulation used throughout permits operation to 300°F and minimized deterioration due to radiation damage.

The rugged construction makes the detector especially useful for Intermediate and Power range reactor instrumentation where mechanical shock and vibration present problems. The internal design provides a relatively high thermal neutron sensitivity of about $4.4 \times 10^{-14}$ amperes/neutron/cm$^2$/second in a compact device. The gamma sensitivity is approximately $5 \times 10^{-11}$ amperes/R/hour.

**MECHANICAL:**
- Maximum Diameter .................. 3-1/16 Inches
- Maximum Overall Length ............... 13-7/8 Inches
- Approximate Sensitive Length ........... 7 Inches
- Net Weight ...................... 2-1/2 Pounds
- Shipping Weight ................. 10 Pounds

**MATERIALS:**
- Outer Case .................. Aluminum
- Electrodes .................. Aluminum
- Insulation .................. Alumina Ceramic
- Neutron Sensitive Material ... Boron Enriched to 96% in B-10
- Gas Filling .................. Argon-Nitrogen Mixture

**IMPEDANCE:**
- Resistance:
  - Signal Electrode to Case (minimum) ........ $10^{11}$ Ohms
  - H.V. Electrode to Case (minimum) .......... $10^{11}$ Ohms
- Capacity:
  - Signal Electrode to Case (Note 3) ........... 250 μF
  - H.V. Electrode to Case (Note 4) ............ 170 μF

**MAXIMUM RATINGS:**
- Voltage Between Electrodes ........... 1500 Volts
- Temperature .................... 300°F
- External Pressure (Note 2) .......... 180 Pounds/Inch$^2$
- Thermal Neutron Flux ............... $10^{11}$ nV

**TYPICAL OPERATION:**
- Operating Voltage (Note 1) .......... 200 to 1000 Volts
- Saturation Characteristics .......... Figure 2
- Thermal Neutron Flux
  - Range .................. $2.5 \times 10^3$ to $2.5 \times 10^{10}$ nV
  - Thermal Neutron Sensitivity (Approx.) $4.4 \times 10^{-14}$ Amperes/nV
  - Gamma Sensitivity (Approx.) ........... $5 \times 10^{-11}$ Amperes/R/hr

1. The voltage necessary to produce saturation varies with the neutron flux level. Either polarity may be used. See Figure 2.
2. The pressurizing atmosphere must be dry and non-corrosive.
3. With H.V. electrode grounded to case.
4. With signal electrode grounded to case.
TYPICAL CONNECTION DIAGRAM

Amphenol Cable 21-467

Signal

Power Supply

FIGURE 1
TYPICAL SATURATION CHARACTERISTICS

Current in Amperes

10^{-8} 10^{-7} 10^{-6} 10^{-5} 10^{-4} 10^{-3}

7.9 \times 10^9 \text{ nv}

1.3 \times 10^9 \text{ nv}

1.7 \times 10^8 \text{ nv}

1.7 \times 10^7 \text{ nv}

1.7 \times 10^6 \text{ nv}

Applied Voltage

0 100 200 300 400 500 600 700

FIGURE 2