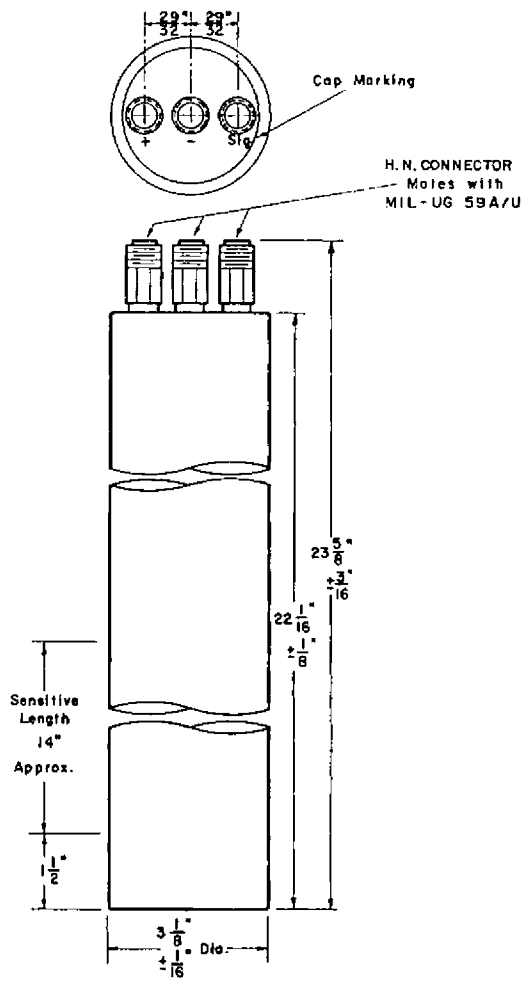
# COMPENSATED IONIZATION CHAMBER TYPE 8074

The 8074 compensated ionization chamber is designed to detect thermal neutrons in the presence of high gamma radiation fields. Provision for electrical adjustment of compensation after installation makes it particularly useful for Intermediate and Power range operation in reactor facilities where high gamma gradients are encountered. The use of stabilized polystyrene and the rugged, guard-ring design assures noise-free operation and minimizes spurious signal currents due to electrical leakage.

The use of materials of low-activation cross section minimizes handling problems and shift of characteristics during exposure. Careful design of the sensitive volumes minimizes shift in compensation characteristics over a wide range of gamma dose rates (See Figure 3).

The thermal neutron sensitivity of the 8074 is approximately $4 \times 10^{-14}$ amperes/neutron/cm$^2$/second. The gamma sensitivity, when operated uncompensated, is approximately $3 \times 10^{-11}$ amperes/R/hour. The combination of these parameters permits highly reliable operation from $2.5 \times 10^2$ to $2.5 \times 10^{10}$ neutrons/cm$^2$/second.




**MECHANICAL:**

| | | |
|---|---|---|
| Maximum Diameter | 3-3/16 | Inches |
| Maximum Overall Length | 23-13/16 | Inches |
| Approximate Sensitive Length | 14 | Inches |
| Net Weight | 5-3/8 | Pounds |
| Shipping Weight | 19 | Pounds |

**MATERIALS:**

| | |
|---|---|
| Outer Case | 3% Al, 97% Mg Alloy |
| Electrodes | 3% Al, 97% Mg Alloy |
| Insulation | Stabilized Polystyrene |
| Neutron Sensitive Material: | |
| Content | Boron enriched in B-10 |
| Thickness | 1 mg/cm$^2$ |
| Gas Filling | Nitrogen |

**IMPEDANCE:**

| | | |
|---|---|---|
| Resistance: (Note 2) | | |
| Signal Electrode to Case (Minimum) | $10^{13}$ | Ohms |
| H.V. Electrode to Case (Minimum) | $10^{12}$ | Ohms |
| Compensating Electrode to Case (Minimum) | $10^{12}$ | Ohms |
| Capacitance: (Note 1) | | |
| Signal Electrode to Case (Approx.) | 275 | μμf |
| H.V. Electrode to Case (Approx.) | 315 | μμf |
| Compensating Electrode to Case (Approx.) | 125 | μμf |

**MAXIMUM RATINGS:**

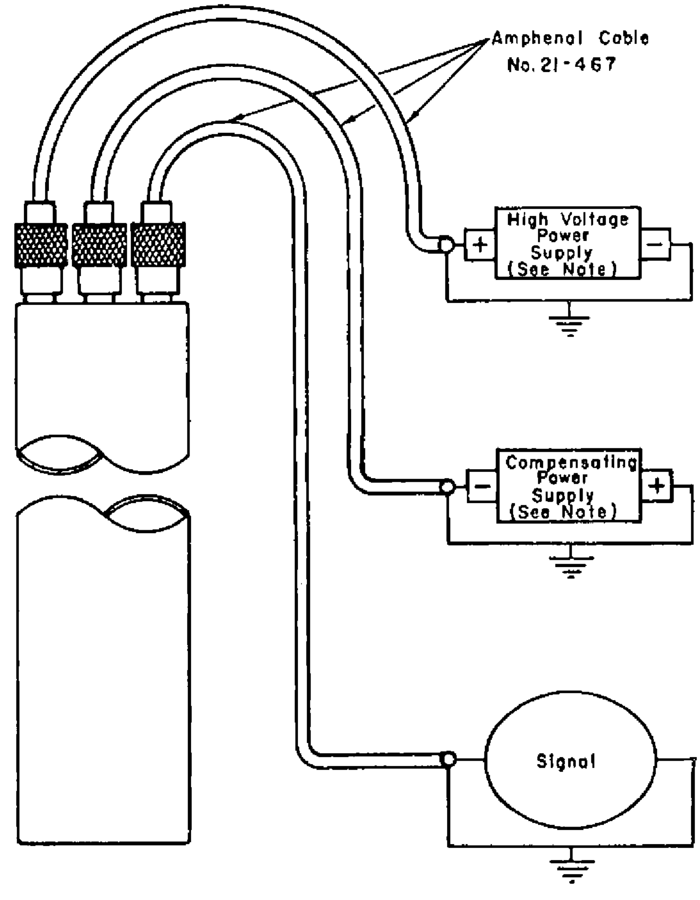
| | | |
|---|---|---|
| Voltage Between Electrodes (dc) | 1500 max. | Volts |
| Temperature | 175 max. | Degrees F |
| External Pressure (Note 3) | 180 max. | Pounds/Inch$^2$ |
| Thermal Neutron Flux | $5 \times 10^{11}$ max. | nv |

TYPICAL OPERATION:

| | | |
|---|---|---|
| Typical Connection | See Figure 1 | |
| Operating Voltage | 300 to 800 | Volts |
| Compensating Voltage (See Figure 3) | −10 to −80 | Volts |
| Saturation Characteristics | See Figure 2 | |
| Thermal Neutron Flux Range | $2.5 \times 10^2$ to $2.5 \times 10^{10}$ | nv |
| Thermal Neutron Sensitivity | $4 \times 10^{-14}$ | Amperes/nv |
| Gamma Sensitivity: | | |
| Total Compensation | | zero |
| Uncompensated | $3 \times 10^{-11}$ | Amperes/R/hour |

1. Capacitance is measured between an electrode and case, with all other electrodes grounded.
2. The detector may not be immersed directly in water, and high humidity environments should be avoided as they will impair performance.
3. The pressurizing atmosphere must be dry and non-corrosive.

TYPICAL CONNECTION DIAGRAM




Note: Permissible power supply regulation and ripple will depend upon the particular application. See Section entitled "Ionization Chamber Operation."

CE-A1324 R1

FIGURE 1

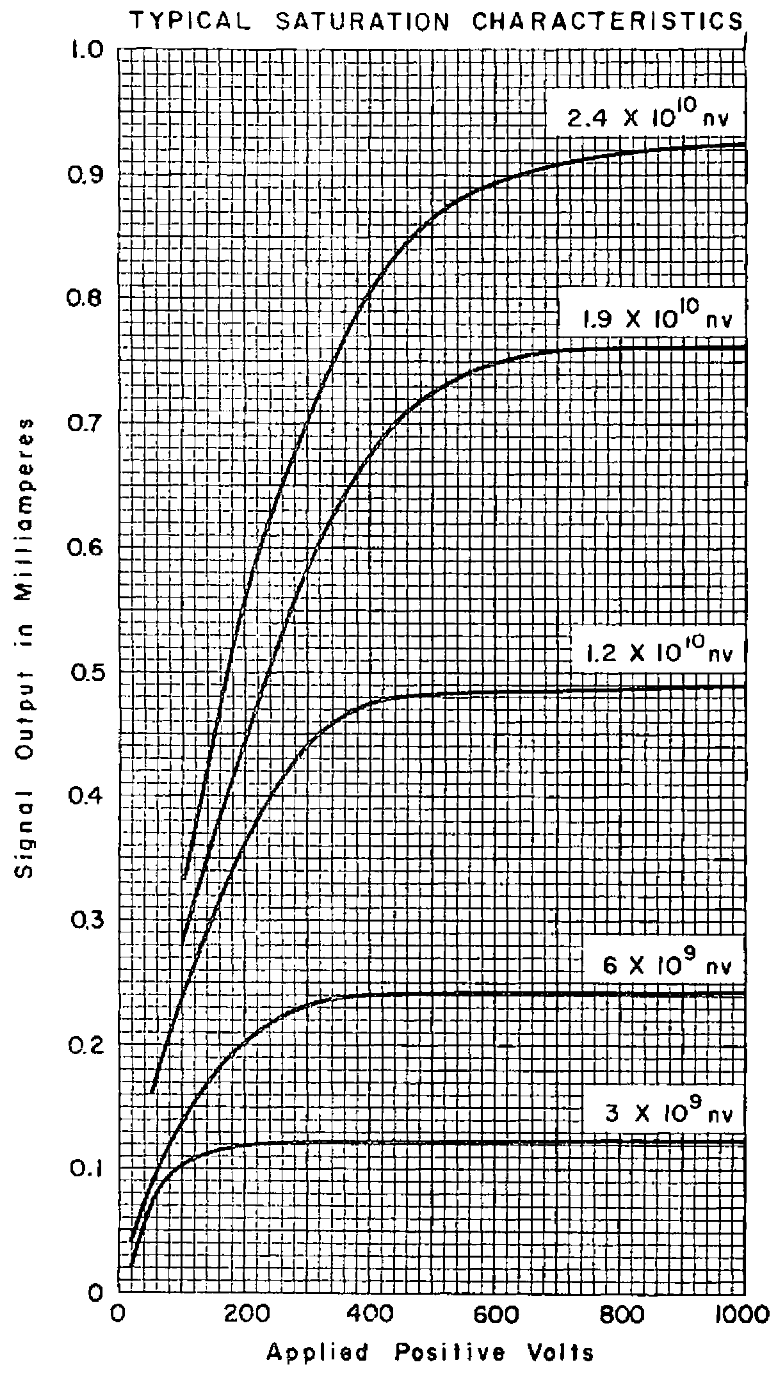



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FIGURE 2

TYPICAL COMPENSATION CHARACTERISTICS

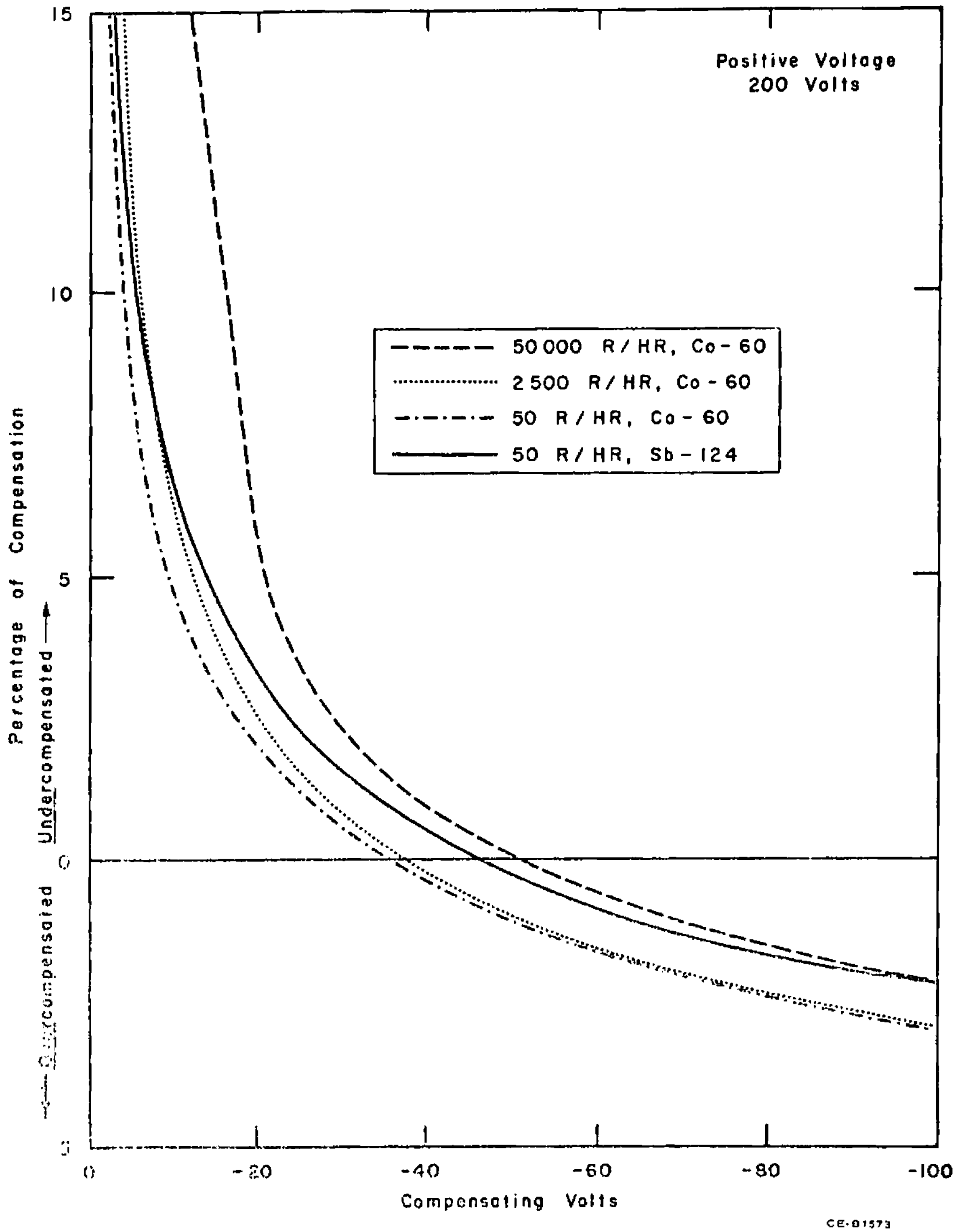


FIGURE 3