

Westinghouse

Feb. 10, 1961

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COMPENSATED IONIZATION CHAMBER TYPE 7741

The 7741 compensated ionization chamber is designed to detect thermal neutrons in the range from 2.5×10^2 to 2.5×10^{10} neutrons/cm²/second, in the presence of very high gamma radiation fields. The detector is of rugged construction, incorporating a design which allows operation at temperatures up to 500°F.

The 7741 incorporates two outstanding design features. The first is the use of a "guard ring" type of construction to minimize reduction in signal currents due to leakage through the insulators. The second is the provision for continuously variable, electrical compensation. The neutron sensitivity of the chamber is approximately 4×10^{-14} amperes/neutron/cm²/second. Gamma sensitivity is approximately 3×10^{-11} amperes/R/hr when operated uncompensated, but it is reduced to approximately 3×10^{-13} amperes/R/hr in compensated operation, thus extending the operating range two decades.

The 7741 is constructed of high purity materials to reduce the effect of induced radioactivity. The case is 1100 aluminum; the electrode of 3% aluminum, 97% magnesium alloy. Insulation is high purity alumina.

The 7741 is similar to the 6377 and 7353 in performance characteristics, differing primarily in outline dimensions and operating temperature.

MECHANICAL:

Maximum Diameter	3-3/16	Inches
Maximum Overall Length	24	Inches
Approximate Sensitive Length	14	Inches
Net Weight	6-1/2	Pounds
Shipping Weight	20	Pounds

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MATERIALS:

Outer Case	1100 Aluminum
Electrodes	3% Al, 97% Mg Alloy
Insulation	Alumina
Neutron Sensitive Material:	
Content	Boron enriched in B-10
Thickness	1 mg/cm ²
Gas Filling	Nitrogen

IMPEDANCE:

Resistance (500°F):			
Signal to Case (Minimum)	10 ⁻¹²	Ohms	
H.V. to Case (Minimum)	10 ⁻¹⁰	Ohms	
Compensating to Case (Minimum)	10 ⁻¹⁰	Ohms	
Resistance (68°F):			
Signal to Case (Minimum)	10 ⁻¹⁴	Ohms	
H.V. to Case (Minimum)	10 ⁻¹²	Ohms	
Compensating to Case (Minimum)	10 ⁻¹²	Ohms	
Capacitance: (Remaining electrodes tied to case)			
Signal to Case (Approx.)	315	uuf	
H.V. to Case (Approx.)	420	uuf	
Compensating to Case (Approx.)	200	uuf	

MAXIMUM RATINGS:

Voltage:			
H.V. to Case	1500	Vdc	
L.V. to Case	500	Vdc	
Signal to Case (for test)	500	Vdc	
Temperature:			
Operating (Max.)	500	°F	
Storage (Max.)	550	°F	
External Pressure:			
(Dry and Non-corrosive atmosphere)	180	psia	
Thermal Neutron Flux	5 x 10 ⁻¹¹	nv	

TYPICAL OPERATION:

Operating Voltage	300 to 800	Vdc
Compensating Voltage	-10 to -80	Vdc
Thermal Neutron Flux Range	2.5 x 10 ² to	
	2.5 x 10 ¹⁰	n/cm ² /sec
Thermal Neutron Sensitivity	4 x 10 ⁻¹⁴	amperes/nv
Gamma Sensitivity Uncompensated	3 x 10 ⁻¹¹	amperes/R/hr
Saturation Characteristics	See Figure	



