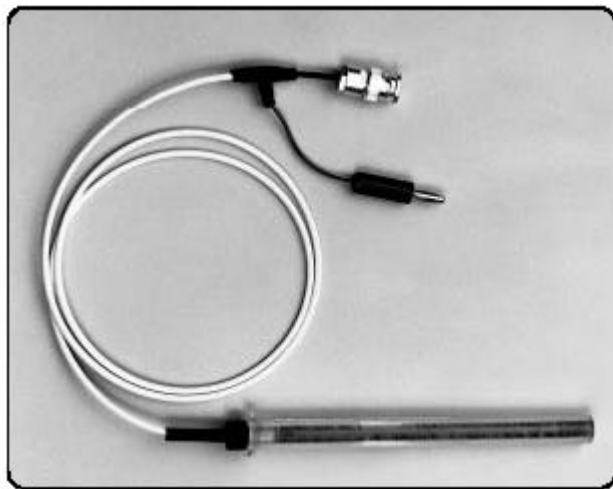




## **Victoreen Model 6000-100 and 500-100 3.2 cc CT Ion Chamber**



CT Dose Probes to calculate CT Dose Index  
3.2 cc volume over 10 cm length  
Calibrated in units of R•cm/ Coulomb

### **INTRODUCTION**

Victoreen 3.2 cc CT Probes consist of a pencil-type ionization chamber with sensitive length of 10 cm. The intended use of Victoreen CT probes, with appropriate phantoms such as the Nuclear Associates Models 76-414 and 76-415, is to measure exposure produced by computed tomography (CT) scanners. The 500-100 probe chamber has a 0.9 meter flexible, low noise cable which is terminated in a male triax BNC connector, and is designed to be used with the Victoreen Model 530 and Inovision Model 35040 Electrometers. Calibration is stated in terms of R•cm/Coulomb.

The 6000-100 probe chamber has a 0.9 meter flexible, low noise cable which is terminated in a male coax BNC connector for signal and a banana plug for bias. It is designed to be used with the Victoreen NEROTM Series Model 8000 NEROTM mAx or Model 4000M+.

## **APPLICATIONS**

It has been shown\* that in a phantom, integration of the radiation exposure profile produced by a single scan from a CT scanner along a line normal to the slice, divided by the table increment, is equal to the exposure to a central slice at that point produced by a series of scans. The line of integration must be of sufficient length to intercept not only the primary beam, but also the Compton scatter produced in the phantom. This integral is then expressed as  $R \cdot cm$ .

A long, thin radiation probe can be used to make this measurement. The probe may be calibrated in a uniform field covering its entire length, generating a correction factor in the conventional manner. Subsequent probe readings, when multiplied by the conventional correction factor, and then by the probe's sensitive length, will be in units of  $R \cdot cm$ .

Since the Victoreen 3.2 cc probes are intended mainly to be used to integrate radiation exposure profiles produced by the CT scanners, this length (10 cm) factor has, for the user's convenience, been built into the calibration.

The correction factor is stated in terms of  $R \cdot cm/Coulomb$ . In the now special case of using this probe to measure uniform field exposures in terms of  $R$ , merely divide the 50-100 correction factor by 10.

## **FEATURES**

- The Model 6000-100 and 500-100 CT Ion Chambers are standard 3.2 cc ion chambers designed to fit into conventional CT phantoms (see CT Dose Phantoms) for calculation of Computed Tomography Dose Index (CTDI) and CT Quality Assurance
- The 10 cm length makes this chamber ideal for spiral/helical and conventional CT machines

## **SPECIFICATIONS**

**Detector Type** Vented air ion chamber

**Volume** 3.2 cc

**Sensitive Length** 10.0 cm

**Chamber Material** Polystyrene

**Chamber Inside Diameter** 6.4 mm

**Chamber Wall Thickness** 54 mg/cm<sup>2</sup>

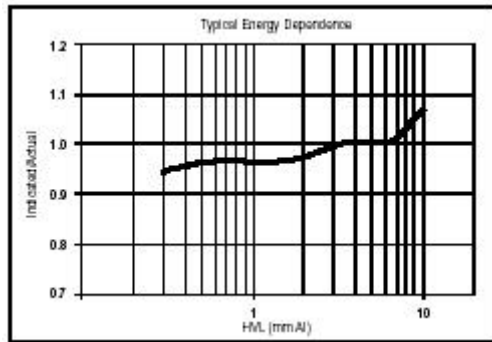
**Electrode Material** Aluminum

**Sensitivity** 10  $R \cdot cm/nC$  (nominal) or 1  $R/nC$

**Standard Calibration**

100 kVCP, 5.5 mm Al HVL (NIST Tech. M100)

**Typical Energy Dependence (phantom adapter removed)**



### Response Uniformity Along Axis

± 3% over central 90% of active length

**Beam Orientation** Normal to chamber axis

**Phantom Adaptor OD**  $1.27 \pm .04$  cm ( $.50 \pm .015$  in)

### Leakage Current

(300 V collection potential) Less than 10-13 A at 10 min. polarization time, less than 10-14 A at 2 hr polarization time

### Intensity Limits, 6000-100 & 500-100

Continuous beam: 4.86 kR/min

(1% recombination loss)

**Pulsed Beam** 51.5 mR/pulse (1% recombination loss)

**Maximum Pulse Repetition Rate** 3.3 kHz

**Cable Length** 3 ft (0.9 m)

**Operating Voltage** - 300 V

### Termination

Model 6000-100 Coax BNC for signal, Banana plug for bias

Model 500-100 Triax BNC

### CT Dose Phantoms

These CT dose phantoms were designed for use with standard CT ion chambers such as mentioned above, in accordance with the Food and Drug Administration's performance standard for diagnostic X-ray systems, which includes regulations specifically applicable to CT systems (21 CFR 1020.33). These phantoms allow the user to calculate CTDI and dose profiles:

Model 76-414 Head Dose Phantom, with 5 plugs

Model 76-415 Body Dose Phantom, with 5 plugs

Model 89-414 Carrying Case

## **PHANTOM SPECIFICATIONS**

**Material** Acrylic (PMMA)

**Thickness** 5.94 in (15 cm)

**Diameter Head Dose** 6.30 in (16 cm)

**Diameter Body Dose** 12.59 in (32 cm)

### **Arrangement**

One on center & four around periphery, 90%  
apart, 1 cm from the edge

### **Inside Hole Diameter (for plugs or probe)**

0.515 in (1.31 cm)

**Hole Plugs** 5 acrylic

**Length** 5.94 in (15 cm)

**Diameter** 0.500 in (1.3 cm)

### **Other Phantoms Available for CT Quality Assurance**

**Model 76-410 Series**, CT Performance Phantom

**Model 76-430** Mini CT QC Phantom

**Model 76-409** Spiral/Helical CT Lesion

Detectability Phantom

**Model 76-432** CT Spiral Phantom

**Model 76-412** CT-SSP (Slice Sensitivity Profile)

Point Response Phantom

**Model 84-357** Interventional Triple-Modality

3-D Abdominal Phantom

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