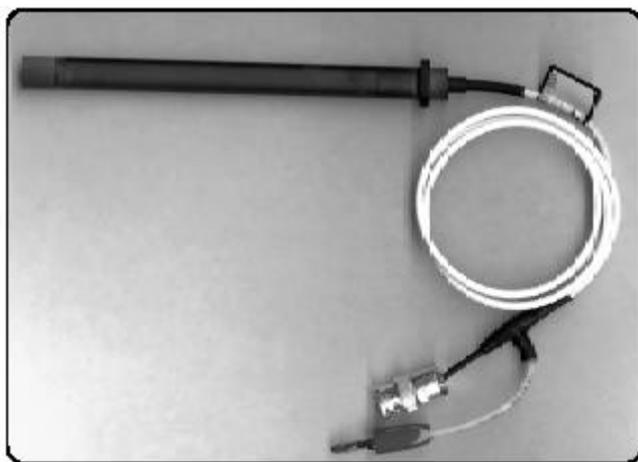




## **Victoreen Model 6000-200 and 500-200 High Sensitivity 10 cc CT Ion Chamber**



High sensitivity CT chamber designed for multislice scanners  
10 cc volume over 10 cm length chamber  
Calibrated in units of R•cm/Coulomb

### **INTRODUCTION**

Victoreen's High Sensitivity 10 cc CT Chamber consists of a pencil-type ionization chamber with sensitive length of 10 cm for computed tomography (CT) Quality Assurance. This high sensitivity 10cc CT chamber has three times the sensitivity of a standard 3.2 cc CT chamber and is designed to be used with your existing CT phantoms. This new architecture provides more stable, reproducible dose measurements for CT slices from 1 mm to 1 cm in thickness.

The 6000-200 probe 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 for use with the Model 8000 NEROTM mAx, 4000M+, NEROTM or RAD CHECKTM PLUS.

The 500-200 probe has a 0.9 meter flexible low noise triax cable which is terminated in a male triax BNC connector, and is designed for use with the Model 530, Model 35040, and other electrometer/dosimeters. Calibration is stated in terms of R•cm/nC.

### **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  $R \cdot \text{cm}$ .

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  $R \cdot \text{cm}$ .

Since the Victoreen 6000-200 and 500-200 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.

Thus, the correction factor provided is stated in terms of  $R \cdot \text{cm}/\text{Coulomb}$ .

## FEATURES

- The Model 6000-200 and 500-200 High Sensitivity CT Ion Chambers were designed for multislice scanners but still fit into the conventional CT phantoms (see CT Dose Phantoms) for calculation of Computed Tomography Dose Index (CTDI) and for CT Quality Assurance
- The 10 cc volume and 10 cm length make this chamber ideal for spiral/helical and conventional CT machines

## SPECIFICATIONS

**Detector Type** Vented air ion chamber

**Volume** 10.1 cc

**Sensitive Length** 10.0 cm

**Chamber Material** Acrylic (PMMA)

**Chamber Outside Diameter** 0.5 in (12.7 mm)

**Chamber Inside Diameter** 0.45 in (11.44 mm)

**Chamber Wall Thickness** 77 mg/cm<sup>2</sup>

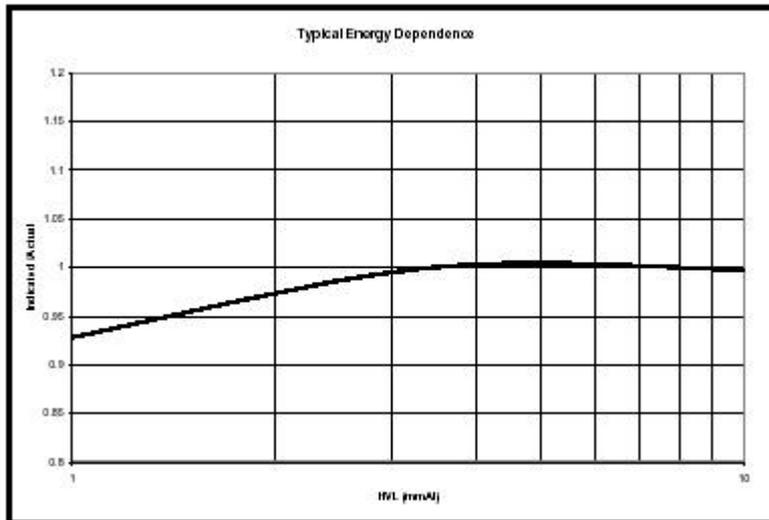
**Electrode Material** Aluminum, 1100

**Sensitivity** 3.2  $R \cdot \text{cm}/\text{nC}$  (nominal) or 0.3/nC

**Standard Calibration**

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

**Typical Energy Dependence**



### Response Uniformity Along Axis

± 3% over central 90% of active length

**Beam Orientation** Normal to chamber axis

### Leakage Current

(300 V collection potential) Less than 10-14 A at 10 min polarization time

### Intensity Limits, 6000-200/500-200

Continuous beam: 31.6 R/sec

(1% recombination loss)

**Pulsed Beam** 15.8 mR/pulse (1% recombination loss)

**Collection Time** 0.478 mSec

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

**Operating Voltage** -3 00 V

### Termination

Model 6000-200 Coax BNC for signal & banana plug for bias

Model 500-200 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 calibrate 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 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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