

X-Ray Test Device

Victoreen® Model 4000M+



- Measures kVp maximum, kVp average, kVp effective, dose and time in one exposure
- Compact, lightweight design
- Displays R or Gy
- External ion chambers for Mammo, CT, image intensifier and phototiming measurements
- Automatic exposure reset for hands-off operation
- Rechargeable Ni-Cd batteries provide more than six hours of continuous service
- RS-232 computer interface
- Storage scope output for real-time waveform display
- Reversible display for fluoro measurements

Introduction

The Victoreen® X-Ray Test Device, Model 4000M+ does it all. Simply place the instrument in the x-ray beam, make one exposure, and it serially displays kVp Maximum, kVp Average, kVp Effective, dose, and time. The Model 4000M+ then automatically resets for the next exposure. A CsI photodiode pair provide the kVp measurements through five user-selectable filter pairs. This ensures optimum accuracy over the entire diagnostic range with minimum filtration dependence. Exposure measurements are made with a parallel plate ionization chamber located above the filter wheel. Exposure time is measured with quartz crystal accuracy. Plus, a variety of external ion chambers may be connected for even greater flexibility.

Specifications

Kilovoltage

Accuracy

1 kV Mo/Mo (22 to 35 kVp)
(Mammo generators w/30 μ Mo)

Range

W/AI Tubes: 27 to 155 kVp
Mo/Mo Tubes: 21 to 50 kVp

Time

Measured during entire exposure at 90% rise/fall of waveform

Accuracy Within 2% or 2 ms, whichever is greater

Range 1 ms to 10 seconds

Exposure

Measured during entire exposure; kVp corrected

Accuracy $\pm 5\%$

Range 10 mR to 10 R

Fluoroscopic rate

Measured over one second intervals during fluoro exposure

Accuracy $\pm 5\%$

Range 0.5 to 200 R/min

Detectors

kV CsI/photodiode pair measures x-ray transmission through differential attenuators

Time Computed from kV waveform stored in memory against quartz crystal time base

Exposure Parallel plate ionization chamber

Volume 36 cm³

Window 38 mg/cm², 18.9 cm² polycarbonate

Calibration Reference to a NIST traceable voltage divider and a calibrated exposure monitor during irradiation

See next page for more specifications.

Specifications (cont)

Physical

Display 16 character dot-matrix LCD

Controls Model 4000+ Five rocker switches

On/Off Power switch

Radio/Fluoro Select radiographic or fluoro operation

High/Low Select for sensitivity

Roll Roll thru data

Exposure/All Select exposure only for external ion chamber

Mo/Mo or W/Al Select anode/filter of x-ray tube

Connectors

Power 9 VDC, 500 mA

Scope BNC for oscilloscope connection

RS-232 DB-9 connector configured as DCE. BNC and banana plug for external Ion chamber

Power requirements 9 VDC 500 mA external supply. Rechargeable internal Ni-Cd batteries supply more than six hours of continuous service with overnight charge

Dimensions 8.5 (w) x 9 (d) x 3 in (h) (21.5 x 23 x 7.6 cm)

Weight Approximately 3.5 lb (1.59 kg)

HVL set Aluminum filters: 2.3, 1.0, and 0.3 mm

Optional accessories

4000 Toolkit for Excel (Model 4000EXL)

Ultra-High Purity HVL Attenuators (Model 07-434): for mammo, set of 6

Carrying Case (Model 4000-69)

RS-232 Cable (Model 190004) 25 ft (7.6 m), 9-pin to 9-pin

External chamber accessories

Radiographic Ion Chamber, 30 cm³ (Victoreen Model 6000-528): energy response: within 7% from 30 to 150 kVp (15 to 65 keV); cable: 15 ft (4.5 m); chamber dimensions: 4 x 4 x 0.54 in thick (10.2 x 10.2 x 1.4 cm)

Mammographic Ion Chamber, 3.3 cm³ (Victoreen Model 6000-529): energy response: within 5% from 0.2 to 5.0 mm Al HVL (16 to 90 kVp); cable: 15 ft (4.5 m); chamber dimensions: 4 cm Ø x 1.5 cm thick. This chamber meets the needs of the MQSA for an external transparent chamber. Option: Probe Holder (Model 6000-529-95) for BRH2 test stand

Image Intensifier Ion Chamber, 150 cm³ (Victoreen Model 6000-530B): energy response: ± 10% from 1.8 to 10 mm Al HVL; cable: 10 ft (3.0 m); chamber dimensions: 6.26 x 8 x 0.63 in (15.9 x 20.6 x 1.6 cm)

Scatter Ion Chamber, 400 cm³ (Victoreen Model 6000-532B): energy response: ± 5% from 32 to 662 keV; cable 10 ft (3.0 m); chamber dimensions: 6.26 x 8 x 0.63 in (15.9 x 20.6 x 1.6 cm)

CT Ion Chamber, 3.2 cm³ (Victoreen Models 6000-100 and 500-100): energy response: ± 5% from 1 to 10 mm Al HVL; cable: 3 ft (0.9 m); sensitive length: 4 in (10.0 cm); chamber inside Ø: 0.25 in (6.4 mm)

CT High Sensitivity Ion Chamber, 10 cm³, for multislice CT (Victoreen Models 6000-200 and 500-200): energy response: ± 5% from 1 to 10 mm Al HVL; cable: 3 ft (0.9 m); sensitive length: 4 in (10.0 cm); chamber inside Ø: 0.45 in (11.44 mm)

Available model(s)

4000M+ X-Ray Test Device

Available AC adapters (specify with order)

Model	Description	Typical geo. region
14-301	110 VAC 9 VDC 500 mA	USA, Japan
14-399	230 VAC 9 VDC 500 mA	Europe
14-415	230 VAC 9 VDC 500 mA	UK
14-415 and 14-416 adapter	230 VAC 9 VDC 500 mA	Australia

CE Tested. Meets applicable standards.

For more information, receive our full product catalog, or order online, contact **Radiation Management Services** business of **Fluke Biomedical**: 440.248.9300 or www.flukebiomedical.com/rms.

Specifications are subject to change without notice.

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