



Specifications

Measured Quantities:

| | |
|--------------------------|---|
| kV: | measured during first 300 ms of exposure: kVp average, kVp effective, and kVp maximum |
| Accuracy: | Mo/Mo: 1 kV W/Al: 2 kV or 2% |
| Range: | tungsten anode tubes: 27 - 155 kVp molybdenum anode tubes: 21 - 50 kVp |
| Time: | measured during entire exposure; referenced to 90% rise/fall time |
| Accuracy: | within 2 ms or 2%, whichever greater |
| Range: | 1 ms to 10 s |
| Exposure: | measured during entire exposure, kVp corrected |
| Accuracy: | ±5% |
| Range: | 10 mR to 10 R |
| Fluoroscopic rate: | measured over 1 s intervals |
| Accuracy: | ±5% |
| Range: | 0.5 R/min to 200 R/min |

Detectors:

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|-----------------------|---|
| kV: | CsI/photodiode pair measures x-ray transmission through differential copper attenuator |
| Time: | computed from kV waveform stored in memory against quartz crystal time base |
| Exposure: | internal plane-parallel ionization chamber |
| Chamber volume: | 36 cc |
| Chamber window: | 38 mg/cm ² , 19 cm ² polycarbonate |
| Calibration: | referenced to a voltage divider and calibration exposure monitor during irradiation |
| Display: | 16 character dot-matrix LCD |
| Controls: | six rocker switches: On/Off - power Radio/Fluoro - select radiographic or fluoro High/Lo - select high or low detector sensitivity Roll/RST - roll through data or reset W/Al / Mo/Mo - select target/filter combination Exp/All - select exposure only or all measurements |

Connectors:

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|-------------------|--|
| Power: | accepts 9 VDC, 500 mA |
| Scope: | coaxial BNC for real-time waveform |
| RS-232: | DB9, configured as DCE |
| Signal: | coax BNC for input from external ion chamber |
| Bias: | banana jack for external chamber bias |
| Power: | 110 VAC UL-listed wall-mount transformer, rechargeable internal battery, recharges when plugged in |
| Dimensions: | 22.9 x 21.6 x 7.6 cm (9 x 8.5 x 3 in) |
| Weight: | 1.6 kg (3.5 lbs) |

Accessories

| | |
|-----------------|---|
| 303 | 3 cc mammography ion chamber |
| 6000-200 | 10 cc CT pencil-type ion chamber |
| 6000-532B | 400 cc parallel-plate ion chamber for scatter |
| 4000-69 | Carrying case |
| 4000EXL | Microsoft® Excel Add-In software |

Model 4000M+ Non-invasive X-Ray Beam Analyzer

The Victoreen 4000M+ measures kVp, exposure, and time simultaneously and non-invasively. In addition to its ability to make accurate measurements on tungsten/aluminum tubes, it is also capable of performing kVp, dose and time measurements on molybdenum anode mammography tubes. An external ion chamber connector provides an interface to a variety of external ionization chambers.

Operation of the 4000M+ is simple and straightforward. The operator simply places the instrument, with the switches set appropriately, on the x-ray table and makes the exposure. The display automatically updates, sequentially displaying the measured values. The instrument resets automatically, being instantly ready to take another exposure. Measurement data can be transferred to a personal computer using Microsoft® Excel Add-In software.

Five user-selectable filter pairs ensure optimum accuracy over the entire diagnostic range, with minimum filtration dependence. Exposure measurements are made with an integral plane-parallel ionization chamber, located above the filter wheel. Exposure time is measured with quartz crystal accuracy.

Features:

- ▶ Simultaneously measures kVp, exposure and time
- ▶ Suitable for Radiographic, Fluoro, Mammo and Dental measurement modes
- ▶ All measurements made non-invasively
- ▶ Accepts external ion chambers
- ▶ PC Interface with optional Excel Add-In software
- ▶ Waveform output

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