



ADVANCED THERAPY DOSIMETER MODEL 35040



TECHNICAL SPECIFICATIONS

- Designed for ultra long-term stability error of approximately 0.1% per five years.
- Virtually removes effects of system leakage during measurement. Uncorrected leakage $<10\text{fA}$ over temperature range.
- Maximum non-linearity variation from straight line of 0.1% for all charge and current ranges.
- Automatic exposure reset.
- Wide bias voltage range from -500V to $+500\text{V}$.
- Eleven user-defined bias settings accurate to ± 0.3 volt.
- Stores up to 32 user-entered ion chamber calibration factors.
- Displays leakage and accumulated charge.
- Displays average current and dose rate.
- Battery and line operation.
- Flexible data presentation with up to 16 user-defined screens.

- Meets all specifications within five minutes after power-on.

DESCRIPTION

The Advanced Therapy Dosimeter, Model 35040, is a reference grade instrument with superior performance in either its basic configuration or customized to user preferences. The Advanced Therapy Dosimeter exceeds the recommendations of calibration laboratories for leakage, linearity, and stability by a wide margin. The long-term stability error is designed to be less than 0.1% over five years. Non-linearity error is much less than recommended by calibration laboratories, and system current offset error is virtually nonexistent for practical measurements. The Advanced Therapy Dosimeter satisfies fundamental user requirements and provides the flexibility to customize displays and perform automatic calculations. While significantly raising the standard of measurement, the Advanced Therapy Dosimeter provides useful information that is not available from other dosimeters.

APPLICATION

The Advanced Therapy Dosimeter is used in calibration dosimetry, quality assurance, and diagnostic testing of linear accelerators. A unique electrometer design provides more accurate dose and dose rate measurements than conventional high meg resistor or capacitor feedback electrometers. The flexibility of the Advanced Therapy Dosimeter optimizes user efficiency and saves time. The Advanced Therapy Dosimeter is fully stable within five minutes, a fraction of the time of conventional dosimeters. Front panel controls select ion chamber calibration factors, enable air density correction, facilitate temperature and pressure entry, and allow bias voltage selection and display. The Advanced Therapy Dosimeter measures effective exposure time in a single exposure, thus eliminating the need for multiple exposures for Cobalt 60 and brachytherapy measurements.

User-customized and front-panel selectable display screens can simultaneously and in real time show dose, dose rate, effective exposure time, average current/rate, accumulated charge/dose, bias voltage, leakage, and other important information that ensures the validity of the measurement.

The Advanced Therapy Dosimeter's customization software allows the user to design up to 16 display screens that display internal conditions, set-up parameters, measurement values, and text information. The software allows the user to enter up to 32 ion chamber calibration factors. Users can program up to 11 bias voltages in 1/10-volt increments from -500 volts to +500 volts in any sequence and select the values from the front panel. The customization software operates with an IBM-compatible PC and connects via a RS-232 cable.

SPECIFICATIONS

DOSE AND RATE DISPLAY RANGES

Charge Full Scale	Charge Sensitivity	Current* Full Scale	Current* Sensitivity
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200.00 pC	0.01 pC	200.0 pA	0.1 pA
2.0000 nC	0.0001 nC	2.000 nA	0.001 nA
20.000 nC	0.001 nC	20.00 nA	0.01 nA
200.00 nC	0.01 nC	100.0 nA	0.1 nA
2.0000mC	0.0001mC	2.400mC	0.001mC

*Average current is displayed with ten times greater resolution.

EFFECTIVE EXPOSURE TIME RANGES

Full Scale Range	Display Resolution
59.99s	0.01s
59min, 59.9s	0.1s

STABILITY

- Designed for ultra long-term stability error of approximately 0.1% per five years.

LEAKAGE

- Virtually removes effects of total system leakage during measurement. Uncorrected leakage <10fA over temperature range.

LINEARITY

- Maximum non-linearity variation from straight line of 0.1% of all charge and current ranges.

RESOLUTION

- Resolution 0.005% of range (4-1/2 digits) for charge, dose, and average rate and average current; 0.05% of range (3-1/2 digits) for current and rate.

WARM-UP

- Fully meets specifications within five minutes of applying power.

MEASUREMENT ACCURACY

- 18°C to 28°C.
- Charge $\pm(0.20\%$ reading plus two counts).
- Current $\pm(0.20\%$ reading plus two counts).

BIAS

- Eleven user-programmable steps from -500V to +500V in 0.1-volt increments.
- Accuracy ± 0.3 volt for loads <0.2mA.
- Front panel selectable.

ION CHAMBER CALIBRATION FACTORS

- Thirty-two user-programmable calibration factors.
- Front panel selectable.

DISPLAY UNITS

- All practical radiation and electrical units.

RS-232 COMPUTER CONFIGURATION

- For customizing and data transfer.

FEATURES

The Advanced Therapy Dosimeter is unparalleled in its fundamental performance and offers exceptional features that enhance the quality of the data.

- Simultaneous measurement and optional display of dose, dose time, and dose rate, as well as display of average current/rate, accumulated charge/dose, and computed values.
- User selectable automatic computations using ion chamber calibration values and air density correction.
- Retention of last set-up upon power-down.
- Automatic power-down after user-specified time period, when operating from battery supply.
- Annunciators warn of low battery, low bias, and operational errors.
- Large capacity battery provides eight hours of continuous operation; fast recharge in less than three hours, even during operation.
- AC line operation over the range of 90VAC to 265VAC and 47Hz to 63Hz without operator intervention.
- Charge and current calibration factors entered by calibration laboratories at user's option. User entry of ion chamber calibration factors.
- Front and rear panel ion chamber connections.
- Measures in dose and rate units, as well as Curies and Becquerels units of activity.
- Automatic reset and hold of measured values between exposures.
- Front panel adjustment of exposure threshold and user disable of threshold to permit manual operation.
- Optional carrying case available.

FRONT PANEL FEATURES

Power On/Off Key: All front panel settings are stored at power-down and recalled at power-up.

Test Function Key: Sequence of screens to display firmware revision, last calibration date, leakage and current, bias voltage and battery voltage level, and charge and current calibration factors.

Detector Select Key: Up to 32 user-entered ion chamber calibration factors selected. Descriptive text, units, and calibration factors are displayed.

Air Density Key: User entry of ambient temperature and pressure; displays calculated air density correction; symbol appears on screens when air density correction is active.

Units Select Key: User selection of rate measurement time base (s, min, and hr).

Bias Select Key: User selection of up to 11 user-programmed ion chamber bias voltage settings from -500V to +500V; displays measured output bias voltage.

Reset/Measure Key: Displays measurement screen; resets displayed charge and dose measurement values to zero and re-initializes the measurement system. Up and down arrows select up to 16 user-designed measurement screens.

4-Line by 20-Character Vacuum Fluorescent Display: Provides excellent visibility in all lighting conditions.

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