

451B/451P

Ion Chamber Survey Meter with Beta Slide/ Pressurized μ R Ion Chamber Survey Meter

Technical Data



Fluke Biomedical offers two primary ion-chamber survey meters. The 451P is a pressurized ion chamber for μ R resolution and the 451B includes a sliding beta shield to serve as an equilibrium thickness for photon measurements and enables beta discrimination. Both models are auto-ranging and measure radiation rate and accumulated dose from various radiation sources (451P: x-ray and gamma; 451B: beta, x-ray, gamma). The ion chamber detector allows for a fast response time to radiation from leakage, scatter beams, and pin-holes. Additionally, the low-noise chamber bias supply provides for fast background-settling time.

The digital display features an analog bar graph, 2.5 digital readout, low battery, and freeze (peak hold) mode indicators, and an automatic backlight function. User controls consist of an ON/OFF button and a MODE button. The case is constructed of lightweight, high strength materials and is sealed against moisture.

The RS-232 interface can be connected directly to a computer for use with the Excel add-in for Windows (451EXL), enhancing the functionality of the instrument. This software allows for data retrieval, user parameter selection and provides a virtual instrument display with audible (requires sound card) and visual alarm indication.

Key features

- μ R resolution – 451P only
- Measures skin dose (slide open) and deep dose (slide closed) – 451B only
- High sensitivity measurement of rate and dose simultaneously, with the capability to record peak rate
- Auto-ranging and auto-zeroing
- RS-232 communications interface with optional Windows-based Excel add-in for data logging
- Ergonomic, anti-fatigue handle with replaceable grip, wrist strap and tripod mount
- Programmable flashing LCD display and audible alarm
- Easily-accessible battery door (operated by two 9-volt alkaline batteries) on the outside of the bottom case
- Available with dose equivalent energy response (SI units)

	451P	451B
Detector	Pressurized ion chamber (125 psi)**	Ion chamber
End users	<ul style="list-style-type: none"> • x-ray manufacturers • state inspectors • government agencies • biomedical technicians • maintenance technicians for airport baggage scanners 	<ul style="list-style-type: none"> • x-ray manufacturers • state inspectors • government agencies • police and fire departments • emergency response and HAZMAT teams • nuclear medicine labs • hospital radiation safety officers • nuclear power workers
Radiation detected	gamma, x-ray	beta, x-ray, gamma

**Due to the pressurized ion chamber, the 451P is considered U.S. Department of Transportation (DOT) Dangerous Goods and must be shipped via IAW DOT special permit DOT-SP 13187.



Technical specifications

Radiation detected

Alpha: > 7.5 MeV
 Beta: > 1 MeV (451P);
 > 100 keV (451B)
 Gamma: > 25 keV (451P);
 > 7 keV (451B)

Operating ranges, response time (451P)

0 µR/h to 500 µR/h (5 sec)
 0 mR/h to 5 mR/h (2 sec)
 0 mR/h to 50 mR/h (1.8 sec)
 0 mR/h to 500 mR/h (1.8 sec)
 0 R/h to 5 R/h (1.8 sec)

Operating ranges, response time (451B)

0 mR/h to 5 mR/h (8 sec)
 0 mR/h to 50 mR/h (2.5 sec)
 0 mR/h to 500 mR/h (2 sec)
 0 R/h to 5 R/h (2 sec)
 0 R/h to 50 R/h (2 sec)

Accuracy

Within 10 % of readings between 10 % and 100 % of full scale indication on any range, exclusive of energy response

Detector

Chamber (cc volume air ionization):
 230 cc (451P); 349 cc (451B)
 Chamber wall (phenolic):
 246 mg/cm² (451B)
 Chamber window (mylar):
 6.6 mg/cm² (451B)
 Beta slide:
 440 mg/cm² (451B)
 Controls: ON/OFF and MODE (451P)

Automatic features

Auto-zeroing, auto-ranging, and auto-backlight

Power requirements

Two 9 V alkaline, 200 hours operation

Warm-up time

Less than two minutes for initial operation when the instrument is in equilibrium with ambient temperature (451P)
 One minute (451B)

Display LCD analog/digital with backlight

Analog: 100 element bar graph 6.4 cm long. Bar graph is divided into 5 major segments, each labeled with the appropriate value for the range of the instrument.

Digital: 2.5 digit display is followed by a significant zero digit depending on the operating range of the instrument. The units of measurement are indicated on the display at all times. Digits are 6.4 mm (0.25 in) high. Low battery and freeze indicators are also provided on the display.

Modes

Integrate mode: Operates continuously 30 seconds after the instrument has been turned on. Integration is performed even if the instrument is displaying in mR/h or R/h.

Freeze mode: Will place a tick mark on the bar graph display to hold on the peak displayed value. The unit will continue to read and display current radiation values.

Environmental

Temperature range:
 -4 °F to 122 °F (451P);
 -4 °F to 158 °F (451B)
 Relative humidity:
 0 % to 100 % (451P);
 0 % to 100 % (at 140 °F) (451B)
 Geotropism:
 Negligible (451P);
 < 1 % (451B)

Typical energy dependence

¹⁶Nitrogen gamma rays are 110 % to 120 % of indicated readings as determined at the University of Lowell

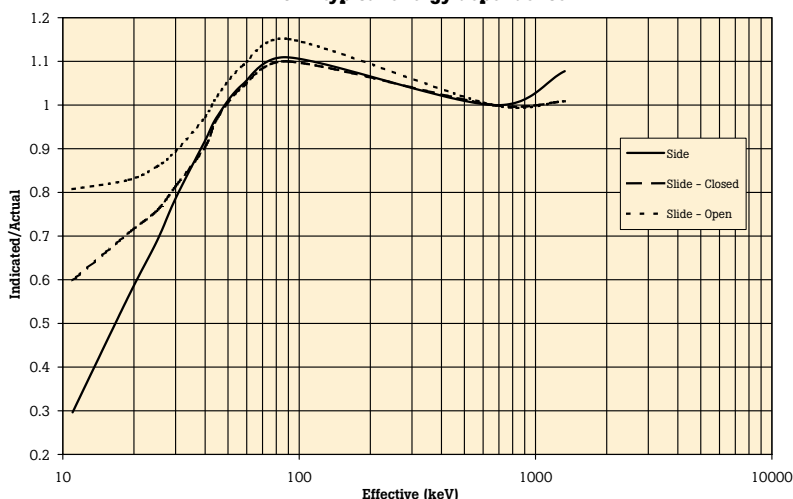
Dimensions (WxDxH)

10 cm x 20 cm x 15 cm
 (4 in x 8 in x 6 in)

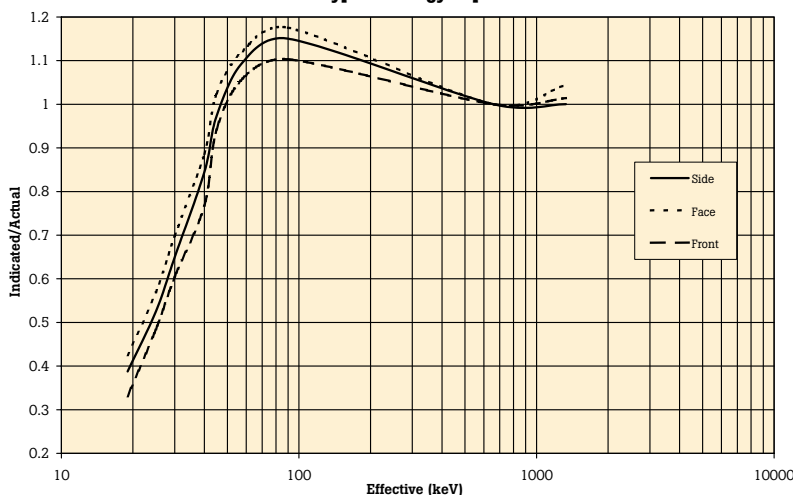
Weight

451P: 1.07 kg (2.4 lb)
 451B: 1.11 kg (2.5 lb)

451B typical energy dependence



451P typical energy dependence



Ordering Information

Models

451P-RYR Pressurized μR Ion Chamber Survey Meter with standard chamber

451B-RYR Ion Chamber Survey Meter with Beta Slide and standard chamber

451P-DE-SI-RYR Pressurized μR Ion Chamber Survey Meter with dose equivalent chamber

451B-DE-SI-RYR Ion Chamber Survey Meter with Beta Slide and dose equivalent chamber

Optional accessories

451EXL 451 Assistant for Excel, includes RS-232 interface cable

190HPS Single Unit Carrying Case

62-103 Check Source, ^{137}Cs , 10 μCi . Flat disc, 1-inch diameter

450UCS Check Source, $^{238}\text{Uranium}$, 0.064 μCi , impregnated, 2 in x 2 in yellow card

About Fluke Biomedical

Fluke Biomedical is the world's leading manufacturer of quality biomedical test and simulation products. In addition, Fluke Biomedical provides the latest medical imaging and oncology quality-assurance solutions for regulatory compliance.

Today, biomedical personnel must meet the increasing regulatory pressures, higher quality standards, and rapid technological growth, while performing their work faster and more efficiently than ever. Fluke Biomedical provides a diverse range of software and hardware tools to meet today's challenges.

Fluke Biomedical Regulatory Commitment

As a medical device manufacturer, we recognize and follow certain quality standards and certifications when developing our products. We are ISO 9001 certified and our products are:

- FDA Compliant
- CE Certified, where required
- NIST Traceable and Calibrated
- UL, CSA, ETL Certified, where required
- NRC Compliant, where required

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The accuracy you need from a company you can trust.

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