

DISTRIBUÉ PAR / DISTRIBUTED BY:



QUEBEC

164, St-Jean-Baptiste
Mercier, QC J6R 2C2
450-691-9090
info@qn.de.ca



ONTARIO

275, Sheldon Drive, Unit 3
Cambridge, ON N1T 1A3
519-894-9069
nadams@qn.de.ca

ALBERTA

7307, 50 street NW
Edmonton, AB T6B 2J9
587-689-6811
lfields@qn.de.ca

www.qn.de.ca

1-800-361-3630

FLUKE®

451B-DE-SI

Ion Chamber Survey Meter with Beta Slide

Technical Data



The 451B state-of-the-art ion chamber survey meter is a handheld battery operated unit designed for use in both rugged and normal environments. The 451B-DE-SI is ideally suited for area monitoring to insure radiation worker safety. The moveable beta shield permits measurement of Deep-Dose Equivalent ($H^*(10)$) and Shallow-Dose Equivalent ($H^*(0.07)$) exposure per United States Nuclear Regulatory Commission and International Commission on Radiation Units & Measurements definitions. The 451B auto-ranges and measures radiation rate and accumulated dose from various radiation sources (alpha, beta, x-ray, gamma). The ion chamber detector allows for a fast response time to radiation from leakage, scatter beams, and pinholes. Additionally, the low-noise chamber bias supply provides for fast background-settling time.

The digital display features an analog bar graph, 2.5 digit readout, low battery indicator, freeze (peak hold) mode indicator, 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

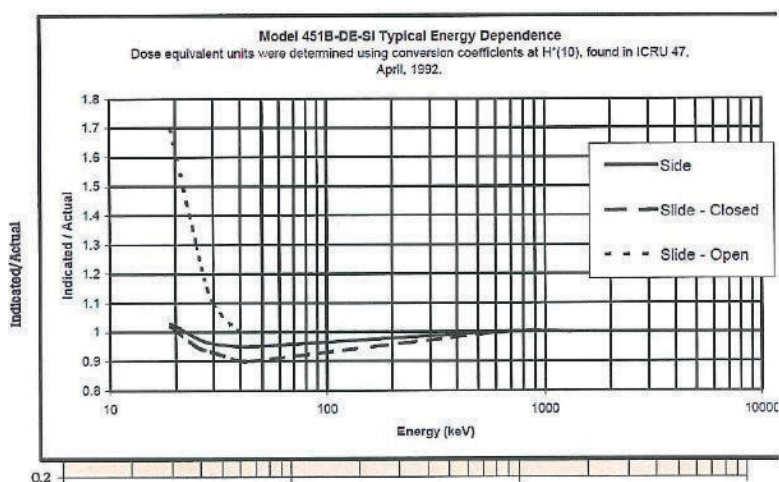
- Measures skin dose (slide open) and deep dose (slide closed)
- High sensitivity measurement of rate and dose simultaneously, with the capability to record peak rate
- Auto-ranging and auto-zeroing
- RS-232 communications interface with optional Windows-based Excel add-in for data logging
- Ergonomic,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



Specifications

Radiation detected	Alpha	> 7.5 MeV
	Beta	> 100 keV
	Gamma	> 7 keV
Operating ranges, response time	0 to 50 μSv/h (8 sec) 0 to 500 μSv/h (2.5 sec) 0 to 5 mSv/h (2 sec) 0 to 50 mSv/h (2 sec) 0 to 500 mSv/h (2 sec)	
Accuracy	Within 10 % of readings between 10 % and 100 % of full scale indication on any range, exclusive of energy response (calibration source is ¹³⁷ Cs)	
Detector	Chamber (cc volume air ionization)	349 cc
	Chamber wall (phenolic)	246 mg/cm ²
	Chamber window (mylar)	6.6 mg/cm ²
	Beta slide	440 mg/cm ²
	451B-DE-SI	In order to achieve energy response consistent with measurements of H*(10) as required by ICRU-47, aluminum has been added to the back wall, 38 % of the side wall area, and to the beta slide. With the Beta Shield open, the 451B-DE-SI can measure skin dose at 10*(0.07), and Deep Dose H*(10) with Beta Shield closed
	Controls	ON/OFF and MODE
Automatic features	Auto-zeroing, auto-ranging, and auto-backlight	
Warm-up time	One minute	
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 μSv/h or mSv/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	-20 °C to 70 °C (-4 °F to 158 °F)
	Relative humidity	0 % to 100 % non-condensing (at 140 °F)
	Geotropism	< 1 %
Typical energy dependence	¹⁶ Nitrogen gamma rays are 110 % to 120 % of indicated readings as determined at the University of Lowell	
Power requirements	Two 9 V alkaline, 200 hours operation	
Dimensions (WxDxH)	10 cm x 20 cm x 15 cm (4 in x 8 in x 6 in)	
Weight	1.11 kg (2.5 lb)	



Ordering Information

Models

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, ¹³⁷Cs, 10 µCi. Flat disc, 1-inch diameter

450UCS Check Source, ²³⁸Uranium, 0.064 µCi, impregnated, 2 in x 2 in yellow card

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QUALITY NDE LTD

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