

RaySafe Xi

Specifications



RAYSAFE Xi GENERAL

EMC TESTED	According to EN 61000-6-1:2007 and EN 61000-6-3:2007
EXPOSURE NEEDED	One
RESET	Automatic
TEMP. RANGE	15 – 35 °C (59 – 95 °F)
DETECTOR CABLE LENGTH	2 and 10 m (6.5 and 33 ft)
SOFTWARE	RaySafe Xi view for recording measured data and waveforms. RaySafe Xi view also exports data to Microsoft Excel.
DATA TRANSFER	RS-232 or Bluetooth
DATA FORMAT	XML
PATENT	Germany DE69430268.6-08, UK 0758522, Japan 3449721, Sweden 9302909-8, France 075822, USA 5761270
PTB APPROVAL	<u>23.04</u> <u>08.02</u>

RAYSAFE Xi BASE UNIT

SIZE	28 x 74 x 142 mm (1.1 x 2.9 x 5.6 in)
WEIGHT	250 g (9 oz)
POWER OFF	Never, or after 5, 20 or 60 min of inactivity
POWER SOURCE	Rechargeable 7.4 V Li-ion battery
BATTERY TIME	20 – 40 hours (depending on detector and if Bluetooth is used)
READ OUT	Three row alphanumeric backlit display with four digits numerical resolution

RAYSAFE Xi mA/mAs DETECTOR

RANGE mA	0.2 – 2000 mA
UNCERTAINTY mA	1 % or ± 0.02 mA
RANGE mAs	0.05 – 9999 mAs
UNCERTAINTY mAs	1 % or ± 0.02 mAs
MAX LOAD	< 200 mA continuously, 500 mA < 1 s, 1000 mA < 0.5 s
REPRODUCIBILITY	< 0.5 %
OVER VOLTAGE PROTECTION	70 V
EXPOSURE TIME	
RANGE	1 ms – 999 s
UNCERTAINTY	0.5 % or 0.2 ms
PULSE	
RANGE	1 – 9999 pulses
PEAK TRIG LEVEL	> 8 mA
FRAME RATE	
RANGE	1/6 – 120 frames/s
mAs PER FRAME	
RANGE	0.001 – 2000 mAs/frame
WAVEFORM	
BANDWIDTH	1 kHz
MEMORY DEPTH	1200 ms

RAYSAFE Xi R/F DETECTOR

SIZE	12 x 22 x 117 mm (0.5 x 0.9 x 4.6 in)
WEIGHT	50 g (2 oz)
DOSE (R/F LOW)	
RANGE	10 nGy – 9999 Gy (1 μ R – 9999 R)
TRIG LEVEL	100 nGy/s (0.7 mR/min)
UNCERTAINTY	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or \pm 10 nGy (1 μ R)
DOSE (R/F HIGH)	
RANGE	10 μ Gy – 9999 Gy (1 mR – 9999 R)
TRIG LEVEL	100 μ Gy/s (0.7 R/min)
UNCERTAINTY	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or \pm 10 μ Gy (1 mR)
DOSE RATE (R/F LOW)	
RANGE	10 nGy/s – 1 mGy/s (70 μ R/min – 7 R/min)
MIN. PEAK TRIG LEVEL	100 nGy/s (0.7 mR/min)
UNCERTAINTY	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or \pm 10 nGy/s (70 μ R/min)
DOSE RATE (R/F HIGH)	
RANGE	20 μ Gy/s – 1000 mGy/s ⁽²⁾ (140 mR/min – 7000 R/min)
MIN. PEAK TRIG LEVEL	100 μ Gy/s (0.7 R/min)
UNCERTAINTY	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or \pm 10 μ Gy/s (70 mR/min)
KV/KVP	
RANGE	35 – 160 kV/kVp (for up to 0.5 mm Cu or equivalent) 60 – 130 kV/kVp (for 0.5 – 1 mm Cu or equivalent)
UNCERTAINTY	2 % (for up to 0.5 mm Cu or equivalent, Active Compensation) 3 % (for 0.5 – 1 mm Cu or equivalent, Active Compensation)

SENSITIVITY (R/F LOW)	0.4 mA, 40 kV, 40 cm (15.7 in), no added filtration
SENSITIVITY (R/F HIGH)	0.8 mA, 70 kV, 50 cm (19.7 in), no added filtration
EXPOSURE TIME	
RANGE	1 ms – 999 s
UNCERTAINTY	0.5 % or 0.2 ms
PULSE	
RANGE	1 – 9999 pulses
PEAK TRIG LEVEL (R/F LOW)	> 3 μ Gy/s
PEAK TRIG LEVEL (R/F HIGH)	> 1 mGy/s
FRAME RATE	
RANGE	1/6 – 120 frames/s
DOSE PER FRAME	
RANGE	1.0 nGy – 9999 Gy (0.10 μ R – 9999 R) per frame
HVL	
RANGE	1.0 – 14.0 mm Al
UNCERTAINTY	10 % (at signal levels above 1/1000 of max dose rate for selected sensor)
TOTAL FILTRATION	
RANGE	1.5 – 35 mm Al (60 – 120 kV)
UNCERTAINTY	10 % or \pm 0.3 mm Al (at signal levels above 1/1000 of max dose rate for selected sensor)
WAVEFORM	
BANDWIDTH (R/F LOW)	0.1 kHz
BANDWIDTH (R/F HIGH)	2.5 kHz
MEMORY DEPTH	1 200 ms

⁽¹⁾ 45 mm Al added filtration at 145 kVp gives a HVL of \sim 13 mm Al.

⁽²⁾ 1000 mGy/s up to 70 kVp, 400 mGy/s at 100 kVp, 250 mGy/s at 140 kVp.

RAYSAFE Xi MAMMOGRAPHY DETECTOR

SIZE 12 x 22 x 117 mm (0.5 x 0.9 x 4.6 in)
WEIGHT 50 g (2 oz)

DOSE

BEAM QUALITIES Basic: Mo/Mo, Mo/Al, Mo/Rh, Rh/Rh, Rh/Al, W/Rh
 Options: M-Pro: W/Rh, Mo/Rh, W/Ag
 M-Pro Plus: W/Rh, Mo/Rh, W/Ag, W/Al, Combo
 Scanning: W/Al

RANGE 5 μ Gy – 9999 Gy (0.5 mR – 9999 R)

TRIG LEVEL 10 μ Gy/s (70 mR/min)

UNCERTAINTY 5 % or \pm 5 μ Gy (0.5 mR)
 (20 – 40 kV: Mo/Mo)

22 – 49 kV: Mo/Al, Rh/Rh, Rh/Al
 22 – 40 kV: Mo/Rh, W/Rh, W/Ag,
 20 – 49 kV: W/Al, Combo

0 – 2.5 mm Al added filtration,
 Active Compensation
 Combo: 0–0.1 mm Al added filtration,
 Active Compensation)

UNCERTAINTY (W/AL SCANNING) 5 % or \pm 5 μ Gy (0.5 mR)
 (22 – 40 kV, 0.5 mm Al total filtration)

DOSE RATE

RANGE 10 μ Gy/s – 100 mGy/s
 (70 mR/min – 700 R/min)

TRIG LEVEL 10 μ Gy/s (70 mR/min)

UNCERTAINTY 5 % or \pm 5 μ Gy/s (35 mR/min)
 (20 – 40 kV: Mo/Mo
 22 – 49 kV: Mo/Al, Rh/Rh, Rh/Al
 22 – 40 kV: Mo/Rh, W/Rh, W/Ag,
 20 – 49 kV: W/Al, Combo
 0 – 2.5 mm Al added filtration, Active
 Compensation
 Combo: 0–0.1 mm Al added filtration, Active
 Compensation)

UNCERTAINTY (W/AL SCANNING) 5 % or \pm 5 μ Gy/s (35 mR/min)
 (22 – 40 kV, 0.5 mm Al total filtration)

kV

BEAM QUALITIES Basic: Mo/Mo
 Options: M-Pro: Mo/Rh, W/Rh
 M-Pro Plus: Mo/Rh, W/Rh, W/Al
 Scanning: W/Al

RANGE (MO/MO) 20 – 40 kV

UNCERTAINTY (MO/MO) 2 % or 0.5 kV (no paddle)
 2 % or 0.7 kV (paddle)
 (Active Compensation for inherent Mo filtration
 of 25 – 35 μ m. User selectable paddle
 compensation.)⁽³⁾

RANGE (MO/RH) 25 – 40 kV

UNCERTAINTY (MO/RH) 2 % or 0.5 kV
 (Active Compensation for inherent Rh filtration of
 25 – 30 μ m.)

RANGE (W/RH) 20 – 40 kV

UNCERTAINTY (W/RH) 2 % or 0.5 kV (no paddle)
 2 % or 0.7 kV (paddle)
 (Active Compensation for inherent Rh filtration
 of 55 – 60 μ m. User selectable paddle
 compensation.)⁽³⁾

RANGE (W/AL) 20 – 49 kV
 (Measuring 40 – 49 kV requires an
 R/F detector)

UNCERTAINTY (W/AL) 2 % or 0.5 kV (no paddle)
 2 % or 0.7 kV (paddle)
 (Active Compensation for inherent Al filtration
 of 0.65–0.75 mm. User selectable paddle
 compensation.)⁽³⁾

RANGE (W/AL SCANNING) 20 – 40 kV

UNCERTAINTY (W/AL SCANNING) 2 % or 0.7 kV
 (0.5 mm Al total filtration)

SENSITIVITY 10 mA, 28 kV, 65 cm (25.6 in),
 no added filtration

⁽³⁾ Definition: Paddle = 0.1 mm Al

Note! Variation in paddle thickness and homogeneity may affect kV results. To achieve the most accurate result, kV measurements without paddle is recommended.

HVL

BEAM QUALITIES

Basic: Mo/Mo, Mo/Al, Mo/Rh, Rh/Rh,
Rh/Al, W/Rh

Options:

M-Pro: W/Rh, Mo/Rh, W/Ag

M-Pro Plus: W/Rh, Mo/Rh, W/Ag,
W/Al

Scanning: W/Al

RANGE

0.2 – 1.2 mm Al, depending on beam quality

UNCERTAINTY

5 %

(for up to 2.5 mm Al added filtration to each beam
quality)

RANGE

0.32 – 0.58 mm Al

(W/AL SCANNING)

UNCERTAINTY

5 %

(W/AL SCANNING)

(with 0.5 mm Al total filtration)

EXPOSURE TIME

RANGE

1 ms – 999 s

UNCERTAINTY

0.5 % or 0.2 ms

WAVEFORM

BANDWIDTH

2.4 kHz

MEMORY DEPTH

1200 ms

RAYSAFE Xi TRANSPARENT DETECTOR

SIZE	200 x 20 x 12 mm (7.9 x 0.8 x 0.5 in)
WEIGHT	40 g (1.5 oz)
DOSE	
RANGE	10 nGy – 9999 Gy (1 μ R – 9999 R)
TRIG LEVEL	1 μ Gy/s (7 mR/min)
UNCERTAINTY	5 % (60 – 150 kVp, HVL: 2 – 10 mm Al ⁽⁴⁾)
DOSE RATE	
RANGE	100 nGy/s – 20 mGy/s (0.7 mR/min – 140 R/min)
MIN. PEAK TRIG LEVEL	1 μ Gy/s (7 mR/min)
UNCERTAINTY	5 % (60 – 150 kVp, HVL: 2 – 10 mm Al ⁽⁴⁾)
EXPOSURE TIME	
RANGE	1 ms – 999 s
UNCERTAINTY	0.5 % or 0.2 ms
PULSE	
RANGE	1 – 9999 pulses
PEAK TRIG LEVEL	> 3 μ Gy/s
UNCERTAINTY	1 pulse
FRAME RATE	
RANGE	1/6 – 120 frames/s
DOSE PER FRAME	
RANGE	1.0 nGy – 9999 Gy (0.10 μ R – 9999 R) per frame

RAYSAFE Xi CT DETECTOR

SIZE	200 x 20 x 12 mm (7.9 x 0.8 x 0.5 in)
SIZE \emptyset	7.5 mm (0.30 in)
SIZE \emptyset PHANTOM ADAPTER	12.5 mm (0.49 in)
EFFECTIVE LENGTH	100 mm (3.94 in)
WEIGHT	50 g (1.75 oz)
RANGE	10 μ Gy – 9999 Gy (1 mR – 9999 R) 20 μ Gy/s – 100 mGy/s (140 mR/min – 680 R/min)
UNCERTAINTY	5 % (at reference point RQT9; 120 kV, 3.7 mm Al and 0.25 mm Cu)
ENERGY DEPENDENCE	< 5 % (at 80 kV to 150 kV; RQA, RQR and RQT qualities)
RADIAL UNIFORMITY	\pm 2 %
AXIAL UNIFORMITY	\pm 3 %, within rated length
INFLUENCE OF RELATIVE HUMIDITY	< 0.3 % (for RH < 80 %)
UNCERTAINTY IN TEMP. AND PRESSURE CORRECTION	2 %
PRESSURE RANGE	80.0 – 106.0 kPa
INTERNATIONAL STANDARD	Fulfills requirements in IEC 61674

RaySafe Xi CT detector comes with a phantom adapter to fit a standard head and/or body phantom.

⁽⁴⁾ 13 mm Al added filtration at 145 kVp gives a HVL of \sim 10 mm Al.

RAYSAFE Xi LIGHT DETECTOR

WEIGHT	170 g (6 oz)
RELATIVE AIR HUMIDITY RANGE	< 80 %
UNCERTAINTY ILLUMINANT A	3 %
DETECTOR MEMORY	30 measurements per sensor
CLASSIFICATION	Class B (according to DIN 5032, part 7)
MAX. DEVIATION FROM THE CIE CURVE FOR THE HUMAN EYE ($V(\lambda)$)	4 % (see figure Photopic Response)

SIZE

LIGHT DETECTOR	30 x 104 x 21 mm (1.2 x 4.1 x 0.83 in)
LUMINANCE TUBE	$\varnothing = 29$ mm (1.1 in) L = 84 mm (3.3 in)
SHADOW RING	$\varnothing = 50$ mm (2 in)

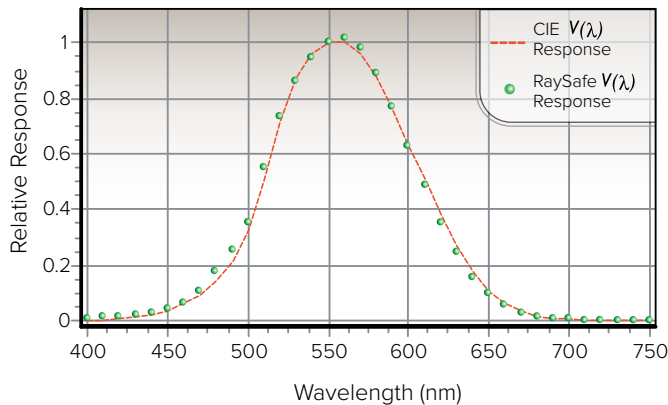
LUMINANCE

RANGE (AUTO)	0.05 – 50 000 cd/m^2
RESOLUTION	0.01 cd/m^2
LUMINANCE DETECTOR OPTICS	$\varnothing 10$ mm (0.4 in) measuring field. Contact measurement focusing lens 1:1.

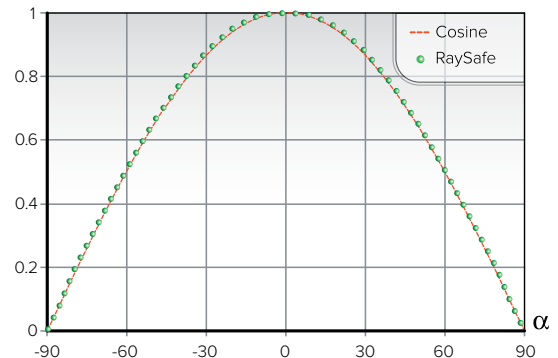
ILLUMINANCE

RANGE (AUTO)	0.05 – 50 000 lux
RESOLUTION	0.01 lux
MAX. DEVIATION FROM COSINE ANGULAR RESPONSE	1.7 % (see figure Cosine Response)

Photopic Response



Cosine Response

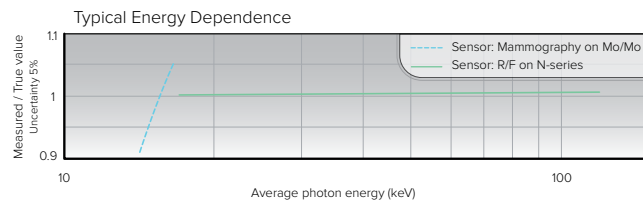


RAYSAFE Xi SURVEY DETECTOR

SIZE	13 x 66 x 175 mm (0.5 x 2.6 x 6.9 in)
DIAMETER	65 mm (2.6 in)
WEIGHT	65 g (2.3 oz)
TRIG	Manual, no threshold
AVERAGE PHOTON ENERGY	13 keV – 1.25 MeV
MINIMUM RESPONSE TIME	0.5 s
SOUND TICKER FREQUENCY	0.5 – 2000 Hz
INTERNATIONAL STANDARD	Fulfills requirements in IEC 60601-1-3
MAX. RESOLUTION	0.001 μ Sv

DOSE

RANGE	0 μ Sv – 9999 Sv (0 μ Gy – 9999 Gy) (0 nR – 9999 R)
UNCERTAINTY (MAMMOGRAPHY)	10 % (< 25 keV)



UNCERTAINTY (R/F) 10 %
(25 – 120 keV)

UNCERTAINTY (NUCLEAR MED.) 20 %
(> 120 keV)

DOSE RATE

RANGE 0 μ Sv/h – 0.15 Sv/h
(0 μ Gy/h – 0.1 Gy/h)
(0 nR/h – 11 R/h)

UNCERTAINTY (MAMMOGRAPHY) 10 % or 0,3 μ Sv/h
(> 1 μ Sv/h, < 25 keV)

UNCERTAINTY (R/F) 10 % or 0,3 μ Sv/h
(> 1 μ Sv/h, 25 – 120 keV)

UNCERTAINTY (NUCLEAR MED.) 20 % or 0,3 μ Sv/h
(> 1 μ Sv/h > 120 keV)

RAYSAFE Xi VIEW

COMPATIBLE WITH Windows 7, Windows Vista,
Windows XP, Windows 2000,
Windows 98 (Second Edition, OSR2)

FILE FORMAT XML

COMMUNICATION RS-232 (115200/8-N-1) or Bluetooth

BLUETOOTH

CONNECTOR 9-pin D-SUB, pre-configured for communication
with Xi View

OPERATING DISTANCE 100 m nominal (actual performance depends on
environment and receiving Bluetooth module)

RAYSAFE UNCERTAINTY DEFINITION

The expanded uncertainty is stated as the combined uncertainty of measurement multiplied by the coverage factor $k=2$, which assuming a normal distribution has a coverage probability of 95 % (complies with GUM by ISO (1995, ISBN 92-67-10188-9)).

*Instrument specifications are subject to purchased configuration.
All specifications may change without notice.*