



Unfors Xi General

EMC tested	According to EN 61000-6-1:2001 and EN 6100-6-3:2001
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	Unfors Xi View for recording measured data and waveforms. Unfors 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	23.04 08.02

Unfors 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	Automatic after 5, 20 or 60 min of inactivity
Power source	Rechargeable NiMH standard 9 V
Battery time	10 – 20 hours (depending on detector and if Bluetooth is used)
Read out	Three row alphanumeric backlit display with four digits numerical resolution

Unfors 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 µR – 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 ± 10 nGy (1 µR)

Dose (R/F high)

Range	10 µGy – 9999 Gy (1 mR – 9999 R)
Trig level	100 µGy/s (0.7 R/min)
Uncertainty	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or ± 10 µGy (1 mR)

Dose rate (R/F low)

Range	10 nGy/s – 1 mGy/s (70 µR/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 ± 10 nGy/s (70 µR/min)

Dose rate (R/F high)

Range	20 µGy/s – 1000 mGy/s ⁽²⁾ (140 mR/min – 7000 R/min)
Min. peak trig level	100 µGy/s (0.7 R/min)
Uncertainty	5 % (40 – 150 kVp, HVL: 1.5 – 14 mm Al ⁽¹⁾ , Active Compensation) or ± 10 µGy/s (70 mR/min)

kV/kVp

Range	35 – 160 kV/kVp
Uncertainty	2 % (for total filtrations from 2.5 mm Al up to 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 µGy/s
Peak trig level (R/F high)	> 1 mGy/s

Unfors 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)).

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

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

Unfors Xi R/F Detector – continued

Frame rate

Range 1/6 – 120 frames/s

Dose per frame

Range 1.0 nGy – 9999 Gy (0.10 µR – 9999 R) per frame

HVL

Range 1.0 – 14.0 mm Al
Uncertainty 10 % or ± 0.2 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

Unfors 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
M-Pro option: W/Rh, Mo/Rh, W/Ag
Scanning mammo option: W/Al
Range 5 µGy – 9999 Gy (0.5 mR – 9999 R)
Trig level 10 µGy/s (70 mR/min)
Uncertainty 5 %
(22 – 40 kV (Mo/Mo: 20 – 40kV), 0 – 2.5 mm Al added filtration, Active Compensation) or ± 5 µGy (0.5 mR)
Uncertainty (W/Al) 5 %
(22 – 40 kV, 0.5 mm Al total filtration) or ± 5 µGy (0.5 mR)

Dose rate

Range 10 µGy/s – 100 mGy/s (70 mR/min – 700 R/min)
Trig level 10 µGy/s (70 mR/min)
Uncertainty 5 %
(22 – 40 kV (Mo/Mo: 20 – 40kV) and for HVL up to 2.5 mm Al added filtration, Active Compensation) ± 5 µGy/s (35 mR/min)
Uncertainty (W/Al) 5 %
(22 – 40 kV + 0.5 mm Al total filtration) or ± 5 µGy/s (35 mR/min)

kV

Beam qualities Basic: Mo/Mo
M-Pro option: Mo/Rh, W/Rh
Scanning mammo option: W/Al
Range (Mo/Mo) 20 – 40 kV
Uncertainty (Mo/Mo) 2 % or 0.7 kV
(Active Compensation for inherent Mo filtration of 25 – 35 µm. User selectable paddle compensation.)
Range 22 – 40 kV
Uncertainty (Mo/Rh) 2 % or 0.7 kV
(Active Compensation for inherent Rh filtration of 25 – 30 µm. User selectable paddle compensation.)
Uncertainty (W/Rh) 2 % or 0.7 kV
(Active Compensation for paddle or no paddle and for inherent Rh filtration of 55 – 60 µm.)
Uncertainty (W/Al) 2 % or 0.7 kV
(0.5 mm Al total filtration)
Sensitivity 10 mA, 28 kV, 65 cm (25.6 in), no added filtration

Exposure time

Range 1 ms – 999 s
Uncertainty 0.5 % or 0.2 ms

HVL

Beam qualities Basic: Mo/Mo, Mo/Al, Mo/Rh, Rh/Rh, Rh/Al, W/Rh
M-Pro option: W/Rh, Mo/Rh, W/Ag
Scanning mammo option: 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 (W/Al) 0.32 – 0.58 mm Al
Uncertainty (W/Al) 5 %
(with 0.5 mm Al total filtration)

Waveform

Bandwidth 0.3 kHz
Memory depth 1200 ms

Unfors Xi CT Detector

Unfors Xi Base Unit firmware	4.0 or higher
Size detector	200 x 20 x 12 mm (7.9 x 0.8 x 0.5 in)
Size \varnothing detector	7.5 mm (0.30 in)
Size \varnothing 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 RQA9; 120 kV, 42.5 mm Al)
Energy dependence	< 5 % (at 80 kV to 150 kV; RQR and RQA 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

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

Unfors Xi Light Detector

Unfors Xi Base Unit firmware	4.05 or higher
Weight	170 g (6 oz)
Relative air humidity range	< 80 %
Calibration uncertainty	2 % (Illuminant A)
Calibration traceability	Unfors Light detector is calibrated to international traceable standards (NIST, PTB).
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)

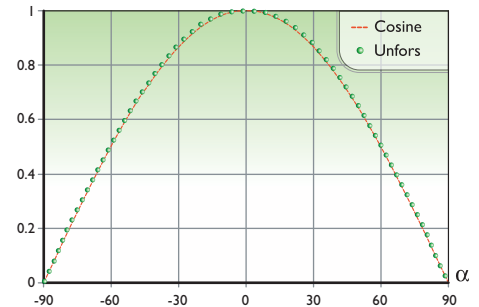
Luminance

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.

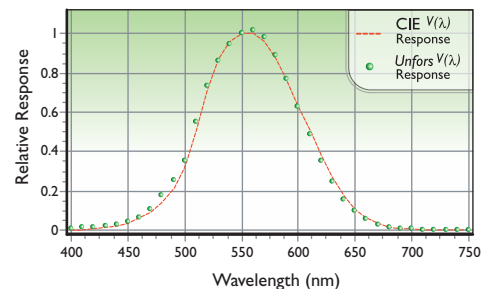
Illuminance

Range (auto)	0.05 – 50 000 lux
Resolution	0.01 lux
Max. deviation from cosine angular response	1.7 % (see figure Cosine Response)

Cosine Response



Photopic Response



Unfors Xi Survey Detector

Unfors Xi Base Unit firmware	5.0 or higher
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
Response time	0.5 – 5 s
Sound ticker frequency	0.5 – 512 Hz
International standard	Fulfills requirements in IEC 601-1-3
Max. resolution	0.001 nGy

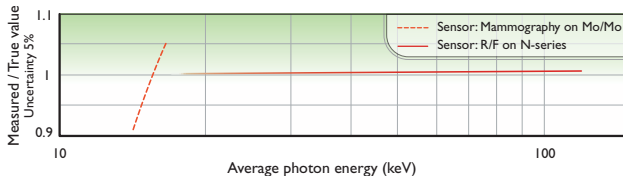
Dose

Range	0 nGy – 9999 Gy (0 nR – 9999 R) (0 nSv – 9999 Sv)
Uncertainty (Mammography)	10 % (> 1 nGy, < 25 keV)
Uncertainty (R/F)	10 % (> 1 nGy, 25 – 120 keV)
Uncertainty (Nuclear Med.)	20 % (> 1 nGy > 120 keV)

Dose Rate

Range	0 nGy/h – 0.1 Gy/h (0 nR/h – 11 R/h) (0 nSv/h – 150 mSv/h)
Uncertainty (Mammography)	10 % (> 4 µGy/h, < 25 keV)
Uncertainty (R/F)	10 % (> 4 µGy/h, 25 – 120 keV)
Uncertainty (Nuclear Med.)	20 % (> 4 µGy/h > 120 keV)

Typical Energy Dependence



Unfors 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
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mAs per frame

Range	0.001 – 2000 mAs/frame
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Waveform

Bandwidth	1 kHz
Memory depth	1200 ms

Unfors Xi View

System requirements	Windows 98 (Second Edition, OSR2), Windows 2000, Windows XP, Windows Vista
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)

Instrument specifications are subject to purchased configuration.

All specifications may change without notice.

The Unfors Concept



Accurate result 10s to learn Pocket sized

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