

	Summary of	Certificate No.: 146884-06152009	9
	Summary of E	Enclosed Documents	
	Product:	Unfors Xi External Detector	
R-Tech Dental of Minnesotta	Model:		
Michael Wiltrout	Serial Number: R/F Arrival Check:	146884 Date: 2009-06-15 Result: With	in Toleran
	R/F Calibration Ce	rtificate: Date: 2009-06-15	
	Calibration Equipr	nent List	
Your instrument has passed set			
Enclosed you will find detailed a	locuments for your instrur	nent.	
Sometica Activity			
Service Activity:			
Upgraded base to ver 5.05, upgrad	led external detector to ver §	5.03, Calibrated and Verified	
10		,	
Recommended calibration interval for this inst	rument is 12 months that begins on t	the date of receipt by the customer.	
Due to the different transportation methods an calibration certificate that is several weeks old	nd local customs (i.e. delivery channe d. Our past experience indicates the c consideration should be given as to	the date of receipt by the customer. I), you may have received an instrument with a salibration of this product is not affected by storag when the instrument is put into service and the	e prior
Due to the different transportation methods an calibration certificate that is several weeks old to its initial receipt by the customer. Important	nd local customs (i.e. delivery channe d. Our past experience indicates the c consideration should be given as to	il), you may have received an instrument with a alibration of this product is not affected by storag	e prior
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Page 1 of 4





Certificate No.: 146884-06152009

Total Filtration = 2.5 mm Al

Arrival Check

Unfors Xi R/F

R-Tech Dental of Minnesotta

Michael Wiltrout			
Date of Arrival Check:	06-15-09	Model:	RF
Product:	Unfors Xi External Detector	Serial Number:	146884

Measurement details

kVp		Total Filtration = 2.5 mm Al			
			R/F Low		
Generato	Generator settings		Measurements		
Set kVp	Set mA	Ref. kVp	Xi kV	spec. 2% Deviation (%)	
49	100	49,6	49,9	0,7%	
70	50	70,5	71,4	1,2%	
99	25	99,7	99,8	0,1%	
145	25	145,7	145,9	0,1%	

al the second and the second secon		R/F High			
Generato	Generator settings		Measurements_		
Set kVp	Set <u>m</u> A	Ref. kVp	Xi kVp	spec. 2% Deviation (%)	
49	250	49,6	49,6	0,1%	
70	100	70,5	70,9	0,6%	
99	32	99,7	99,3	-0,4%	
145	25	145,7	146,1	0,2%	

Dose	Dose Total Filtration = 2.5 mm /					
	R/F Low					
Generator settings Measurements						
Set kVp	Set mAs	Ref. Dose µGy	Xi dose µGy	spec. 5% Deviation (%)		
49	32	220,4	221,8	0,7%		
70	16	237,4	238,9	0,7%		
99	8	223,9	223,1	-0,3%		
145	8	434,5	425,0	-2,2%		

_			Total Filtra	ation = 2.5 mm Al	
e de la Calendaria. En 1930 - La Calendaria de	R/F High				
Generato	enerator settings Measurements				
Set kVp	Set mAs	Ref. Dose µGy	Xi dose µGy	spec. 5% Deviation (%)	
49	80	7346	7366	0,3%	
70	32	6317	6313	-0,1%	
99	10	3847		-1,2%	
145	8	5630	5478	-2,7%	

Time		Total Filtration = 2.5 mm Al			
R/F High					
Generato	Generator settings		Measurements		
		Ref. Time	Xi Time	spec. 0.5%	
Set kVp	Set ms	ms	ms	Deviation (%)	
70	320	320,0	320,6	0,2%	

*) Out of Tolerance



unfors

Certificate No.: 146884-06152009

Certificate of Calibration

Unfors Xi R/F

R-Tech Dental of Minnesotta

Michael Wiltrout			
Date of Calibration:	06-15-09	Product:	Unfors Xi External Detector
Serial Number:	146884	Model:	RF

Measurement details

kVp			Total Filtra	tion = 2.5 mm Al
R/F Low				
Generator	settings	Measurements		
Set kVp	Set mA	Ref. kVp	Xi kV	spec. 2% Deviation (%)
49	100	49,3	49,2	-0,3%
70	50	70,5	70,5	0,0%
99	25	99,8	98,9	-0,9%
145	25	146,0	146,4	0,2%
Active Com	pensation	Total Filtration = 2.5 + 10 mm Al		
80	50	80,6	81,8	1,5%

			Total Filtra	ation = 2.5 mm Al
		R/F High	、 、 、 、 、 、 、 、 、 、 、 、 、 、	
Generato	r settings	Measureme	ents	
Set kVp	Set <u>mA</u>	Ref. kVp	Xi kVp	spec. 2% Deviation (%)
49	250	49,3	49,6	0,4%
70	100	70,5	70,5	0,0%
99	32	99,8	99,5	-0,3%
145	25	146,0	147,1	0,8%
Active Con	npensation	Total Filtration = 2.5 + 10 mm Al		
80	64	80,6	81,2	0,8%

Dose			Total Filtra	tion = 2.5 mm Al
	in a start and a	R/F Low		
Generator settings Measurements				
Set kVp	Set mAs	Ref. Dose µGy	Xi dose µGy	spec. 5% _Deviation (%)
49	32	274,4	275,1	0,3%
70	16	297,5	296,2	-0,4%
99	8	278,2	276,6	-0, <u>6</u> %
145	8	334,7	334,3	-0,1%
Active Com	pensation	То	tal Filtration = 2	2.5 + 10 mm Al
80	16	67,4	67,3	-0,1%
	Total Filtration = 2.5 mm Al + 26 mm A			
70	50	21,57	21,64	0,3%

and the second second		R/F High		en aget stade
Generato	or settings	Measureme	ents	
Set kVp	Set mAs	Ref. Dose µGy	Xi dose µGy	spec. 5% Deviation (%)
49	80	8387	8397	0,1%
70	32	7257	7259	0,0%
99	10	4408	4389	-0,4%
145	8	6335	63 <u>35</u>	0,0%
Active Compensation Total Filtration = 2.5 + 10 mr			2.5 + 10 mm Al	
80	20	1045	1043	-0,2%

Total Filtration = 2.5 mm AI

Total Filtration = 2.5 mm Al

R/F High					
Generato	r settings	Measurements			
Set kVp	Set mAs	Ref. HVL	Xi HVL	spec. 10% Deviation (%)	
70	32	2,48	2,54	2,4%	

HVL		Total Filtra	ation = 2.5 mm Al	
		R/F Low		
Generator	settings	Measuremen	ts	
Set kVp	Set mAs	Ref. HVL	Xi HVL	spec. 10% Deviation (%)
70	16	2,48	2,56	3,2%

Time Total Filtration = 2.5 mm				
R/E High				
Generator	settings	Measuremen	ts	
Í		Ref. Time	Xi Time	spec. 0.5%
Set kVp	Set ms	ms	ms	Deviation (%)
70	320	321,0	320,7	-0,1%





Certificate No.: 146884-06152009

Calibration Equipment

R-Tech Dental of Minnesotta

Michael Wiltrout

Date of Calibration(s):	06-15-09	Model:	RF
Product:	Unfors Xi External Detector	Serial Number:	146884

The listed equipment below were used as main references for the calibration

	R/F Arrival Check	R/F Calibration		
GENERATOR	CPI INDICO 100	CPI INDICO 100		
WAVEFORM TYPE	HF	HF		
ANODE/FILTER	W / 2.5 mm Al	W / 2.5 mm Al	······································	
FIELD SIZE	10 x10 cm	10 x10 cm	· · · · · · · · · · · · · · · · · · ·	
FDD	R/F Low: 200/100 cm R/F High: 50 cm	R/F Low: 200/100 cm R/F High: 50 cm		

	R/F Arrival Check	Calibration Date	R/F Calibration	Calibration Date		
REFERENCE SYSTEM	Unfors Xi S/N: 151656	02-18-09	Unfors Xi S/N: 148208	09-19-08		
	Parker Medical HV-1 S/N: 9110-1-1	12-04-08	Parker Medical HV-1 S/N: 11074-1-2	05-05-09		
REFERENCE SYSTEM	Digi-X S/N: 163	12-04-08	Fluke 287 S/N: 98170136	05-05-09		
	Fluke 87 V S/N: 89940147	01-12-09				
REFERENCE SYSTEM	Digi-X S/N: 163	12-19-08	Digi-X S/N: 163	12-19-08		

The expanded uncertainties of measurement for the Unfors Xi are:

2 % for kVp 0.5 % for exposure time 5 % for Dose

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 % (Guide to Uncertainty of Measurements, ISO, 1995). Calibration condition:

Ambient temperature: 22°C ± 3°C Relative humidity: 50% ± 10%

All reference systems are calibrated once a year. kV systems are calibrated by the Swedish National Testing and Research Institute and are traceable to PTB. All dose systems are calibrated by PTB and are traceable to NIST on available beam qualities. NIST does not currently have traceable dose standards for the W/Rh, Mo/Rh (2 mmAl), Rh/Al and Mo/Al beam qualities. Unfors Instruments certifies the W/Rh, Mo/Rh, Rh/Al, Rh/Rh and Mo/Al (if applicable) beam quality measurements, made with this Unfors Xi, to be accurate within its published specifications.

Jusan

Unfors Xi is calibrated according to FDA MQSA requirements. Unfors calibration procedure: "Procedure calibration and verification Xi RF detector" and "Procedure calibration and verification Xi Mam, MPro, WAI detector" in applicable parts

Tested by: Jie He

Certified by:

Susan Cussen

UNFORS INSTRUMENTS Inc.

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Certificate No.: 147404-06152009

Summary of Enclosed Documents

R-Tech Dental on Minnesota Michael Wiltrout

Product:	Unfors Xi Base Unit w/ mAs			
Model:	mAs			
Serial Number:	147404			

Date: 06-15-09

mAs Calibration Certificate: Calibration Equipment List

Your instrument has passed several strict tests and has been approved for delivery. Enclosed you will find detailed documents for your instrument.

Service Activity:

Calibrated and verified

Recommended calibration interval for this instrument is 12 months that begins on the date of receipt by the customer.

Due to the different transportation methods and local customs (i.e. delivery channel), you may have received an instrument with a calibration certificate that is several weeks old. Our past experience indicates the calibration of this product is not affected by storage prior to its initial receipt by the customer. Important consideration should be given as to when the instrument is put into service and the manufacture recommended calibration interval.





Certificate No.: 147404-06152009

Certificate of Calibration

R-Tech Dental on Minnesota Michael Wiltrout

Serial number:	147404	Product:	Unfors Xi Base Unit w/ mAs
Date of calibration:	6-15-09	Model:	mAs

Measurement details

mA				
Nominal	Settings	Measur	ed Data	
Current (mA)	Exposure Time (s)	Ref. Current (mA)	Xi Current (mA)	spec. 1.0% Deviation (%)
1,2	6	1,2	1,2	0,7%
20	6	20,0	20,0	0,0%

mAs	and the state of the second	
	Measured Data	
Reference mAs (mAs)	Xi mAs (mAs)	spec. 1.0% Deviation (%)
200	200,9	0,5%





Certificate No.: 147404-06152009

Calibration Equipment

R-Tech Dental on Minnesota Michael Wiltrout

Date of calibration:	6-15-09	Model:	mAs
Product:	Unfors Xi Base Unit w/ mAs	Serial no:	147404

The listed equipment below were used as main references for the calibration

Reference Equipment		Calibration Date
REFERENCE SYSTEM	Unfors mAs Box S/N: 114	04-21-09
REFERENCE SYSTEM	Fluke 189 S/N: 92180049	01-08-09

The expanded uncertainties of measurement for the Unfors Xi Base Unit w/ mAs are:

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0.1 % for mAs 0.15% for mA

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 % (Guide to Uncertainty of Measurements, ISO, 1995).

All reference systems are calibrated once a year. The mA system is tested by Fluke and tracable to NIST. The mAs system is tested by Bodycote Metech accredit by SWEDAC.

Calibration condition:

Ambient temperature: 72°F ± 3°F Relative humidity: 50% ± 10%

Tested by:

Tested by:	Jie He
Certified by:	Lisarc
	Susan Cussen

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