

ABSOLUTE DOSIMETRY



EXRADIN® DETECTORS

EXRADIN® DETECTORS

A GLOBAL REPUTATION FOR EXCELLENCE

For over 40 years top research institutes and standards laboratories world-wide have used Exradin Detectors for a broad range of dosimetry measurements in diverse radiation environments.

The Exradin line continues to build upon vetted ion chambers like the Exradin A12 and Exradin A1SL with advanced microionization chambers like the Exradin A26. Our passion for metrology, expertise in engineering and dedication to durability ensures that each detector we produce embodies this tradition of quality workmanship and exacting precision.



THE EXRADIN ADVANTAGE

BETTER COMPONENTS

- Waterproof construction eliminates the need for sleeves or protective coatings.
- Excellent inherent conductivity removes the need for coatings found in other chambers. Conductive coatings can flake off and degrade the chamber performance.

SUPERIOR STABILITY

- Advanced guard design creates a consistent collecting volume with a uniform electric field, providing a stable, repeatable signal.
- Exradin detectors feature some of the quickest settling times of any manufacturer.
- Exceptionally wide guard rings on all parallel plate chambers eliminate volume perturbation effects.
- An Exradin A12 farmer-type chamber survived three 1 meter drop tests onto a hard floor, in three different orientations, without a change in calibration.*

IDEAL DESIGN FOR IMPROVED ACCURACY

- The collecting volumes of Exradin ion chambers are defined by the guard, not an insulator, creating a significantly more stable signal than competing detectors.
- Axially symmetric design ensures a uniform isotropic response.
- Collection efficiencies of 99.9% or greater.
- Chamber venting through a flexible tube surrounding the triaxial cable makes Exradin chambers ideal for use in water or plastic phantoms.

* "Evaluation of a Water-proof, Homogeneous Farmer-Type Ion Chamber for Orthovoltage and High Energy X-Rays and Electron Beams". V.M. Tello, A. Lawyer, C. Chu, J.A. BenComo and W.F. Hanson, presented at AAPM July 1996

THIMBLE ION CHAMBERS

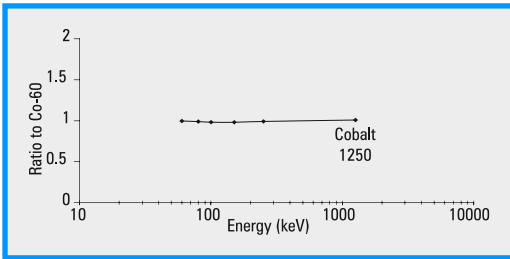
STRICT MANUFACTURING TOLERANCES AND WATERPROOF CONSTRUCTION MAKE EXRADIN THIMBLE ION CHAMBERS IDEAL FOR DOSIMETRY CALIBRATIONS IN WATER, AIR AND OTHER PHANTOM MATERIALS.



EXRADIN A19 ION CHAMBER

0.62 cm³ THIMBLE ION CHAMBER
MR compatible version available

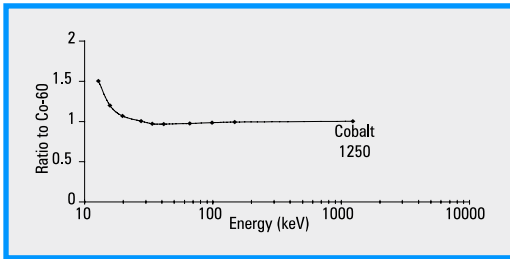
- Fits plastic phantom cavities and build-up caps designed for classic graphite farmer chambers
- Characterized for TG-51 procedures



EXRADIN A12 ION CHAMBER

0.64 cm³ THIMBLE ION CHAMBER
MR compatible version available

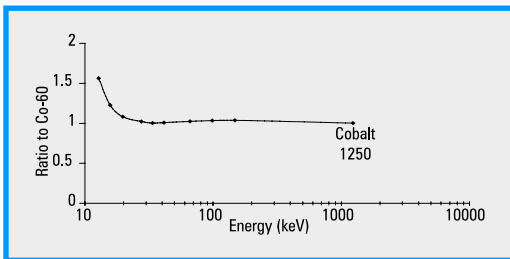
- Fast settling time for superior absolute dosimetry measurements in water, air or phantoms, and a removable stem to accommodate a variety of setup configurations
- Characterized in TG-51 and TRS-398



EXRADIN A12S ION CHAMBER

0.24 cm³ THIMBLE ION CHAMBER
MR compatible version available

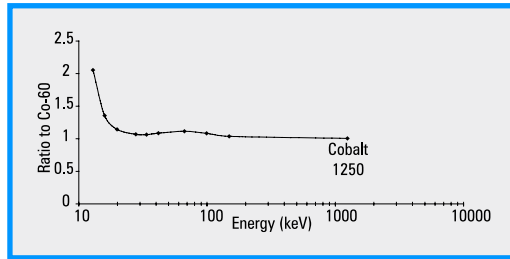
- Designed for absolute dosimetry calibrations in water, air or phantoms
- The collector is approximately one-third the size of the A12, allowing for finer resolution measurements in the same plastic phantom cavities.



EXRADIN A1SL ION CHAMBER

0.053 cm³ SLIMLINE MINIATURE SHONKA
MR compatible version available

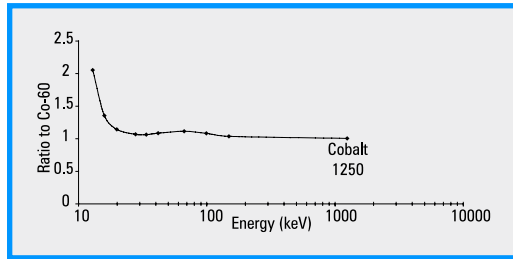
- Available in air or tissue equivalent plastic
- Provides a perfect balance between fast scanning and point-dose measurements
- Characterized for TG-51 procedures



EXRADIN A1 ION CHAMBER

0.053 cm³ MINIATURE SHONKA

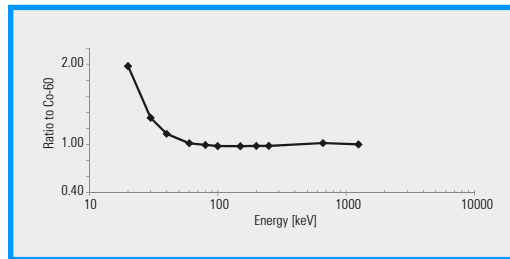
- Same internal dimensions and collecting volume as the A1SL
- Larger diameter stem ideal for use in solid phantoms
- Characterized in TG-51 and TRS-398



EXRADIN A28 ION CHAMBER

0.125 cm³ SCANNING
MR compatible version available

- Exceptional omni-directional spatial resolution for relative dosimetry scanning in water phantoms and use in small field measurements



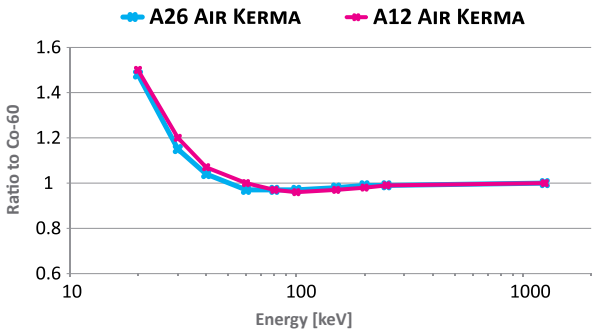
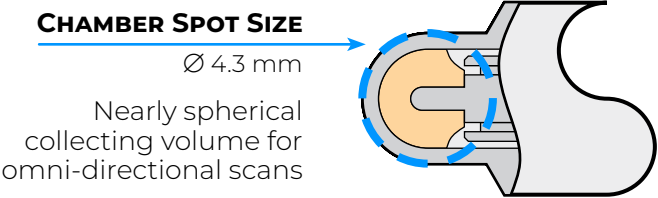
MICRO ION CHAMBERS

SUPERIOR SMALL-FIELD DOSIMETRY TO ASSESS PINPOINT RADIATION FIELDS IN IMRT, STEREOTACTIC, ORTHOVOLTAGE, AND SUPERFICIAL SKIN TREATMENTS.

EXRADIN A26 ION CHAMBER

0.015 cm³ MICROPOINT
MR compatible version available

- Uniform 4.3 mm diameter spot size reduces volume averaging effects and eliminates angular dependencies of volume averaging
- Rapid settling
- Stable, reproducible measurements
- Realistic and meaningful ion recombination corrections
- Minimal polarity dependence
- Minimal energy dependence
- The only microchamber that was designed to meet reference class criteria from IEC 60731 and TG-51



EXRADIN A16 ION CHAMBER

0.007 cm³ MICROPOINT

- Exceptional spatial resolution and exact pinpoint beam profile characterization
- Ideal for stereotactic radiosurgery and IMRT applications

EXRADIN A14SL ION CHAMBER

0.015 cm³ SLIMLINE MICROCHAMBER

- Exceptional spatial resolution and exact pinpoint beam profile characterization
- Ideal for stereotactic radiosurgery and IMRT applications
- Compatible with plastic phantom cavities designed for the A1SL

EXRADIN A14 ION CHAMBER

0.015 cm³ MICROCHAMBER

- Exact internal dimensions and collecting volume as the Model A14SL, with a larger diameter stem ideal for use in solid phantoms.

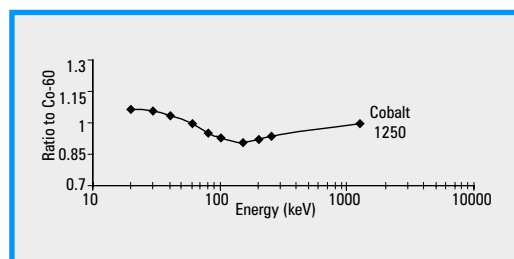
PARALLEL PLATE CHAMBERS

EXCEPTIONALLY WIDE GUARD RINGS ENSURE PRECISION IN DEPTH-DOSE MEASUREMENT WITH NO PERTURBATION IN FIELD LINES.

EXRADIN A10 ION CHAMBER

0.050 cm³ PARALLEL PLATE

- Excellent spatial resolution for dose distribution measurements in a water phantom
- An acrylic waterproof cap is included for use in TG-51 electron beam protocols

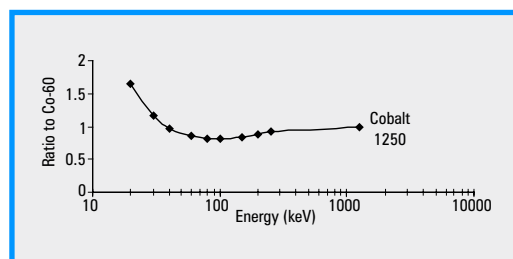


EXRADIN A11 ION CHAMBER

0.62 cm³ PARALLEL PLATE

P11 also available

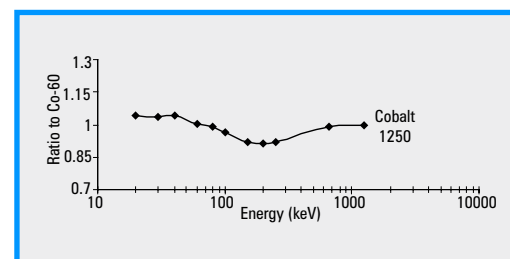
- Inherently waterproof. May be operated while fully submerged without any protective sheath
- Ideal for repeated TG-51/TRS-398 dose distribution measurements in a water phantom



EXRADIN A11TW ION CHAMBER

0.93 cm³ THIN WINDOW PARALLEL PLATE

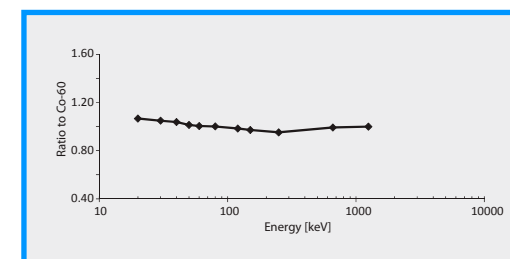
- Tailored for use in superficial therapy and low energy diagnostic beams
- The thin-window design provides nearly constant response over the entire diagnostic energy range



EXRADIN A20 ION CHAMBER

0.074 cm³ LOW ENERGY X-RAY

- Low-energy x-ray chamber
- Assess and calibrate pinpoint radiation fields for x-rays, stereotactic and TG-61 compliant superficial skin therapy



EXRADIN MAGNA A600 ION CHAMBER

1.50 cm³ DIAGNOSTIC PARALLEL PLATE

- Designed for consistent air kerma, absorbed dose and exposure measurements
- Vented and fully-guarded
- Perfectly suited for mammography and general diagnostic x-ray regions

EXRADIN MAGNA A650 ION CHAMBER

3.46 cm³ DIAGNOSTIC PARALLEL PLATE

- Vented and fully guarded
- For use in mammography and general diagnostic energy x-ray regions

SPHERICAL ION CHAMBERS

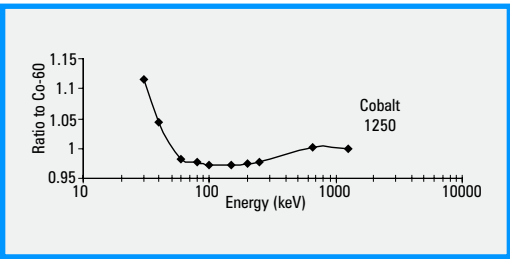
EXRADIN SPHERICAL ION CHAMBERS ARE RELIED UPON BY STANDARDS LABORATORIES WORLDWIDE FOR PRECISE MEASUREMENT OF RADIATION EXPOSURE AND EXPOSURE RATES. THEY ARE EASILY POSITIONED AND ARE EXCELLENT FOR IN-AIR MEASUREMENTS.



EXRADIN A3 ION CHAMBER

3.6 cm³ SHONKA-WYCKOFF SPHERICAL

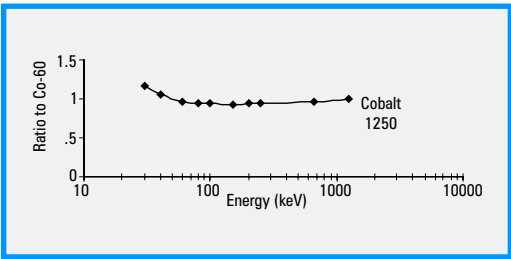
- Ideal for laboratory transfer standards and secondary standards for exposure measurements



EXRADIN A4 ION CHAMBER

30 cm³ SHONKA-WYCKOFF SPHERICAL

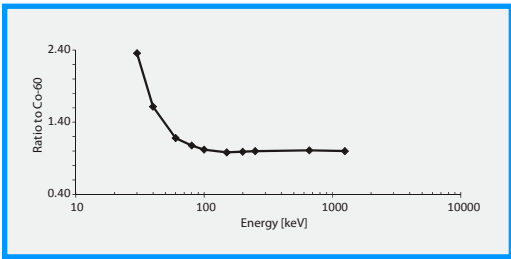
- Ideal for laboratory transfer standards, secondary standards for exposure measurement and integrating exposure over a large area
- Requires 500V bias



EXRADIN A5 ION CHAMBER

100 cm³ SHONKA-WYCKOFF SPHERICAL

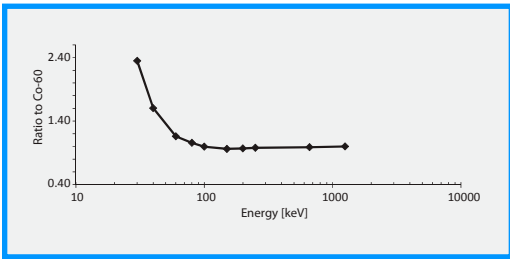
- Ideal for secondary standards for exposure measurement, integrating exposure over a large area and room scatter measurements
- Requires 800V bias



EXRADIN A6 ION CHAMBER

800 cm³ SHONKA-WYCKOFF SPHERICAL

- Ideal for exposure measurements, providing secondary standard quality measurements, and integrating low exposure over a large area such as for room scatter measurements
- Requires 1000V bias



EXRADIN A8 ION CHAMBER

15.7 LITER SHONKA-WYCKOFF SPHERICAL

- Ideal for extremely low exposure rate measurements, providing secondary standard quality measurements, and integrating exposure over a large area such as for room scatter measurements
- Requires 1000V bias

DETECTORS

EXRADIN A101 ION CHAMBER

4.54 cm³ CT ION CHAMBER

- Performs the measurements necessary for calculating the CTDI as described in TG-74
- Excellent response uniformity over the chamber length, with variation less than $\pm 3\%$

EXRADIN A17 ION CHAMBER

1.91 cm³ SLICE THERAPY

- Tailored for tomotherapy applications such as weekly QA checks or patient dose verification with phantoms and water tanks
- Excellent response uniformity over the chamber length, with variation less than $\pm 1.5\%$

EXRADIN D1H & D1V DIODES

MICRO FIELD MEASUREMENTS

Maximize spatial resolution and minimize angular dependence, allowing for consistency & accuracy

SPECIALIZED FOR SMALL FIELDS

- Produce flatter profiles and sharper resolution with a smaller active measurement area than traditional ion chambers
- The diode face of the D1V is perpendicular to the beam when upright, making it ideal for scanning applications and use in water phantoms
- The diode face of the D1H is perpendicular to the beam when flat, for use inside traditional plastic phantoms
- Superior measurement of field sizes up to 20 x 20 cm with excellent spatial resolution and minimal noise
- Can be used with either photon or electron beams

MINIMIZE ANGULAR DEPENDENCE

- Less than 0.5% angular dependence when tilted up to 20° to the beam

EXRADIN W2 SCINTILLATOR

MEASUREMENT WITHOUT PERTURBATION

The optimal water equivalent detector for small field dosimetry

MR compatible version available

SIGNIFICANT CLINICAL ADVANTAGES

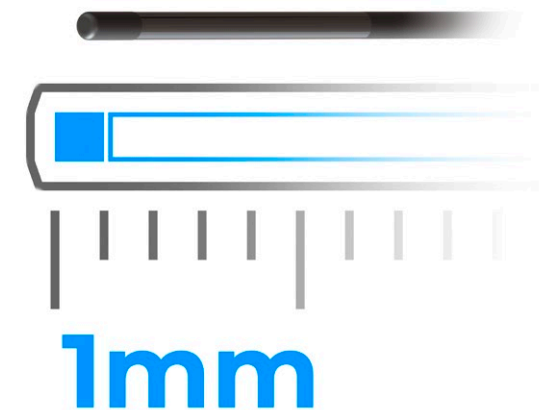
- Water equivalent
- Inherently waterproof
- User replaceable fiber, includes both 1x1 mm and 1x3 mm fibers
- No dose rate, temperature, or energy dependencies
- AAPM/IAEA TRS 483 states the scintillator is the only detector with a k_Q of 1.000, making the W2 the ideal SRS detector

HIGHEST QUALITY ELECTRONICS

- The MAX SD is a dedicated optical detection and signal processing unit that corrects for Čerenkov signal
- Provides point measurement capability through a web page interface on desktop or mobile
- All corrections are built in

SMALL FIELD SCANNING

- Can be used for both water scanning and point dosimetry
- Measurement signals can be converted to a proportional analog output, which can be read by any electrometer
- The W2 system can be connected to any water phantom system for scanning



ABSOLUTE DOSIMETRY



	THIMBLE ION CHAMBERS						MICRO ION CHAMBERS				CT		PARALLEL PLATE ION CHAMBERS						SPHERICAL ION CHAMBERS				
MODEL	1	A1SL	A28	A19	A12	A12S	14	A14SL	A16	A26	A101	A17	A10	11	11TW	A20	Magna A600	Magna A650	A3	A4	A5	A6	A8
Collecting Volume (cm³)	0.053	0.053	0.125	0.62	0.64	0.24	0.015	0.015	0.007	0.015	4.54	1.91	0.050	0.62	0.93	0.074	1.50	3.46	3.6	30	100	800	15.7 L
Spot Size* (mm)	8.0×6.4	8.0×6.4	ø 8.0	26.2×7.0	26.5×7.1	13.1×7.1	5.3×6.4	5.3×6.4	3.5×3.4	ø 4.3													
Centroid of Collecting Volume from exterior tip of shell (mm)	3.86	4.06	4.47	13.0	12.9	5.79	2.21	2.39	1.65	1.98													
Centroid of Collecting Volume from exterior surface of window (mm)													1.0	2.0	1.5	1.8	4.0	4.0					
Outside Diameter of Shell (mm)	6.0	6.35	8	7.1	7.1	7.1	6.0	6.35	3.4	4.3	10.0	12.7							19.6	39.1	63.1	120.4	323.2
Inside Diameter of Shell (mm) Collecting Volume Outer Diameter	4.0	4.0	5.8	6.1	6.1	6.1	4.0	4.0	2.4	3.3	8.0	6.0							19.1	38.1	57.2	114.4	311.2
Window Collector Gap (mm)													2.0	2.0	3.0	5.0	7.95	7.95					
Shell Wall Thickness (mm)	1.0	1.2	1.1	0.5	0.5	0.5	1.0	1.2	0.5	0.5	1.0	3.3							0.25	0.5	3.0	3.0	6.0
Collector Diameter (mm)	1.0	1.0	1.0	1.0	1.0	1.0	0.3	0.3	0.3	0.75	2.5	2.5	5.4	20.0	20.0	1.93	12.7	21.9	2.1	4.1	6.5	11.6	22.4
Guard Ring Width (Radial) (mm)													4.3	4.4	4.4	1.2	3.9	7.6					
Collector Length (mm)	4.4	4.4	6.4	21.6	21.6	7.5	1.5	1.5	1.27	1.78	100	80							13.3	24.9	37.3	74.0	166.7
Window Material*													K	1.0 mm, A, P, or T	K	2K	K	K					
Window Thickness													0.05 mm	1.0 mm	0.05 mm	0.09 mm	0.05 mm	0.05 mm					
MR Compatibility Available		MR	MR	MR	MR	MR				MR													
Shell/Entry Window, Collector and Guard Material*	A	A	A	A	A	A	A	A	A	A	A	A	A	A, P	A	A	A	A	A	A	A	A	A
Nominal Air Kerma Calibration Factor†	5.4E+8 Gy/C	5.4E+8 Gy/C	2.3E+8 Gy/C	4.5E+7 Gy/C	4.4E+7 Gy/C	1.2E+8 Gy/C	1.9E+9 Gy/C	1.9E+9 Gy/C	4.1E+9 Gy/C	1.85E+9 Gy/C	6.2E+6 Gy/C	1.5E+7 Gy/C	5.6E+8 Gy/C	4.6E+7 Gy/C	3.0E+7 Gy/C	3.8E+8 Gy/C	1.9E+7 Gy/C	8.2E+6 Gy/C	9.0E+8 R/C	1.1E+8 R/C	3.3E+7 R/C	4.2E+6 R/C	2.1E+5 R/C
Recommended Polarizing Voltage (V)	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	300	500	800	1000	1000
Nominal Leakage (amp)	± 10 x 10 ⁻¹⁵										± 10 x 10 ⁻¹⁵												
Maximum Polarizing Voltage (V)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	400	400	1000	1000	1000	1000	1000
Waterproof	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes (2)	Yes	Yes (2)	No	No	No	No	No	No	No	No
Included Buildup Cap	None	None	Co-60	Co-60	Co-60	Co-60	None	None	Co-60	Co-60	None (1)	Co-60 integral	None	None	None	None	None	None	None	None	Co-60 integral	Co-60 integral	Co-60 integral

* MATERIAL: A – C552 Shonka air-equivalent plastic
P – D400 polystyrene-equivalent plastic
K – 3.86 mg/cm² Kapton
2K – 7.72 mg/cm² Kapton

*Detector models with a non-circular Spot Size are listed as L x W (as indicated below); models with a circular Spot Size are listed as a diameter (Ø).
If using a buildup cap, the buildup cap diameter must be considered.

† Nominal calibration factor for Co-60 at 22° C
(1) comes included with an acrylic sleeve to adapt chamber to fit Ø0.50 in (12.7 mm) phantom holes
(2) included waterproofing cap is PMMA, 1.0mm entry window, TG-51 compliant

ABSOLUTE DOSIMETRY

STANDARD IMAGING®



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