



EXRADIN **A101 CT Ion Chamber**

REF 92680

SeeDOS Product User Manual





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E X R A D I N

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CERTIFIED
ISO 9001



Distributed by SeeDOS Ltd
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General Precautions

Warnings and Cautions alert users to dangerous conditions that can occur if instructions in the manual are not obeyed. Warnings are conditions that can cause injury to the operator, while Cautions can cause damage to the equipment.



WARNING:

Electrical shock hazard when connected to 300 V bias supply.



CAUTION:

Proper use of this device depends on careful reading of all instructions and labels.



CAUTION:

Do not drop, mishandle, or disassemble unit since it may result in change of calibration factor, or damage to thin-walled Thimble tip. Refer all servicing to qualified individuals.



CAUTION:

Do not sharply bend triax cable. Damage to the cable may result in high leakage currents.

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7601 MURPHY DRIVE
MIDDLETON, WI 53562



General Operation

All **Exradin** chambers are attached to a 1.5-m length of low-noise flexible triaxial cable that is terminated by a triaxial or coaxial connector. The collector of the chamber is common with the center wire of the cable and the center contact of the connector. The guard is common with the inner cable braid and the middle connector contact of triaxial connectors, and the connector body of coaxial connectors. The shell (outer electrode), usually ground, is common with the outer braid of the cable and the connector body in the case of triaxial connectors and the pigtail extending out the rear of coaxial connectors.

The design of **Exradin** chambers requires that the collector and guard operate at essentially the same potential. The polarizing potential, supplied by an electrometer, is applied between the shell and the guard. Either polarity may be applied to the shell and either the shell or guard may be grounded. Safety and other considerations recommend grounding the shell, which then requires an electrometer with a floating input.

All **Exradin** chambers can support 1000 V between shell and guard. However, depending on the particular circumstance and radiation intensity, as little as 90 V may yield essentially 100% charge collection.

Because **Exradin** ionization chambers do not exhibit voltage soakage phenomena, readings of ionization current may be made immediately after application of the polarizing potential. However, it is good practice to pause a minute or two after changing the potential to allow switching transients induced in the electrometer to completely subside. Such transients are most evident in the rate (current) mode.

General Operation

The CT chamber is designed to measure CT slices. These may be summed or integrated as is the standard practice for CT Measurements. Thus, the MSAD (multiple scan average dose) can be determined as is usual. For this reason, the response is flat within the length of the chamber. Figure 1 shows the flat response of the chamber; it is flat to within $\pm 3\%$ over the central 10 cm of its length.

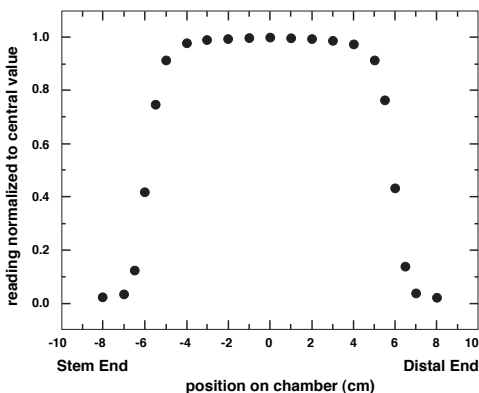


Figure 1: Flatness of the CT chamber

Operating Instructions

1. With nothing connected to the input jack of the electrometer, turn the power on and wait at least 15 minutes for warm up.
2. Verify the leakage of the electrometer is within the manufacturer's stated acceptable limits.
3. Connect the ionization chamber to the electrometer and apply 100% voltage bias.
4. Allow the electrometer and ionization chamber system at least 10 minutes to stabilize, making certain that all cabling is lying flat and unkinked.
5. Verify the leakage of the ionization chamber is within the manufacturer's stated acceptable limits. If measured in the presence of background sources, note that this signal will add to the leakage of the chamber.
6. Some electrometers, such as the Standard Imaging MAX-4000 Electrometer, allow the user to zero the device at any time. If desired, perform this system zeroing now.

General Operation

- 7.** Check the system leakage. Take a reading without exposing the chamber to radiation. This reading should be less than 0.1% of the final signal expected. If it is not, the leakage should be subtracted from the signal.
- 8.** Measure atmospheric temperature and pressure. For well chambers, measure the temperature in the well of the chamber.
- 9.** Insert the CT chamber and take at least 3 measurements. Generally, the measurements should not be moving in only one direction (i.e. three readings that continue to drop and hence may not yet be stabilized). If a current measurement is done, allow sufficient time for value to stabilize.
- 10.** Analyze the data taking into account the average of the readings, system leakage, temperature/pressure corrections, calibration factors and any other appropriate corrections to be made. Keep in mind that the calibration factor consists of the electrometer calibration and the ionization chamber calibration factor.
- 11.** When all measurements are completed, set bias voltage to 0 VDC, turn off the electrometer and disconnect the ionization chamber.

Service Notes

External Marks

The Exradin A101 CT Chamber is provided with (3) external groove marks on the chamber body, signifying important locations of the collecting volume. The middle groove represents the center of the axial length of the collecting volume. The two outer-most grooves represent the termination of the collecting volume, each 5 cm away from the central groove. Within these two outer-most grooves is the collecting volume that is rated with a flatness response of $\pm 3\%$, and is 10.0 cm in length.

Adapter Sleeve

The Adapter Sleeve for the CT Chamber is constructed of acrylic (PMMA). The Adapter Sleeve has an outer diameter of 12.7mm which will fit into most commercially available CT Phantoms. Simply slide the Sleeve over the CT Chamber until the Sleeve bottoms are on the shoulder of the CT Chamber, and insert the CT Chamber with sleeve into the CT Phantom.

Venting

The CT Chamber vents to the ambient via (2) holes located on the cylindrical body of the chamber proper. When the acrylic Adapter Sleeve is in position on the chamber body, there is adequate clearance for the chamber to vent.

Underwater Operation

This chamber is not waterproof. This type of chamber is typically not used in water.



Service and Maintenance

There are no user-serviceable parts within these ionization chambers. Under no circumstance should the user attempt to repair or disassemble the chamber and/or connector, as the warranty will become void and the calibration factor will change. Under normal use, the chambers should provide years of trouble-free service.

Parts and Accessories

REF	Description
72170	A101 Acrylic Adapter Sleeve 1.3 mm, PMMA
72157	LEMO Connector in place of Triax BNC Plug (M/F)

Customer Responsibility



This product and its components will perform properly and reliably only when operated and maintained in accordance with the instructions contained in this manual and accompanying labels. A defective device should not be used. Parts which may be broken or missing or are clearly worn, distorted or contaminated should be replaced immediately with genuine replacement parts manufactured by or made available from Standard Imaging, Inc.

Caution: Federal law in the U.S.A and Canada restricts the sale, distribution or use of this device to, by or on the order of a licensed medical practitioner. The use of this device should be restricted to the supervision of a qualified medical physicist.

Should repair or replacement of this device become necessary after the warranty period, the customer should seek advice from Standard Imaging Inc. prior to such repair or replacement. If this device is in need of repair, it should not be used until all repairs have been made and the product is functioning properly and ready for use. After repair, the chamber may need to be calibrated. The owner of this device has sole responsibility for any malfunction resulting from abuse, improper use or maintenance, or repair by anyone other than Standard Imaging Inc.

The information in this manual is subject to change without notice. No part of this manual may be copied or reproduced in any form or by any means without prior written consent of Standard Imaging Inc.

Features and Specifications

Collecting Volume:	4.6 cc
Collecting Volume Length:	10.0cm
Collector Diameter:	2.4 mm
Body Tube Outside Diameter:	10.0 mm
Wall Thickness:	1.0 mm
Chamber Length:	164.3 mm

Body Tube and Guard Material:	Shonka air-equivalent C552 plastic
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Response Uniformity over the central 10 cm of chamber length:	±3%
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Energy Response, 80 to 150kVp:	±4%
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Collector Material:	Carbon Fiber
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Electrical Power Requirements:	Operates at ±300 VDC
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Nominal Collection Efficiency:	100%
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Maximum Polarizing Potential:	1000 V
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Nominal Inherent Leakage Currents:	10 ⁻¹⁵ A
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Low-Noise Triaxial Cable:	1.5 m long; 50 ohms; 29 pf/ft
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Connector:	Triaxial BNC Plug (2-Lug Male) and protective cap connected by chain (standard); others available upon request
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Included Adapter Sleeve:	Wall Thickness of 1.3 mm; Constructed of PMMA
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Operating Parameters

Humidity:	20 to 80%, non-condensing
Temperature:	10 to 40° C
Pressure:	680 to 770 mm Hg

Storage Parameters

Humidity:	0 to 95%, non-condensing
Temperature:	-15 to 50° C
Pressure:	600 to 800 mm Hg

Warranty

Standard Imaging, Inc. sells this product under the warranty herein set forth. The warranty is extended only to the buyer purchasing the product directly from Standard Imaging, Inc. or as a new product from an authorized dealer or distributor of Standard Imaging, Inc.

For a period of twenty-four (24) months for ionization chambers and twelve (12) months for all other Standard Imaging, Inc. products from the date of original delivery to the purchaser or a distributor, this product is warranted against functional defects in materials and workmanship, provided it is properly operated under conditions of normal use, and that repairs and replacements are made in accordance herewith. The foregoing warranty shall not apply if the product has been disassembled, altered or repaired other than by Standard Imaging, Inc. or if the product has been subject to abuse, misuse, negligence or accident.

Standard Imaging's sole and exclusive obligation and the purchaser's sole and exclusive remedy under the above warranties are limited to repairing or replacing free of charge, at Standard Imaging's option, a product: (1) which contains a defect covered by the above warranties; (2) which are reported to Standard Imaging, Inc. not later than seven (7) days after the expiration date of the 12 or 24 month warranty period; (3) which are returned to Standard Imaging promptly after discovery of the defect; and (4) which are found to be defective upon Standard Imaging's examination. Transportation charges are the buyer's responsibility. This warranty extends to every part of the product except fuses, batteries, or glass breakage. Standard Imaging, Inc. shall not be otherwise liable for any damages, including but not limited to, incidental damages, consequential damages, or special damages. Repaired or replaced products are warranted for the balance of the original warranty period, or at least 90 days.

This warranty is in lieu of all other warranties, express or implied, whether statutory or otherwise, including any implied warranty of fitness for a particular purpose. In no event shall Standard Imaging, Inc. be liable for any incidental or consequential damages resulting from the use, misuse or abuse of the product or caused by any defect, failure or malfunction of the product, whether a claim of such damages is based upon the warranty, contract, negligence, or otherwise.

This warranty represents the current standard warranty of Standard Imaging, Inc. Please refer to the labeling or instruction manual of your Standard Imaging, Inc. product for any warranty conditions unique to the product.

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