



EXRADIN®

A101 CT
Ionization Chamber

REF 92680



User Manual



www.StandardImaging.com



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A101 CT **Ionization Chamber**

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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.

 **WARNING:**
Exradin Ion Chambers are intended for quality assurance and calibration measurements. They are not intended to be connected to a patient for real-time dosimetry measurements.

 **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 a 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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General Operation

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 switch-

General Operation Continued

ing transients induced in the electrometer to completely subside. Such transients are most evident in the rate (current) mode.

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.

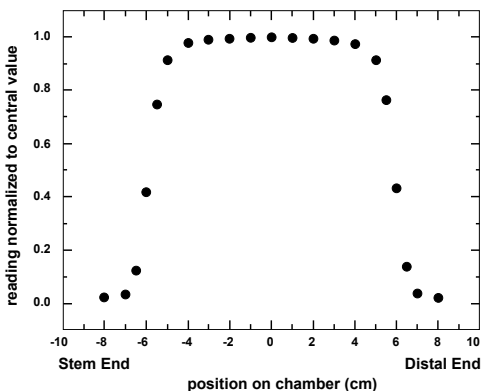


Figure 1: Flatness of the CT chamber

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 desired 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 unkninked.
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

General Operation Continued

at any time. If desired, perform this system zeroing now.

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.

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.

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)

Features and Specifications

Collecting Volume:	4.6 cc
Collecting Volume Length:	10.0 cm
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
Response Uniformity over the central 10 cm of chamber length:	±3%
Energy Response, 80 to 150kVp:	±4%
Collector Material:	Carbon Fiber
Electrical Power Requirements:	Operates at ±300 VDC
Nominal Collection Efficiency:	100%
Maximum Polarizing Potential:	1000 V
Nominal Inherent Leakage Currents:	10 ⁻¹⁵ A
Low-Noise Triaxial Cable:	1.5 m long; 50 ohms; 29 pf/ft
Connector:	Triaxial BNC Plug (2-Lug Male) and protective cap connected by chain (standard); others available upon request
Included Adapter Sleeve:	Wall Thickness of 1.3 mm; Constructed of PMMA
<u>Operating Parameters</u>	
Humidity:	20 to 80%, non-condensing
Temperature:	10 to 40° C
Pressure:	680 to 770 mm Hg
<u>Storage Parameters</u>	
Humidity:	0 to 95%, non-condensing
Temperature:	-15 to 50° C
Pressure:	600 to 800 mm Hg
Product Standards:	IEC 60601-1, ¹ IEC 61674,  0413

¹ Designed to Meet

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 12.7 mm which will fit into most commercially available CT Phantoms. Simply slide the Sleeve over the CT Chamber until the Sleeve bottoms 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 this ionization chamber. 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.

If assistance is desired in the proper disposal of this product (including accessories and components), after its useful life, please return to Standard Imaging.

Service Policy

If service, including recalibration, is required, please contact Standard Imaging's Customer Service department by phone or email prior to shipping the product. Standard Imaging's Customer Service and Technical Service staff will attempt to address the product issue via phone or email. If unable to address the issue, a return material authorization (RMA) number will be issued. With the RMA number, the product can be returned to Standard Imaging. It is the responsibility of the customer to properly package, insure and ship the product, with the RMA number clearly identified on the outside of the package. The customer must immediately file a claim with their carrier for any shipping damage or lost shipments. Return shipping and insurance is to be pre-paid or billed to the customer, and the customer may request a specific shipper. Items found to be out of warranty are subject to a minimum service fee of 1 hour labor (excluding recalibrations) for diagnostic efforts and require a purchase order (PO) before service is performed. With concurrence from customer, the product may be replaced if it is unserviceable or if the required service is cost prohibitive. Products incurring service charges may be held for payment. Standard Imaging does not provide loaner products. See the Standard Imaging Warranty and Customer Responsibility for additional information.

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 Canadian law restrict the sale, distribution, or use of this product to, by, or on the order of a licensed medical practitioner. The use of this product should be restricted to the supervision of a qualified medical physicist. Measurement of high activity radioactive sources is potentially hazardous and should be performed by qualified personnel.

Should repair or replacement of this product become necessary after the warranty period, the customer should seek advice from Standard Imaging Inc. prior to such repair or replacement. If this product 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 product may need to be calibrated. The owner of this product 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.

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 provided in the table below from the date of original delivery to the purchaser or a distributor, this Standard Imaging, Inc. product, provided in the table is warranted against functional defects in design, 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 altered, disassembled or repaired other than by Standard Imaging, Inc. or if the product has been subject to abuse, misuse, negligence or accident.

Product	Warranty Period
Standard Imaging Ionization Chambers	2 years
Standard Imaging Well Chambers	2 years
Standard Imaging Electrometers	2 years
Standard Imaging Software Products	1 year
All Other Standard Imaging Products	1 year
Standard Imaging Custom Product	90 days
Consumables	90 days
Serviced Product	90 days
Resale Products	As defined by the Original Equipment Manufacturer
ADCL Product Calibration ADCL Product Calibration (Standard Imaging uses the UW-ADCL for recalibrations required under warranty)	0 - 90 days = 100% of ADCL Calibration Costs 91 - 182 days = 75% of ADCL Calibration Costs 183 - 365 days = 50% of ADCL Calibration Costs 366 - 639 days = 25% of ADCL Calibration Costs (days from date of shipment to customer)

Standard Imaging's sole and exclusive obligation and the purchaser's sole and exclusive remedy under the above warranties are, at Standard Imaging's option, limited to repairing, replacing free of charge or revising labeling and manual content on, 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 warranty period in the table; (3) which are returned to Standard Imaging, Inc. promptly after discovery of the defect; and (4) which are found to be defective upon examination by Standard Imaging Inc. Transportation related charges, (including, but not limited to shipping, customs, tariffs, taxes, and brokerage fees) to Standard Imaging are the buyer's responsibility. This warranty extends to every part of the product except consumables (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 or the Standard Imaging, Inc. web page for any warranty conditions unique to the product.

