



EXRADIN **Parallel Plate Ion Chambers**

User Manual

SeeDOS Product User Manual





EXRADIN **Parallel Plate Ion Chambers**

User Manual



CERTIFIED
ISO 9001



STANDARD IMAGING INC.
7601 Murphy Drive
Middleton, WI 53562

TEL 800.261.4446
TEL 608.831.0025
FAX 608.831.2202

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. Refer all servicing to qualified individuals.



CAUTION:

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

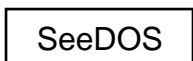
This manual applies to the following thimble chamber models:

Model	REF
A10	92702
A11	92701
P11	92703
T11	92704
A11TW	92708
P11TW	92709
T11TW	92710
A15	92727

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General Operation

All **Exradin** parallel plate chambers are attached to a 2-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, in the case of triaxial connectors, and the connector body, in the case of coaxial connectors. The window (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 window and the guard as shown in **Figure 1**. Either polarity may be applied to the window and either the window or guard may be grounded. Safety and other considerations recommend grounding the window, which then requires an electrometer with a floating input.

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

General Operation

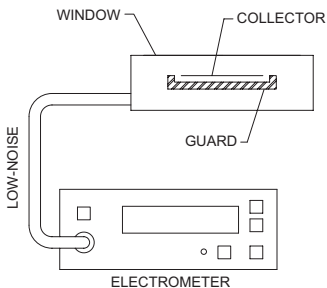


Figure 1: Parallel Plate Chamber and Electrometer

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.

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 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 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. For

General Operation

well chambers, measure the temperature in the well of the chamber.

9. Insert the ion 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

Stem (A10 ONLY)

The one-piece delrin stem (0.9 cm OD, 7.6 cm long) found on the A10 is an integral part of the ionization chamber assembly and is not to be removed under any circumstances.

Stem (11 and 11TW ONLY)

The standard stem configuration for all Model 11 and 11TW parallel plate chambers is a 1.1 cm OD black phenolic, two-piece stem, with 10.1 and 12.7 cm segments. They are threaded together and can be separated if desired. Different stem configurations are available. In every case, the stem is threaded onto the base of the chamber proper. The stem may be separated from the chamber to provide greater mobility of the chamber when operating in a liquid phantom. When securing stem to chamber, do not over-tighten. Thread stem onto base until stem snugs up to the body of the chamber.

Stem (A15 ONLY)

The A15 has a one-piece phenolic stem (1.3 cm OD, 22.9 cm long). It is an integral part of the ionization chamber assembly and is not to be removed under any circumstances. The triaxial connector is mounted directly to the end of the stem.

Service Notes

Venting (A10, 11 and 11TW ONLY)

These particular ionization chambers are equipped with a Tygon™ tube secured to the chamber body and running the full length of the triaxial cable. (The triaxial cable is inside the tubing.) The tubing is sealed to the chamber body, and is open to ambient conditions at the connector end. There is no interference caused to the stem configurations by the Tygon™ tubing. This tubing is not intended to be removed or altered by the customer, and doing so will void the warranty.

Venting (A15 ONLY)

The A15 ionization chamber is designed to vent to ambient conditions via (2) small holes located on the outer window support ring.

Calibration Cap

Calibration caps constructed of the same material as the major elements of the chamber are available to provide more than adequate build-up for Cobalt-60 radiation.

To secure cap on chamber:

Simply place cap over chamber window. In the event of a Model 11TW Calibration/Waterproof Cap, follow instructions found under *Waterproofing Cap for Model 11TW*.

Waterproofing Cap (A10 AND 11TW ONLY)

The waterproofing cap provided with the chamber is made of acrylic and has a 1.0 mm thick window as recommended by the AAPM TG-51 protocol. The O-Ring inside the cap is designed to offer a snug fit to the chamber's outer diameter, to ensure its seal.

To secure cap on chamber: press cap firmly down onto chamber until it bottoms on chamber window ring. Occasionally, the O-Ring inside the cap will become twisted and prevent complete bottoming. If this occurs, simply rotate the cap (either clockwise or counterclockwise) while continuing downward pressure, until it bottoms on chamber window ring.

To remove cap from chamber:

Gently rotate (either clockwise or counterclockwise) cap while pulling slightly upward.

KAPTON™ WINDOW (A10, 11TW AND A15 ONLY)

The window is made of thin conducting Kapton™ film and is under tension. Touching anything to the window is to be avoided.

Service Notes



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
72136	A10 Waterproof cap; 1.0 mm; acrylic
72137	Model 11 Waterproof cap; 1.0 mm; acrylic
72130	A11 Co-60 Calibration Cap; 1.8 mm
72131	P11 Co-60 Calibration Cap; 3.2 mm
72132	T11 Co-60 Calibration Cap; 3.4 mm
72133	A11TW Co-60 Calibration/ Waterproof Cap; 2.8 mm
72134	P11TW Co-60 Calibration/ Waterproof Cap; 4.2 mm
72135	T11TW Co-60 Calibration/ Waterproof Cap; 4.4 mm

Calibration

As is standard practice for other ionization chambers, it is recommended that Exradin chambers be calibrated every (2) years. This calibration should be performed by an Accredited Dosimetry Calibration Laboratory (ADCL). Standard Imaging offers calibrations from the University of Wisconsin ADCL. You need only one purchase order to cover calibrations, shipping and handling, and service. Standard Imaging hand carries all instruments to and from the University of Wisconsin ADCL.

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.

General Chamber Specifications

Nominal Collection

Efficiency: 100%

Maximum Polarizing

Potential: 1000 V

Nominal Inherent Leakage

Currents: 10^{-15} A

Low-Noise Triaxial Cable: 50 ohms, 29 pF/ft, 1.5 m long

Signal Connector: Triaxial BNC Plug (2-Lug Male);
unless requested as other

High Voltage Connector: Integral with triaxial connector
(shell of chamber is common with
connector body)

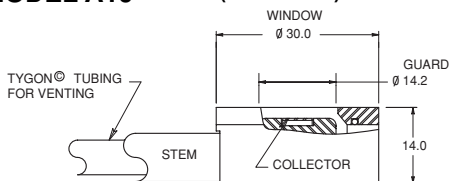
Humidity: 10-80%, non-condensing

Temperature: -15 - 50 °C

Pressure: 680 - 770 mm Hg

Planar Electron Chamber

MODEL A10 A10 (REF 92702)



ALL DIMS ARE APPROX AND IN MM

SIDE VIEW

Collecting Volume: 0.051 cm³
Nominal Calibration Factor: 60 R/nC
Centroid of Collecting Volume: 1.0 mm from top of window
Collector Diameter: 5.4 mm
Window-Collector Gap: 2.0 mm
Window: Kapton film, 3.86 gm/cm²

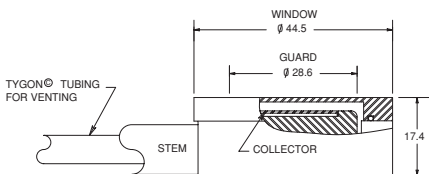
Window Support Rings, Collector, and Guard Material: A10 - Shonka Air-Equiv. plastic C552

Included Waterproofing Cap: Wall thickness of 1.0 mm; constructed of acrylic; TG-51 compliant

Polarity: < 1%

Spokas Parallel Plate Chamber

MODEL 11 A11 (REF 92701) P11 (REF 92703) T11 (REF 92704)



ALL DIMS ARE APPROX AND IN MM

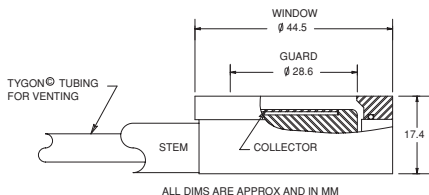
SIDE VIEW

Collecting Volume: 0.62 cm³
Nominal Calibration Factor: 5.5 R/nC
Centroid of Collecting Volume: 2.0 mm from top of window
Collector Diameter: 20.0 mm
Window-Collector Gap: 2.0 mm
Window: 1.0 mm

Window Support Rings, Collector, and Guard Material:
A11 - Shonka Air-Equiv. plastic C552
P11 - Polystyrene-Equiv. plastic D400
T11 - Shonka Tissue-Equiv. plastic A150

Thin-Window Parallel Plate Chamber

MODEL 11TW **A11TW (REF 92708)**
P11TW (REF 92709)
T11TW (REF 92710)



SIDE VIEW

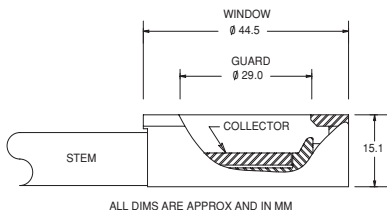
Collecting Volume: 0.92 cm³
Nominal Calibration Factor: 3.4 R/nC
Centroid of Collecting Volume: 1.5 mm from top of window
Collector Diameter: 20.0 mm
Window-Collector Gap: 3.0 mm
Window: Kapton film, 3.86 gm/cm²

Window Support Rings, Collector, and Guard Material:
A11TW - Shonka Air-Equiv. plastic C552
P11TW - Polystyrene-Equiv. plastic D400
T11TW - Shonka Tissue-Equiv. plastic A150

Included Waterproofing Cap: Wall thickness of 1.0 mm; constructed of acrylic; TG-51 compliant

Low Energy Parallel Plater Chamber

MODEL A15 **A15 (REF 92727)**



SIDE VIEW

Collecting Volume: 2.46 cm³
Nominal Calibration Factor: 1.4 R/nC
Centroid of Collecting Volume: 4.0 mm from top of window
Collector Diameter: 20.0 mm
Window-Collector Gap: 8.0 mm
Window: Kapton film, 3.86 gm/cm²

Window Support Rings, Collector, and Guard Material: **A15** - Shonka Air-Equiv. plastic C552

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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Please contact cwalters@seedos.com
