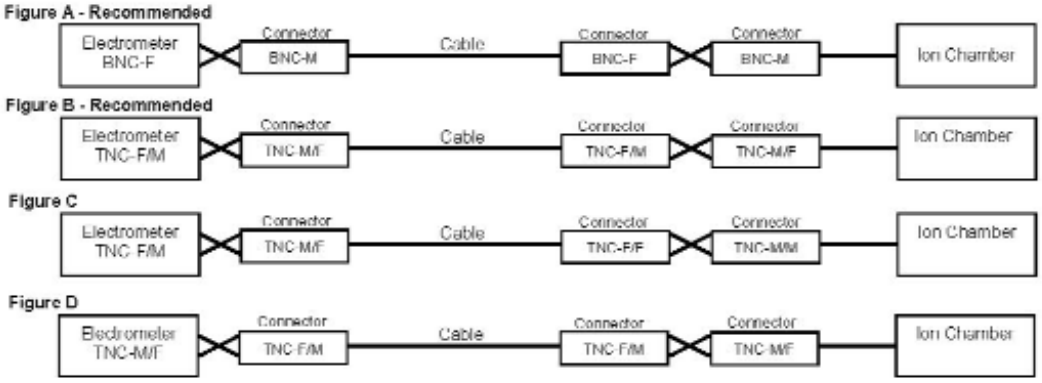
REFERENCE GUIDE FOR ELECTROMETER - CABLE - CHAMBER CONNECTIONS

Capintec Electrometer uses TNC-F/M or BNC-F . . . . . (Figure A or C)
Capintec Triax Cable uses TNC-M/F and TNC-F/F. . . . . (Figure C)
Capintec Chamber uses TNC-M/M or BNC-M . . . . . (Figure A or C)
Wellhofer Electrometer uses TNC-F/M . . . . . (Figure C)
Wellhofer Triax Cable uses TNC-M/F and TNC-F/F . . . . . (Figure C)
Wellhofer Chamber uses TNC-M/M. . . . . (Figure C)
N.E. Electrometer uses TNC-F/M . . . . . (Figure B)
N.E. Chambers w/Triax Cable uses TNC-M/F or BNC-M . (Figure B)
Victoreen Electrometer uses TNC-M/F . . . . . (Figure D)
Victoreen Chamber with Triax Cable uses TNC-M/F . . . . (Figure D)
Keithley Electrometer uses BNC-F . . . . . (Figure A)
Keithley Chamber with Triax Cable uses BNC-M . . . . . (Figure A)
PTW Chamber with 1 Meter Triax Cable uses BNC-M. . . (Figure A or B)
PTW Chamber with 10 Meters Triax Cable uses BNC-M . (Figure A)
PTW Extensions Triax Cable uses BNC-M and BNC-F . . (Figure A)
PTW Electrometer uses M, TNC-F/M or BNC-F . . . . . (Figure A)
Standard Imaging Electrometer uses BNC-F . . . . . (Figure A)
CNMC Electrometer uses BNC-F . . . . . (Figure A)

DIAGRAM FOR REFERENCE GUIDE CONNECTIONS



TRIAX CONNECTOR ADAPTERS


323-320


323-324


323-328


323-329


323-340


323-341


323-342


323-343

Item 323-320 is able to modify the BNC-F Keithley Electrometer to the TNC M/F Capintec, Wellhofer or Nuclear Enterprises Triax Cable.

Item 323-323 is able to modify the BNC-F Triax Cable to the TNC-F/M Wellhofer, Capintec and Nuclear Enterprises Electrometer.

Item 323-324 is able to modify the BNC-M Chamber to the TNC-F/M Wellhofer, Capintec and Nuclear Enterprises Electrometer.

Item	Triax Connector Adapters
323-320	Triax BNC-M to Triax TNC-F/M Connector
323-323	Triax BNC-M to Triax TNC-F/F Connector
323-324	Triax BNC-F to Triax TNC-M/F Connector
323-328	Triax BNC-F to Triax BNC-F Connector
323-329	Triax BNC-M to Triax BNC-M Connector
323-334	Triax BNC-M to Triax BNC-F Connector

Item	Coax to Triax Connector Adapters
323-339	Coax BNC-M to Triax BNC-F Connector with 1 m Cable
323-340	Coax BNC-F to Triax BNC-M Connector Diode to Electrometer Connector

Item	Coax Connector Adapters
323-341	Coax BNC-F to BNC-F Connector
323-342	Coax BNC-F to BNC-F Panel Mount Connector
323-343	Coax BNC-M to BNC-M Connector

Item	Custom Connector Adapter
323-350	Custom Adapters with 1 Meter Triax Cable

See Example Page of Traix Cable Connectors

CONNECTOR EXAMPLES

The connector center pin is underlined (ie. BNC-F, TNC-F/M and TNC-F/F)

TRIAX BNC-M AND BNC-F

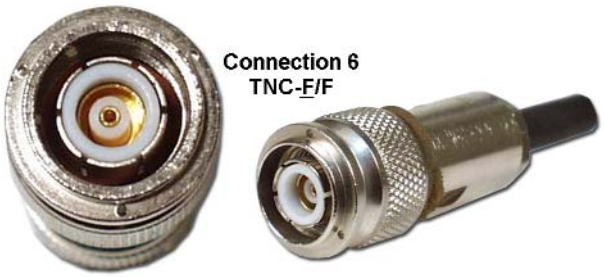
BNC = Twist and Lock

TRIAX TNC-M/F AND TNC-F/M

TNC = Threaded

TRIAX TNC M/M AND TNC F/F

TNC = Threaded



CONNECTOR DUST CAPS

323-360

323-361

323-362

323-363

The Dust Caps with chains prevent dirt and dust from accumulating in the connectors. If dust and dirt were to accumulate it would cause high leakage currents.

Item #	Description
323-360	Male Dust Cap for BNC-F and Female Center Pin
323-361	Female Dust Cap for BNC-M and Male Center Pin
323-362	Male Dust Cap for TNC-F/M or TNC-M/M Connector
323-363	Female Dust Cap for TNC-M/F or TNC-F/F Connector

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COAX EXTENSION CABLES

Item #	Description
322-891	Coax Extension Cable 10 Meter (32') BNC-F to BNC-M
322-892	Coax Extension Cable 15 Meter (49') BNC-F to BNC-M
322-893	Coax Extension Cable 20 Meter (65') BNC-F to BNC-M

TRIAX EXTENSION CABLES

The triaxial cable assemblies are made of Microdot flexible white, 3 mm diameter, shielded, low-noise, high impendance, radiation resistant cable, designed to carry the extremely small currents generated by ion chambers without signal degradation.

A standard extension cable has a male connector on one end to mate with the electrometer and a female connector on the other end to mate with the output connector of the ion chamber.

See reference guide and connector example pages to determine correct connectors for triax cables. The connector center pin is underlined (ie. BNC-F, TNC-F/M and TNC-F/F).

323-1303 Thru 323-1306

323-1313 Thru 323-1316

323-1323 Thru 323-1326

BNC TRIAX CABLE - WITH DUST CAPS

For Keithley or PTW

Connectors: BNC-F and BNC-M

Item #	Description	Meters - Feet
323-1303	BNC Triax Cable	10 - 33
323-1304	BNC Triax Cable	12 - 40
323-1305	BNC Triax Cable	15 - 50
323-1306	BNC Triax Cable	18.5 - 60
323-140	Each Additional Meter	

TNC TRIAX CABLE

For NE America (Nuclear Enterprise)

Connectors: TNC-M/F and TNC-F/M

Item #	Description	Meters - Feet
323-1313	TNC Triax Cable	10 - 33
323-1314	TNC Triax Cable	12 - 40
323-1315	TNC Triax Cable	15 - 50
323-1316	TNC Triax Cable	18.5 - 60
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

TNC TRIAX CABLE

For Capintec or Wellhofer

Connectors: TNC-M/F and TNC-F/F

Item #	Description	Meters - Feet
323-1323	TNC Triax Cable	10 - 33
323-1324	TNC Triax Cable	12 - 40
323-1325	TNC Triax Cable	15 - 50
323-1326	TNC Triax Cable	18.5 - 60
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

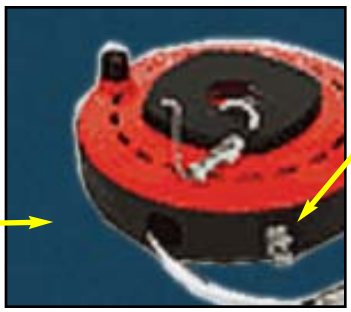
CUSTOM TRIAX CABLES AND CABLE REELS

These cables and reels are made to the customers specified length and connections. Please include cable length and type of connections, name of contact person and phone number when ordering.

TRIAX CABLE ON REEL

Cable reel assemblies offer a great convenience in winding and storage of extension cables. A cable reel will extend the life a cable significantly by eliminating kinks and providing protection during storage. Only as much cable as needed should be reeled out.
The Extended End is where the cable reels out. The Hub End has 18" of fixed triax cable. Connector type and location is determined by where the reel will be used, inside or outside of room.

See reference guide and connector example pages to determine correct connectors for triax cables.
The connector center pin is underlined (ie. BNC-F, TNC-F/M and TNC-F/F).



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BNC TRIAX CABLE REEL WITH DUST CAPS

For Keithley or PTW - Connector Ends Will Mate

Extended End: BNC-F
Hub: BNC-M

Item #	Description	Meters (Feet)
323-2414	Triax Cable Reel	12 (40)
323-2415	Triax Cable Reel	15 (50)
323-2416	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

Extended End: BNC-M
Hub: BNC-F

Item #	Description	Meters (Feet)
323-2404	Triax Cable Reel	12 (40)
323-2405	Triax Cable Reel	15 (50)
323-2406	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

TNC TRIAX CABLE REEL

For N. E. America (Nuclear Enterprise) & (New) Wellhofer - Connector Ends Will Mate

Extended End: TNC-F/M
Hub: TNC-M/F

Item #	Description	Meters (Feet)
323-2424	Triax Cable Reel	12 (40)
323-2425	Triax Cable Reel	15 (50)
323-2426	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

Extended End: TNC-M/F
Hub: TNC-F/M

Item #	Description	Meters (Feet)
323-2434	Triax Cable Reel	12 (40)
323-2435	Triax Cable Reel	15 (50)
323-2436	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

TNC TRIAX CABLE REEL

For Capintec or (Old) Wellhofer - Connector Ends Will Not Mate

Extender End: TNC-F/F
Hub: TNC-M/F

Item #	Description	Meters (Feet)
323-2444	Triax Cable Reel	12 (40)
323-2445	Triax Cable Reel	15 (50)
323-2446	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

Extender End: TNC-M/F
Hub: TNC-F/F

Item #	Description	Meters (Feet)
323-2454	Triax Cable Reel	12 (40)
323-2455	Triax Cable Reel	15 (50)
323-2456	Triax Cable Reel	20 (65)
323-140	Each Additional Meter	

Dust Caps May Be Purchased Separately

PTW FARMER IONIZATION CHAMBERS

Features
- Guard ring up to measuring volume
- Guard ring at potential of the collecting electrode
- Touchable parts free of high voltage
- Open measuring volume, without check device air density correction is necessary
- The outer dimensions are fully compatible with the Farmer Chambers of other manufacturers
- High voltage to be connected only with active current-limiting device (Imax < 0.5 mA)

Item 300-645: PTW 30002 / 30011 - is the chamber for absolute dosimetry for use with therapy dosemeters where a completely graphite-built chamber is required. This chamber is of delicate construction since it is equipped with a graphite cap and a graphite central electrode. It should be handled with care.

Item 300-650: PTW 30004 / 30012 - is the chamber for absolute dosimetry for use with therapy dosemeters where a graphite-aluminum chamber is required. This chamber is of delicate construction since it is equipped with a graphite cap. It should be handled with care.

PTW CROSS REFERENCE FROM OLD TO NEW MODEL NUMBERS

PTW#S OLD TO NEW	CHAMBER DESCRIPTION
23333 / 233633 / 30001 / 30010	0.6 cc Farmer (PMMA/AL) Discontinued See 30006/30013
30002 / 30011	0.6 cc Farmer (Graphite/Graphite)
30004 / 30012	0.6 cc Farmer (Graphite/AL)
30006 / 30013	0.6 cc Waterproof Chamber

Item 300-655: PTW 30006 / 30013 - is a **waterproof** version of the standard PTW 30001. It may be used in water phantoms and does not require a protective sleeve. The chamber is designed for absolute dosimetry in radiation therapy. It is rugged in construction. Open volume, vented at connector.

Each chamber is supplied with an integral 1 meter cable, an acrylic build-up cap, and a padded storage case and calibration certificate.

Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Item #	Description
300-645-BNC-M	PTW 30002 / 30011 Farmer Chamber
300-650-BNC-M	PTW 30004 / 30012 Farmer Chamber
300-655-BNC-M	PTW 30006 / 30013 **Waterproof** Farmer Chamber
322-0020	Waterproof Rubber Sleeve for Farmer Chamber

Specifications	Item 300-645	Item 300-650	Item 300-655 (Waterproof)
PTW	30002 / 30011	30004 / 30012	30006 / 30013 **MOST POPULAR**
Volume:	0.6 cm^3	0.6 cm^3	0.6 cm^3
Nominal Useful Range:	140 kV to 50 MeV	60 kV to 50 MeV	30 kV to 50 MeV
Response:	$2 \cdot 10^{-8}$ C/Gy	$2 \cdot 10^{-8}$ C/Gy	$2 \cdot 10^{-8}$ C/Gy
Leakage:	$\pm 4 \cdot 10^{-15}$ A	$\pm 4 \cdot 10^{-15}$ A	$\pm 4 \cdot 10^{-15}$ A
Polarizing Voltage:	Max. 500 V	Max. 500 V	Max. 500 V
Cable Leakage:	10^{-12} C/(Gy · cm)	10^{-12} C/(Gy · cm)	10^{-12} C/(Gy · cm)
Wall Material:	Graphite	Graphite	PMMA,($C_5H_8O_2$) Graphite (C)
Wall Density:	1.85 g/cm^3	1.85 g/cm^3	1.19 g/cm^3 (PMMA),1.85 g/cm^3 (C)
Wall Thickness:	0.45 mm	0.425 mm	0.335 mm PMMA, 0.09 mm C
Area Density:	83.3 mg/cm^2	79 mg/cm^2	56.5 mg/cm^2
Electrode:	Graphite 1 mm ∅, 20.7 mm L.	Aluminum 1 mm ∅, 21.2 mm L.	Aluminum 1.1 mm ∅, 21.2 mm L.
Range of Temperature:	10ºC - 40º C	10ºC - 40º C	10ºC - 40º C
Range of Relative Humidity:	20% - 75%	20%-80%(<20g/cm^3)	10% - 80%
Ion Collection Time:	300 V: 0.18 ms 400 V: 0.14 ms 500 V: 0.11 ms	300 V: 0.18 ms 400 V: 0.14 ms 500 V: 0.11 ms	300 V: 0.18 ms 400 V: 0.14 ms 500 V: 0.11 ms
Build-up Cap	PMMA	PMMA	PMMA

PTW PINPOINT® IONIZATION CHAMBERS

PTW 31014, 31015, 31016

Waterproof ion chambers for dose measurements in radiotherapy with high spatial resolution. These PinPoint chambers are for high energy photon measurements including IMRT and have an open chamber volume that is vented via the cable and connector. The chambers have a 36 mm rigid stem for mounting.

Features
- Vented sensitive volumes
- Suitable for use in water
- Suitable for dose scanning in radiotherapy beams with a superior spatial resolution
- Fully guarded up to measuring volume

The waterproof PinPoint® Chambers have been specially designed for relative beam profile measurements in a motorized water phantom for characterization of LINAC radiation fields where superior spatial resolution is desired.

PTW CROSS REFERENCE FROM OLD TO NEW MODEL NUMBERS

PTW#S OLD TO NEW	CHAMBER DESCRIPTION
31006 / 31014	0.015cc Universal PinPoint
31009 / 31015	0.03cc Universal PinPoint

Item 300-672 the 0.015 cm^3 PointPoint® chamber has an inner diameter of 2 mm and is 5 mm long.
Item 300-673 the 0.03 cm^3 PinPoint® chamber has an inner diameter of 2.9 mm and is 5 mm long
Item 300-674 the 0.016cm^3 PinPoint® 3D chamber has a 2.9 mm diameter and length. This chamber shows an identical spatial resolution in all three dimensions due to the special design of this chamber. This provides additional precision when scanning beams in the x- and y- direction without changing the chamber orientation.

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

Item #	Description
300-672	0.015 cm^3 Universal PinPoint® Chamber - PTW 31014
300-673	0.03 cm^3 Universal PinPoint® Chamber - PTW 31015
300-674	0.016 cm^3 Omni-Directional PinPoint® Chamber - PTW 31016

Specifications	Item 300-672	Item 300-673	Item 300-674
PTW	31014	31015	31016
Measuring Volume:	0.015 cm^3 Universal	0.03 cm^3 Universal	0.016 cm^3 Omni-Directional
Nominal Useful Range:			
Photons:	^{60}Co to 50 MV	^{60}Co to 50 MV	^{60}Co to 50 MV
Electrons:	6 to 50 MeV	6 to 50 MeV	6 to 50 MeV
Response:	400 pC/Gy	800 pC/Gy	400 pC/Gy
Leakage Current:	≤ ± 4 fA	≤ ± 4 fA	≤ ± 4 fA
Polarizing Voltage Effect:	< 1%	< 1%	< 1%
Cable Leakage:	≤ 1 pC/(Gy • cm)	≤ 1 pC/(Gy • cm)	≤ 1 pC/(Gy • cm)
Wall Material & Thickness:	0.57 mm PMMA 0.09 mm Graphite	0.57 mm PMMA 0.09 mm Graphite	0.57 mm PMMA 0.09 mm Graphite
Wall Density:	PMMA: 1.19 g/cm^3 Graphite: 1.84 g/cm^3	PMMA: 1.19 g/cm^3 Graphite: 1.84 g/cm^3	PMMA: 1.19 g/cm^3 Graphite: 1.84 g/cm^3
Area Density:	84.4 mg/cm^2	84.4 mg/cm^2	84 mg/cm^2
Electrode Material:	Al 99.98 R	Al 99.98 R	Al 99.98 R
Ion Collection Time:	400 V: 20 µs	400 V: 50 µs	400 V: 60 µs
Range of Temperature:	10 - 40° C (50° - 104° F)		
Range of Relative Humidity:	10 - 80% (max 20 g/m^3)		
Build-Up Cap:	PMMA		
Measuring Quantity:	Air Kerma, Absorbed dose to water and exposure		
Cable Length:	1.3 m		
Standard Connection:	Standard Connection: BNC-M Triax - If non standard connection is needed - Specify Connection		

MARKUS® ELECTRON CHAMBER

PTW 23343

Plane-parallel ion chamber with thin membrane for high-energy electron measurements in water and solid state phantoms

Features
- Suitable for use in solid state and water phantoms
- Vented measuring volume
- Fully guarded up to measuring volume
- Touchable parts free of high voltage.
- Chamber is **waterproof when used with protective cap**.

The Markus chamber is the first chamber specifically designed for electron dosimetry. A PMMA waterproofing cap, equivalent to 1 mm of water, and an annulus, for solid state phantom measurements, are included. The chamber's small measuring volume makes it ideal for electron measurements when very high spatial resolution is required. The diaphragm front allows measurements in the build-up region of electron fields to a depth of virtually zero.

Nominal Useful Range: 2 MeV to 45 MeV
Cable Length: 1.05 m
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Specifications

Volume: 0.055 cm^3
Response: $2 \cdot 10^{-9}$ C/Gy
Leakage: $\pm 2 \cdot 10^{-16}$ A
Polarizing Voltage: 300 V recommended, 400 V maximum
Cable Leakage: $3.5 \cdot 10^{-12}$ C/(Gy · cm)
Wall Material: Polyethylene CH2
Membrane Thickness: 0.03 mm
Area Thickness: 2.5 mg/cm^2
Electrode: Acrylic, graphite coated, 5.3 mm∅
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 10% to 80%
Ion Collection Time:
150 V: 0.20 ms
300 V: 0.09 ms
400 V: 0.07 ms

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

A calibration certificate with a ^{60}Co calibration factor given in absorbed dose to water is included. Air density correction is required for each measurement.

Item #	Description
300-625	Markus Ion Chamber - PTW 23343

ADVANCED MARKUS® ELECTRON CHAMBER

PTW 34045

Plane-parallel chamber for high-energy electron measurements in water and solid state phantoms.

Features
- Vented sensitive volume of 0.02 cm^3
- Same outer dimensions as the Markus chamber
- Suitable for relative and absolute electron dosimetry
- Wide guard ring design
- The chamber is **waterproof when used with protective cap**

The Advanced Markus chamber[1] is a further development of the Markus chamber, featuring a wide guard ring design to avoid perturbation effects by reducing the influence of scattered radiation from the housing. Since the outer shape is identical to the Markus chamber, all existing Markus chamber phantom plates and adapters can be used with the Advanced Markus chamber.

The small sensitive volume makes the chamber ideal for dose distribution measurements in a water phantom, giving a good spatial resolution. The chamber features a flat energy response within the nominal energy range. The membrane material is polyethylene of 0.03 mm thickness. The Advanced Markus chamber comes with a protective acrylic cover of 0.87 mm thickness (1 mm water equivalence) for use in water.

[1]The Advanced Markus chamber was developed in cooperation with Prof. Rosenow, Göttingen University, Germany.

Nominal Useful Range: 2 MeV to 45 MeV
Cable Length: 1.05 m
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

A calibration certificate with a ^{60}Co calibration factor given in absorbed dose to water is included. Air density correction is required for each measurement.

Item #	Description
300-626	Advanced Markus® Electron Chamber - PTW 34045

ROOS® ELECTRON CHAMBER

PTW 34001

Precision plane-parallel chamber for absolute dosimetry of high-energy electron radiation in water and solid state phantoms.

Features
- Vented sensitive volume of 0.35 cm^3
- Reference chamber for precise absolute electron dosimetry
- **Completely Waterproof**.
- Suitable for use in water and in solid state phantoms
- Perturbation free design and minimal polarity effect

The Roos electron chamber[1] is used as a reference electron chamber. It is recommended by the IAEA[2] for high precision electron dosimetry in radiation therapy.

The chamber has a 4 mm wide guard ring to exclude any perturbation effect even at low electron energies. The polarity effect is negligible (< 0.5% at 10 MeV). The energy response is only influenced by the stopping power ratios water/air. The acrylic entrance window has a thickness of 1 mm.

[1]The Roos Electron chamber was developed in cooperation with Dr. Roos, PTB-Braunschweig, German Federal Institutes of Physics and Metrology (National Laboratory of Germany).

[2]Technical Report No. TRS-381. The use of Plane Parallel Ionization Chambers in High Energy Electron and Photon Beams. IAEA (International Atomic Energy Agency), Vienna 1997.

Nominal Useful Energy Range: 2 MeV to 45 MeV
Cable Length: 1.08 m
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Specifications

Volume: 0.35 cm^3
Response: $1 \cdot 10^{-8}$ C/Gy
Leakage: $\pm 4 \cdot 10^{-15}$A
Polarizing Voltage: 100 V recommended, maximum 400 V
Cable Leakage: $3.5 \cdot 10^{-12}$ C/(GY · cm)
Wall Material: Acrylic, ($C_5H_8O_2$)
Wall Density: 1.19 g/cm^3
Wall Thickness: 1.0 mm
Area Density: 119 mg/cm^2
Electrode: Acrylic, graphite coated; 15 mm ∅
Guard Ring: 4 mm wide
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 10% to 80%
Ion Collection Time:
100 V: 0.37 ms
200 V: 0.13 ms
300 V: 0.07 ms

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

A calibration certificate with a ^{60}Co calibration factor given in absorbed dose to water is included. Air density correction is required for each measurement.

Item #	Description
300-675	Roos Ion Chamber - PTW 34001

PTW 23323 SEALED MICRO CHAMBER

Therapy chamber for in-vivo measurements

Features:
- Sealed ionization chamber for in-vivo measurements
- Waterproof, flexible design for intracavitary use
- Sensitive volume 0.1 cm^3, fully guarded

The 23323 micro chamber is used for patient in-vivo measurements in conjunction with an electrometer classified for this purpose. Applications are external beam and brachytherapy dose measurements on the patient's surface or in body cavities such as the rectum. for the use in body cavities the chamber should ne protected by a rubber sleeve. The micro chamber is to be used with a radioactive check device and features a stable response even if the chamber temperature changes.

Specifications

Outer diameter: 7 mm
Measuring quantities: absorbed dose to water
Reference radiation quality: ^{60}Co
Nominal sensitive volume: 0.1 cm^3
Design: waterproof, fully guarded
Reference point: on chamber axis, 8 mm from chamber tip
Direction of incidence: radial
Nominal response: 3.8 nC/Gy
Long-tern stability: ≤ 1% per year
Chamber voltage: 400 V nominal, ± 500 V maximal
Photon energy response: ≤ ± 2% (140 kV ... ^{60}Co)
Directional response in water: < ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 30° (280 kV)
Temperature dependence: ≤ ± 5% within the useful range
Temperature equilibrium time: (2 ... 3) min/°C
Leakage current: ≤ ± 4 fA
Cable leakage: ≤ 1 pC/(Gy·cm)
Wall of sensitive volume:
0.61 mm PMMA,
1.19 g/cm^3
0.13 mm graphite,
0.82 g/cm^3
rubber
Total wall area density: 197 mg/cm^2
Dimension of sensitive volume: radius 1.625 mm, length 11.875 mm
Central electrode: Al 99.5, diameter 0.8 mm
Build-up cap: PMMA, thickness 3 mm

Ion collection efficiency at nominal voltage
Ion collection time: 28 µs
Max dose rate for
≥ 99.5% saturation: 107 Gy/s
≥ 99.0% saturation: 213 Gy/s
Max dose per pulse for
≥ 99.5% saturation: 2.1 mGy
≥ 99.0% saturation: 4.2 mGy

Useful ranges:
Chamber voltage: ± (100 ... 400) V
Radiation quality: 66 keV ... 50 MV photons
Field size: (4 x 4)cm^2 ... (40 x 40)cm^2
Temperature: (10 ... 40)°C, (50 ... 104)°F
Humidity: (20 ... 75)%, max 20 g/m^3
Air pressure: (700 ... 1060) hPa
Note: A calibration certificate is included with each chamber.

Item #	Description
300-605-BNC-M	Micro Chamber 0.1 cm^3 - PTW 23323

PTW SEMIFLEX IONIZATION CHAMBERS

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PTW CROSS REFERENCE FROM OLD TO NEW MODEL NUMBERS

PTW#S OLD TO NEW	CHAMBER DESCRIPTION
233642 / 31002 / 31010	0.125 cc Semiflex
23332 / 233641 / 31003 / 31013	0.3 cc Semiflex
233643 / 31005 / 31011	0.125 cc Short Stem Semiflex

Waterproof thimble chambers for measuring high-energy photon and electron radiation in air, water and phantom material.

Item 300-660 Semiflex™ 0.125 cm³ ion chamber
Designed for measurements in the useful beam of high energy photon and electron fields in a water phantom, this chamber can also be used for IMRT measurements.

Item 300-662 Semiflex™ 0.3cm³ ion chamber
This chamber is mainly used for relative measurements in a water phantom of high energy photon and electron beams.

Features
- Vented sensitive volumes of 0.125 cm^3 and 0.3 cm^3
- Suitable for use in water phantoms
- Flat energy response within a wide energy range

The semiflex chambers are designed for therapy dosimetry, mainly for dose distribution measurements in motorized water phantoms. They have a short stem for mounting and a flexible connection cable.

The guard ring borders the measuring volume. An acrylic build-up cap for in-air measurement in ^{60}Co beams is included with each chamber.

All Semiflex chambers are shaped cylindrically with an inner diameter of 5.5 mm; they differ only in the length of the measuring volume. The 0.125 cm^3 chamber is ideal for a 3D dosimetry in a water phantom, since the measuring volume is approximately spherical resulting in a flat angular response over an angle of ±160° and a uniform spatial resolution along all three axes of a water phantom.

Nominal useful range: 30 Kev to 50 MeV photons.
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

A calibration certificate for calibration in absorbed dose to water or in air kerma is included. Air density correction is required for each measurement.

Specifications - Item 300-660 (PTW 31002 / 31010) - 0.125 cm^3 Chamber - 36 mm Rigid Stem

Cable Length: 1.3 m
Volume: 0.125 cm^3
Response: $4 \cdot 10^{-9}$ C/Gy
Leakage: $\pm 4 \cdot 10^{-15}$A
Polarizing Voltage: Max 500 V
Cable Leakage: $1 \cdot 10^{-12}$ C/(Gy · cm)
Wall Material: PMMA $(C_5H_8O_2)_n$
Wall Density: 1.18 g/cm^3
Wall Thickness: 0.7 mm
Area Density: 82.6 mg/cm^2
Electrode: Aluminum; 1 mm Ø, 5 mm long
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time:
300 V: 0.15 ms
400 V: 0.10 ms
500 V: 0.08 ms

Item #	Description
300-660	0.125 cm^3 Semiflex Chamber - 31002 / 31010 - BNC-M

Specifications - Item 300-662 (PTW 31003 / 31013) - 0.3 cm^3 Chamber

Cable Length: 1.3 m
Volume: 0.3 cm^3
Response: $1 \cdot 10^{-8}$ C/Gy
Leakage: $\pm 4 \cdot 10^{-15}$A
Polarizing Voltage: Max 500 V
Cable Leakage: $1 \cdot 10^{-12}$ C/(Gy · cm)
Wall Material: PMMA $(C_5H_8O_2)_n$
Wall Density: 1.18 g/cm^3
Wall Thickness: 0.7 mm
Area Density: 82.6 mg/cm^2
Electrode: Aluminum, graphite coated; 1.5 mm Ø; 14.25 mm long
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time:
300 V: 0.10 ms
400 V: 0.08 ms
500 V: 0.06 ms

Item #	Description
300-662	0.3 cm^3 Semiflex Chamber - 31003 / 31013 - BNC-M

Specifications - Item 300-665 (PTW 31005 / 31011) - 0.125cm^3 Short Stem - 18.75 mm Rigid Stem

Cable Length: 1.3 m
Volume: 0.125 cm^3
Sensitivity: 0.04 nC/R
Sensitive Length: 6.5 mm
Electrode Dimensions: 1 mm Ø x 5 mm
Aluminum Stem Length: 19 mm
Electrode Material: Aluminum graphite coated
Outside Diameter: 6.9 mm thimble, 7 mm stem
Wall Thickness: 0.7 mm, 82.6 mg/cm^2, acrylic/graphite
Leakage: $4x10^{-15}$ A
Polarizing Voltage: Max 500 V

Item #	Description
300-665	0.125 cm^3 Short Stem Semiflex - 31005 / 31011 - BNC-M

PTW RIGID STEM IONIZATION CHAMBERS

300-615

300-610

PTW CROSS REFERENCE FROM OLD TO NEW MODEL NUMBERS	
PTW#S OLD TO NEW	**CHAMBER DESCRIPTION**
23332 / 30016	0.3 cc Rigid Stem
23331 / 30015	1.0 cc Rigid Stem

Thimble chambers for measuring high-energy photon and electron radiation in air and in phantom material.

Features
- Very flat energy response within a wide range
- Guard ring up to measuring volume
- Suitable as reference chambers for use in solid state phantoms
- Guard ring at potential of the collecting electrode. Touchable parts free of high voltage
- Open measuring volume, without check device air density correction is necessary
- High voltage to be connected only with active current-limiting device (I_{max} < 0.5mA)

These Rigid Stem Chambers are designed as reference chambers for absolute dosimetry to be used in radiation therapy or by secondary standard dosimetry laboratories. These chambers have very small variations of response with radiation quality from low X-ray energies up to high-energy photon and electron radiation. Both chambers are constructed with a 25 cm long rigid stem for easy mounting in the radiation field.

Item 300-615 the 0.3cm^3 chamber has a smaller volume in comparison to **Item 300-610** the 1 cm^3 chamber which makes this chamber more suitable for use with pulsed radiation because of its better saturation.

Each chamber includes an acrylic build-up cap for measurement in ^{60}Co beams and a calibration certificate for calibration in absorbed dose to water or in air karma. Air density correction is required for each measurement.

Nominal Useful Energy Range: 30 keV to 50 MeV.
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

Specifications - Item 300-615 (PTW 23332 / 30016) 0.3 cm^3 Chamber

Volume: 0.3 cm^3
Response: $1 \cdot 10^{-8}$ C/Gy
Leakage: $\pm 4 \cdot 10^{-15}$ A
Polarizing Voltage: max 500 V
Cable Leakage: $1 \cdot 10^{-12}$ C/(Gy · cm)
Wall Material: PMMA $(C_5H_8O_2)_n$
Wall Density: 1.18 g/cm^3
Wall Thickness: 0.5 mm
Area Density: 59 mg/cm^2
Electrode: Aluminum, graphite coated; 2 mm Ø; 16.5 mm long
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time:
300 V: 0.05 ms
400 V: 0.04 ms
500 V: 0.03 ms

Item #	Description
300-615	Ionization Chamber, Rigid Stem 0.3 cm^3

Specifications - Item 300-610 (PTW 23331 / 30015) - 1 cm^2 Chamber

Volume: 1 cm^3
Response: $3.3 \cdot 10^{-8}$ CGy
Leakage: $\pm 4 \cdot 10^{-15}$ A
Polarizing Voltage: max 500 V
Cable Leakage: $1 \cdot 10^{-12}$ C/(Gy · cm)
Wall Material: PMMA $(C_5H_8O_2)_n$
Wall Density: 1.18 g/cm^3
Wall Thickness: 0.55 mm
Area Density: 64.9 mg/cm^2
Electrode: Aluminum, graphite coated; 1.5 mm Ø; 20 mm long
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time:
300 V: 0.3 ms
400 V: 0.2 ms
500 V: 0.2 ms

Item #	Description
300-610	Ionization Chamber, Rigid Stem 1 cm^3

PTW 60016 DOSIMETRY DIODE P - PHOTONS

Waterproof Silicon Detector for Dosimetry in High-Energy Photon Beams Up to Field Size 40cm x 40cm

- **Useful for measurements in small and large photon fields**
- **Excellent spatial resolution**
- **Minimized energy response for field size independent measurements up to 40 cm x 40 cm**

The Dosimetry Diode P is ideal for dose measurements in small photon fields as encountered in IORT, IMRT and stereotactic beams. The excellent spatial resolution makes it possible to measure very precisely beam profiles even in the penumbra region of small fields. The superior energy response enables the user to perform accurate percentage depth dose measurements which are field size independent up to field sizes of (40 x 40) cm^2. The waterproof detector can be used in air, solid state phantoms and in water.

Useful Ranges

Radiation Quality: ^{60}Co ... 25 MV photons
Field Size: 1 x 1 cm^2 ... 40 x 40 cm^2
Temperature: 50 ... 104 °F (10 ... 40 °C)
Humidity: 10 ... 80 %, max 20 g/m^3

Specifications

Type of Product: p-type silicon diode
Application: Dosimetry in radiotherapy beams
Measuring Quantity: Absorbed dose to water
Reference Radiation Quality: ^{60}Co
Nominal Sensitive Volume: 0.03 mm^3
Design: Waterproof, disk-shaped sensitive volume perpendicular to detector axis
Reference Point: On detector axis, 2 mm from detector tip
Direction of Incidence: Axial
Nominal Response: 9 nC/Gy
Dose Stability: </= 0.5 %/kGy at 6 MV; </= 1 %/10 kGy at 15 MV
Temperature Response: </= 0.4 %/K
Energy Response: At higher depths than d_{max}, the percentage depth dose curves match curves measured with ionization chambers within ± 0.5 %
Detector Bias Voltage: 0 V
Signal Polarity: Negative
Directional Response in Water: </= ± 0.5% for rotation around the chamber axis, </= ± 1% for tilting </= ± 20°
Leakage Current: </= 100 fA
Cable Leakage: </= 1 pC/(Gy·cm)

Materials and Measures

Entrance Window: 1 mm RW3, 1.045 g/cm^3, 1 mm epoxy
Total Window Area Density: 221 mg/cm^2
Water-Equivalent Window Thickness: 2.2 mm
Sensitive Volume: 1 mm^2 circular; 30 µm thick
Outer Dimensions: 7 mm diameter x 47 mm length

Item	Description
300-681	PTW 60016 - Dosimetry Diode P - Photons

PTW 60017 DOSIMETRY DIODE E - PHOTON / ELECTRON

Waterproof Silicon Detector for Dosimetry in High-Energy Electron and Photon Beams

- **Useful for measurements in all electron fields and for small photon fields**
- **Excellent spatial resolution**
- **Minimized energy response**
- **Thin entrance window for measurements in the vicinity of surfaces and interfaces**

The Dosimetry Diode E is ideal for dose measurements in small electron and photon fields as encountered in IORT, IMRT and stereotactic beams. The excellent spatial resolution makes it possible to measure very precisely beam profiles even in the penumbra region of small fields. The superior energy response enables the user to perform accurate percentage depth dose measurements which are field size independent up to field sizes of 40 x 40 cm^2. The waterproof detector can be used in air, solid state phantoms and in water.

Useful Ranges

Radiation Quality: 6...25 MeV electrons; ^{60}Co...25 MV photons
Field Size: 1 x 1 cm^2...40 x 40 cm^2 for electrons;
1 x 1 cm^2...10 x 10 cm^2 for photons
Temperature: 50...104 °F (10...40 °C)
Humidity: 10...80%, max 20 g/m^3

Specifications

Type of Product: p-type silicon diode
Application: Dosimetry in radiotherapy beams
Measuring Quantity: Absorbed dose to water
Reference Radiation Quality: ^{60}Co
Nominal Sensitive Volume: 0.03 mm^3
Design: Waterproof, disk-shaped sensitive volume perpendicular to detector axis
Reference Point: On detector axis, 0.77 mm from detector tip
Direction of Incidence: Axial
Nominal Response: 9 nC/Gy
Dose Stability: </= 0.5%/kGy at 6 MV; </= 1%/kGy at 15 MV; </= 0.5%/kGy at 5 MeV; </= 4%/kGy at 21 MeV
Temperature Response: </= 0.4 %/K
Energy Response: At higher depths than d_{max}, the percentage depth dose curves match curves measured with ionization chambers within ± 0.5 %
Detector Bias Voltage: 0 V
Signal Polarity: Negative
Directional Response in Water: </= ± 0.5% for rotation around the chamber axis, </= ± 1% for tilting </= ± 20°
Leakage Current: </= ± 50 fA
Cable Leakage: </= 1 pC/(Gy·cm)

Materials and Measures

Entrance Window: 0.3 mm RW3, 1.045 g/cm^3, 0.4 mm epoxy
Total Window Area Density: 140 mg/cm^2
Water-Equivalent Window Thickness: 1.33 mm
Sensitive Volume: 1 mm^2 circular; 30 µm thick
Outer Dimensions: 7 mm diameter x 45.5 mm length

Item	Description
300-682	PTW 60017 - Dosimetry Diode E - Photon/Electron

DIAMOND DETECTOR
PTW 60003

Waterproof diamond detector for dose measurements in high-energy photon and electron beams.

- Very small sensitive volume of 1 to 6 mm^2 and typically 0.3 mm thickness
- Good tissue-equivalence
- Suitable for dose scanning in IMRT and stereotactic fields because of its excellent spatial resolution
- The angular response in water is better than ±2%
- Suitable for use in remote controlled water phantoms

The Diamond Detector[1], based on a naturally grown diamond, is a nearly tissue-equivalent radiation detector. It is designed for dose distribution measurements in high energy photon and electron beams, featuring a favorable signal-to-noise ratio. Because of its small sensitive volume, the detector is applied for IMRT, stereotactic beams, brachytherapy and water phantom scanning, and is especially well suited for beams with very small field sizes or steep fluence gradients.

The Diamond Detector responds with an excellent spatial resolution, low energy and temperature dependence, high sensitivity, nearly no directional dependence and high resistance to radiation damage. The response is linear within ±2% in the energy range from 80 keV up to 20 MeV. The detector has a short stem for mounting to a water phantom mechanism and a flexible cable to be connected to a dosemeter with connecting system M, which supplies the required bias voltage of 100 V.

[1]The Diamond Detector was developed in cooperation with the IPTP Institute , Riga.

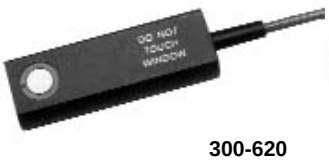
Specifications

Nominal Energy Range: 80 KeV to 20 MeV photons, 4 to 20 MeV electrons
Cable Length: 5' (1.5 m)
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.
Dose Rate Range: 0.05 to 30 Gy/min
Outer Probe Diameter: 7.3 mm
Weight Including Cable and Connector: approx. 170 g.

Specifications available at rpdinc.com.

Item #	Description
300-680	Diamond Detector, PTW 60003

SOFT X-RAY IONIZATION CHAMBERS



300-620

300-630

300-632

Plane-parallel chambers with thin membranes for measuring therapeutic x-rays in air and solid state phantoms.

Features
- Guard ring up to measuring volume
- Suitable for use in solid state phantoms and in air
- Guard ring at the potential of the inner electrode. All touchable parts free of high voltage
- Open measuring volume, without check device air density correction is necessary
- Very thin flat entrance windows for dose measurements of low energy x-ray beams
- High voltage to be connected only with active current-limiting device (I_{max}< 0.5 mA)

Item 300-620 the Small 0.02 cm^3 soft X-ray chamber is the standard chamber for dose measurements in superficial radiation therapy.
Item 300-630 the Big 0.20 cm^3 soft X-ray chamber is an alternative chamber for dose measurements in superficial radiation therapy or mammography, where a higher response is necessary.

The usual calibration of both chambers is done at 15 kV to 70 kV. The chambers have a very flat energy response in the range from 10 kV to 100 kV
Item 300-632 the 0.0053 cm^3 soft X-ray chamber has an extremely small design that allows measurements in very small fields or with steep dose gradients. The typical calibration is at 15 to 50 KV, and the energy response within this range is ±2%.

All chambers include a calibration certificate. Air density correction is required for each measurement.

Cable Length: 0.7 m
Standard Connection: BNC-M Triax
If non standard connection is needed - specify connection.

Specs. - Info. - MSDS: Visit www.rpdinc.com or call.

Specifications - Item 300-620 (PTW 23342) - Small 0.02 cm^3 Chamber

Volume: 0.02 cm^3
Response: 3 □ 10^{-10} C/Gy
Leakage: ± 1 □ 10^{-14} A
Polarizing Voltage: Max 300 V
Cable Leakage: 1 □ 10^{-12} C/(Gy □ cm)
Wall Material: PE $(CH_2)_n$
Membrane Thickness: 0.03 mm
Area Density: 2.5 mg/cm^2
Electrode: Graphite; 3 mm Ø
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time: 150 V: 0.05 ms; 300 V: 0.03 m

Item #	Description
300-620	Small 0.02 cm^3 Soft X-Ray Chamber - PTW 23342

Specifications - Item 300-630 (PTW 23344) - Big 0.2 cm^3 Chamber

Volume: 0.20 cm^3
Response: 7 □ 10^{-10} C/Gy
Leakage: ± 1 □ 10^{-14} A
Polarizing Voltage: Max 500 V
Cable Leakage: 1 □ 10^{-12} C/(Gy □ cm)
Wall Material: PE $(CH_2)_n$
Membrane Thickness: 0.03 mm
Area Density: 2.5 mg/cm^2
Electrode: Graphite with amber, graphite coated; 13 mm Ø
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 20% to 75%
Ion Collection Time: 300 V: 0.05 ms; 400 V: 0.04 ms; 500 V: 0.03 ms

Item #	Description
300-630	Big 0.2 cm^3 Soft X-Ray Chamber - PTW 23344

Specifications - Item 300-632 (PTW 34013) - Soft X-Ray Chamber 0.0053 cm^3

Volume: 0.0053 cm^3
Response: 2 □ 10^{-10} C/Gy
Leakage: ± 1 □ 10^{-14} A
Polarizing Voltage: Max 400 V
Cable Leakage: 1 □ 10^{-12} C/(Gy □ cm)
Wall Material: PE $(CH_2)_n$
Membrane Thickness: 0.025 mm
Area Density: 2.3 mg/cm^2
Electrode: Graphite; 1.7 mm Ø
Range of Temperature: 10° C to 40° C
Range of Relative Humidity: 10% to 80% (max. 20g /m^3)
Ion Collection Time: 400 V: 0,009 ms
Directional Dependence: £ ± 5% at £ ± 10°

Item #	Description
300-632	0.0053 cm^3 Soft X-Ray Chamber - PTW 34013

3.2 cc CT ION CHAMBER

Specifications

Detector Type: Vented air ion chamber
Volume: 3.2 cc
Sensitive Length: 10.0 cm
Chamber Material: Polystyrene
Chamber Inside Diameter: 6.4 mm
Chamber Wall Thickness: 54 mg/cm^2
Electrode Material: Aluminum
Sensitivity: 10 R•cm/nC (nominal)
Standard Calibration: 100 kVCP, 5.5 mm Al HVL (NIST Tech. M100)
Response Uniformity Along Axis: ± 3% over central 90% of active length
Beam Orientation: Normal to chamber axis
Phantom Adapter OD: 1.27 ± 0.04 cm (0.50 ± 0.015 in)
Leakage Current (300 V collection potential): Less than 1013 A at 10 min polarization time, less than 1014 A at 2 hr polarization time
Intensity Limits: Continuous beam: 4.86 kR/min (1% recombination loss)
Pulsed Beam: 51.5 mR/pulse (1% recombination loss)
Maximum Pulse Repetition Rate: 3.3 kHz
Cable Length: 3' (0.9 m)
Operating Voltage: -300V

Item #	Description
300-505	CT Ion Chamber, 3.2 cc, with triax BNC: used with the 35040 (ATD), TRIAD™ and TRIAD™ TnT
300-515	CT Ion Chamber, 3.2 cc, with coax BNC for signal and banana plug for bias: used with the 4000, 8000 and RAD-CHECK® PLUS Dosimeter

10 cc CT ION CHAMBER

Specifications

Detector Type: Vented air ion chamber
Volume: 10.1 cc
Sensitive Length: 10.0 cm
Chamber Material: Acrylic (PMMA)
Chamber Outside Diameter: 0.5 in ± 0.015 in (12.7 mm ± 0.4 mm)
Chamber Inside Diameter: 0.45 in (11.4 mm)
Chamber Wall Thickness: 77 mg/cm^2
Electrode Material: Aluminum, 1100
Sensitivity: 3.2 R•cm/nC (nominal) or 0.3/n
Standard Calibration: 100 kVCP, 5.5 mm Al HVL (NIST Tech. M100)
Response Uniformity Along Axis: ± 3% over central 90% of active length
Beam Orientation: Normal to chamber axis
Leakage Current: (300 V collection potential) Less than 10^{-14}A at 10 min polarization time
Intensity Limits: Continuous beam: 31.6 R/Sec, (1% recombination loss)
Pulsed Beam: 15.8 mR/pulse (1% recombination loss)
Collection Time: 0.478 mSec
Cable Length: 3' (0.9 m)
Operating Voltage: -300 V

Item #	Description
300-510	CT Ion Chamber High Sensitivity, 10 cc for multislice CT, with triax BNC: used with the 35040 ATD and other electrometer/dosimeters, including TRIAD™ and TRIAD™ TnT

EXRADIN FARMER-TYPE CHAMBERS

Model A12 , A12S, and A19

For absolute dosimetry calibrations in water, air or other phantom material

Model A12

Model A12S

Model A19

Features

- Proven guard design yields stable, precise measurements and minimizes settling time by creating uniform field lines
- Shell, collector, and guard are made of durable, long lasting Shonka conductive plastic
- Use of homogeneous material throughout the chamber minimizes perturbation of the beam due to the presence of the chamber and optimizes measurements
- Axially symmetric design of the chamber provides an uniform, isotropic response
- Inherent waterproof construction eliminates need for additional protective coverings
- A matching 2.8 mm thick 60Co build-up cap of C552 Shonka air-equivalent plastic is provided for air calibrations and measurements
- Additional build-up caps of Delrin and brass are available
- Ionization collection efficiency is 99.9% or better

Waterproof construction and two piece removable stem makes it ideal for use in water phantoms. The chamber vents through a flexible tube that surrounds the triaxial cable, ensuring the collecting volume is in pressure equilibrium with the surroundings. The design assures there are no stem or voltage soakage effects, providing precise and reliable measurements.

Farmer-type Chambers are constructed of rugged C552 Shonka air-equivalent plastic, providing excellent conductivity and years of reliable use. Rigorous one meter drop test proves ruggedness and reliability.

Model A12

For absolute dosimetry calibrations in water, air, or other phantom material. The Model A12 is completely characterized in TG 51 and TRS 398. Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for ease of use. Collecting volume is 0.65 cc.

Model A12S

The Model A12S thimble chamber is a modified Farmer-Type Chamber Model A12. The collector length of the Model A12S is approximately one-third the size of the Model A12, which confines its collecting volume to more of the tip of the chamber. Collecting volume is 0.25 cc.

Model A19

The Classic Farmer-type Chamber is fully guarded in the Exradin tradition of quality design to eliminate perturbation and minimize settling times and provides precise absolute dosimetry calibrations in water, air, or other phantom material. The Classic Farmer-type Chamber fits existing plastic phantom cavities and build-up caps. Collection volume is 0.63 cc.

CE CE0413, Designed to meet IEC 60601-1, IEC 60731

Item #	Description
300-240-A12	Exradin A12 Farmer Type Chamber, 0.65 cc
300-240-A12S	Exradin A12S Farmer Type Chamber, 0.25 cc
300-240-A19	Exradin A19 Farmer Type Chamber, 0.63 cc

EXRADIN IONIZATION CHAMBERS MATERIAL CODES:

A = C552 Shonka Air Equivalent Plastic
P = D400 Polystyrene Equivalent Plastic
T = A150 Shonka Tissue Equivalent Plastic
M = Magnesium

Specifications	Item 300-240-A12	Item 300-240-A12S	Item 300-240-A19
Exradin	Model 12	Model 12S	Model 19
Collecting Volume:	0.65 cm^3	0.25 cm^3	0.63 cm^3
Nominal Calibration Factor:	5 R/nC	14 R/nC	5 R/nC
Centroid of Collecting Volume:	12.9 mm from chamber tip	5.8 mm from chamber tip	12.8 mm from chamber tip
Collector Diameter:	1.0 mm	1.0 mm	1.0 mm
Outside Diameter Sensitive Region:	7.1 mm	7.1 mm	7.0 mm
Wall Thickness:	0.5 mm	0.5 mm	0.5 mm
Stem:	1.3 cm OD black phenolic, two piece w/ 5.1 & 12.7 cm segments	1.3 cm OD black phenolic, two piece w/ 5.1 & 12.7 cm segments	Non-removable 1.3 cm OD x 4.6 cm long black annodized aluminum
Wall, Collector and Guard Material:	A	A	A
Maximum Polarizing Potential:	1000 V		
Inherent Leakage Currents:	10^{-15} A		
Cable:	50 Ohms, 29 pF/ft, 1.5 m long		
Signal Connector:	Triax BNC-M		
High Voltage Connector:	Integral with triaxial connector		
Venting:	Vented to the Ambient via the flexible vent tube surrounding the triaxial cable		
Included 60CO Build-up Cap:	Wall thickness of 2.8 mm; constructed of C552		
Nominal Collection Efficiency:	1.000		
Waterproof:	Yes		

EXRADIN PARALLEL PLATE CHAMBERS

Model A10, Model 11 and Model 11TW

For use in routine electron beam measurements and for depth-dose studies in electron, photon, proton, and neutron beams.

- The TG-51 Protocol requires a parallel plate chamber for electron energies ≤ 6 MeV.
- The **Model 11** is **inherently waterproof** without any additional cap or covering. The **11TW** and the **A10 require waterproof caps** due to their Kapton film windows. Both chambers include a water proofing cover for TG-51.
- Fully guarded for extremely uniform field lines and negligible variation of polarizing potential, thus polarity corrections are not needed.
- Exceptionally wide 4.14 mm guard rings exceed the benefits described in TG-39 for 3 mm rings. This allows for no perturbation in field line, even at low electron energies, ensuring precision in depth-dose measurements.
- Strong, reliable construction with homogenous conductive plastic construction allows for little to no scatter when compared to other similar type chambers.
- Long rigid stem allows accurate positioning of the chamber. No stem effects are present.
- Energy dependence is only influenced by the stopping power correction, a type dependent correcting is not necessary.
- The chamber vents through a flexible tube that surrounds the triaxial cable. This vent tube is sealed to the chamber body and open near the connector.
- The **Model 11's** larger volume is ideally suited for routine electron field measurements in a water phantom. A Cobalt-60 buildup cap is available.
- **Model A10's** small measuring volume allows for excellent spatial resolution. It is ideally suited for smaller electron field measurements in a water phantom for absolute electron dosimetry calibration.
- **Model A10** is capable of measuring in zero depth in the buildup region of an electron field.

Item #	Description
300-225-A10	Exradin A10 Planar Electron, Markus Type, 0.05 cc
300-230-A11	Exradin A11 Spokas, Parallel Plate Chamber, 0.62 cc
300-230-P11	Exradin P11 Spokas, Parallel Plate Chamber, 0.62 cc
300-230-T11	Exradin T11 Spokas, Parallel Plate Chamber, 0.62 cc
300-232-A11TW	Exradin A11TW Thin Window Parallel Plate, 0.94 cc
300-232-P11TW	Exradin P11TW Thin Window Parallel Plate, 0.94 cc
300-232-T11TW	Exradin T11TW Thin Window Parallel Plate, 0.94 cc

CE

EXRADIN IONIZATION CHAMBERS MATERIAL CODES:

A = C552 Shonka Air Equivalent Plastic
IP = D400 Polystyrene Equivalent Plastic
T = A150 Shonka Tissue Equivalent Plastic
M = Magnesium

Specifications	Item 300-225-A10	Item 300-230-A11, P11, T11	Item 300-232-A11TW, P11TW, T11TW
Exradin	Model 10	Model 11	Model 11TW
Collecting Volume:	0.05 cm^3	0.6 cm^3	0.94 cm^3
Nominal Calibration Factor:	60 R/nC (TG-21) 527.4 Gy/µc (Air Kerma)	5.5 R/nC (TG-21) 48.3 Gy/µC (Air Kerma)	3.4 R/nC (TG-21) 29.9 Gy/µC (Air Kerma)
Centroid of Collecting Volume:	1.0 mm from window surface	2.0 mm from window surface	1.5 mm from window surface
Collector Diameter:	5.4 mm	20.0 mm	20.0 mm
Window-Collector Gap:	2.0 mm	2.0 mm	3.0 mm
Window:	Conductive Kapton Film, 3.86 mg/cm^2	1.0 mm thick	Conductive Kapton Film, 3.86 mg/cm^2
Body, Collector and Guard Material:	A	A, P or T	A, P or T
Maximum Polarizing Potential:	< 1000 volts	< 1000 volts	< 1000 volts
Inherent Leakage Currents:	<10^{-15} amps	<10^{-15} amps	<10^{-15} amps
Cable:	50 Ohms, 29 pF/F, 1.5 m Long	50 Ohms, 29 pF/F, 1.5 m Long	50 Ohms, 29 pF/F, 1.5 m Long
Stem:	8.9 mm O.D. Black Delrin 1 piece 7.6 cm L; not removable	11.1mm OD Black Phenolic, 2 piece 10.0 + 12.7 cm L.; removable	11.1mm OD Black Phenolic 2 piece(10.0 + 12.7 cm L. ; removable
Signal Connector:	Triaxial BNC-M		
High Voltage Connector:	Integral with Triaxial Connectors		
Venting:	Vented to the ambient via the flexible vent tube surrounding the triaxial cable		

EXRADIN THIMBLE CHAMBERS

Model 1, Model A1S, Model 2, and Model A18

For relative dosimetry scanning and measuring points in water, air or other phantom material.

A1, T1 **A1SL** **A2, P2, T2** **A18**

Exradin Thimble Chambers

- Proven guard design yields stable, precise measurements and minimizes settling time by creating uniform field lines
- Shell, collector, and guard are all made of durable, long lasting Shonka conductive plastic
- Use of homogeneous material throughout the chamber minimizes perturbation of the beam due to the presence of the chamber and optimizes measurements
- Axially symmetric design of the chamber provides a uniform, isotropic response
- Inherent waterproof construction eliminates need for additional protective coverings
- Ionization collection efficiency is always 99.9% or better

The chambers vent through a flexible tube that surrounds the triaxial cable, ensuring the collecting volume is in pressure equilibrium with the surroundings. The designs assure there are no stem or voltage soakage effects, providing precise and reliable measurements.

Model 1

The Exradin Miniature Shonka Thimble Chamber provides a perfect balance between fast scanning and point dose measurements within 1 cm in water, air, or other phantom material. Model A1 is completely characterized in TG 51 and TRS 398. The chamber features exceptional spatial resolution for relative dosimetry scanning and is capable of measuring small field sizes of 6 mm by 8 mm for accurate point dose measurements. Its waterproof construction and two piece removable stem makes it ideal for use in water phantoms. Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for ease of use.

Model A1SL

The Model A1SL Thimble Chamber is the Slim-Line version of Model A1. It has the exact same internal dimensions and collecting volume as the Model A1, yet the entire chamber has the uniform diameter of 6.4 mm (0.250"), ideal when using a small phantom. Non-removable one piece stem for easy, precise positioning. Small collection volume allows for optimal spatial resolution and exact characterization of a small area of the beam in depth-dose measurements.

Model A2

The Spokas Thimble Chamber permits the precise measurement of exposure and air kerma in photon beams and of absorbed dose in photon, electron, proton, neutron, and mixed photon-neutron beams. Waterproof construction and two piece removable stem makes it ideal for use in wtare phantoms. Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for ease of use.

Model A18

Features exceptional spatial resolution for relative dosimetry scanning and is capable of measuring small field sizes of 6.9 mm by 8.3 mm for accurate point dose measurements. Waterproof construction. Non-removable one piece stem for easy, precise positioning. A matching 2.0 mm thick Cobalt-60 build-up cap of C552 Shonka air-equivalent plastic is provided for air calibrations and measurements. ^{60}Co Build-up cap is included with wall thickness of 2.0 mm, constructed of C552 Shonka air equivalent plastic.

CE *CE0413, Designed to meet IEC 60601-1, IEC 60731*

Item #	Description
300-205-A1	Exradin A1 Miniature Shonka, 0.056 cc
300-205-T1	Exradin T1 Miniature Shonka, 0.056 cc
300-205-A1SL	Exradin A1SL Slim-Line Miniature Shonka, 0.056 cc
300-210-A2	Exradin A2 Spokas Thimble Chamber, 0.5 cc
300-210-P2	Exradin P2 Spokas Thimble Chamber, 0.5 cc
300-210-T2	Exradin T2 Spokas Thimble Chamber, 0.5 cc
300-205-A18	Exradin A18 Shonka Thimble Chamber, 0.125 cc

EXRADIN CHAMBER MATERIAL CODES:

A = C552 Shonka Air Equivalent Plastic
T = A150 Shonka Tissue Equivalent Plastic
P = D400 Polystyrene Equivalent Plastic

Specifications	Item 300-205-A1, and T1	Item 300-205-A1SL	Item 300-210-A2, P2 and T2	Item 300-205-A18
Exradin	Model 1	Model A1SL	Model 2	Model A18
Collecting Volume:	0.057 cm^3	0.057 cm^3	0.54 cm^3	0.125 cm^3
Nominal Calibration Factor:	60 R/nC	60 R/nC	6 R/nC	25 R/nC
Centroid of Collecting Volume:	4.0 mm from tip of chamber	4.1 mm from tip of the chamber	7.0 mm from tip of chamber	4.9 mm from tip of chamber
Collector Diameter:	1.0 mm	1.0 mm	4.6 mm	1.0 mm
Outside Diameter Sensitive Region:	6.0 mm	6.35 mm	11.4 mm	6.9 mm
Wall Thickness:	1.0 mm	1.1 mm	1.0 mm	1.0 mm
Wall, Collector and Guard Material:	A or T	A	A, P or T	A
Maximum Polarizing Potential:	1000 volts	1000 volts	1000 volts	1000 volts
Inherent Leakage Currents:	10^{-15} Amps	10^{-15} Amps	10^{-15} Amps	10^{-15} Amps
Cable:	50 Ohms, 29 pF/f, 1.5 m long	50 Ohms, 29 pF/f, 1.5 m long	50 Ohms, 29 pF/f, 1.5 m long	50 Ohms, 29 pF/f, 1.5 m long
Signal Connector:	Triaxial BNC-M	Triaxial BNC-M	Triaxial BNC-M	Triaxial BNC-M
High Voltage Connector:	Integral w/triaxial connectors	Integral w/triaxial connectors	Integral w/triaxial connectors	Integral w/triaxial connectors
Stem:	1.3 cm OD Black phenolic two piece with 5.1 & 12.7 cm segments	Non-removable 0.64 cm OD x 5.6 cm L, black anodized aluminum	1.3 cm OD Black phenolic two piece with 5.1 & 12.7 cm segments	Non-removable 0.69 cm OD x 5.5 cm L, black anodized aluminum
Waterproof:	Yes	Yes	Yes	Yes
Vented to the ambient via the flexible vent tube surrounding the triaxial cable				

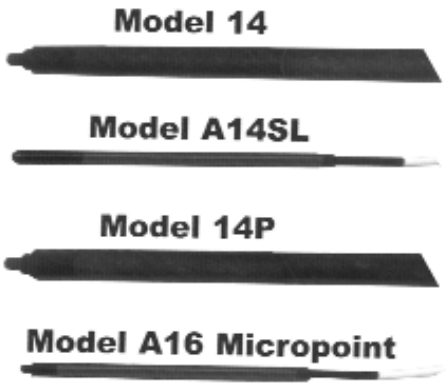
EXRADIN MICROCHAMBERS

Model 14, Model 14P, Model A14SL and Model A16

For assessing pinpoint radiation fields for orthovoltage, x-rays and stereotactic, and superficial skin therapy.

- Axially symmetric design, homogenous construction, and complete guarding for uniform field lines.
- Extremely small volumes allow for exceptional spatial resolution and exact pinpoint characterization of a small area of the beam and beam profile measurements in a water phantom or water equivalent material.
- **Inherently waterproof** construction.
- Uniform isotropic response on cylindrical axis measuring volume.
- Two separate stem pieces of 10.1 cm and 12.7 cm can be coupled together for easy mounting.
- The **Model A14SL** stem keeps the entire chamber with stem only 0.64 cm in diameter.
- The chamber vents through a flexible tube that surrounds the triaxial cable. This vent tube is sealed to the chamber body and open near the connector.
- Extremely small field sizes of 4 x 6 mm for **Model 14** and **A14SL** and 4 x 4 mm for **Model A16** allow for accurate measurements without partial volume effects.

A16 Micropoint chamber is designed primarily for applications like IMRT and stereotactic surgery, which use Cobalt and higher energy beams. A typical calibration factor for air kerma in a cobalt beam is 3.5 x 10^9 Gy/C.



CE

Item #	Description
300-250-A14	Exradin A14 Microchamber, 0.009 cc
300-250-T14	Exradin T14 Microchamber, 0.009 cc
300-250-A14SL	Exradin A14ASL Microchamber, 0.009 cc
300-252-A14P	Exradin A14P Planar Microchamber, 0.002 cc
300-252-T14P	Exradin T14P Planar Microchamber, 0.002 cc
300-253-A16	Exradin A16 Micropoint, 0.007 cc

EXRADIN IONIZATION CHAMBERS MATERIAL CODES:

A = C552 Shonka Air Equivalent Plastic
IP = D400 Polystyrene Equivalent Plastic
T = A150 Shonka Tissue Equivalent Plastic
M = Magnesium

Specifications	Item 300-250-A14, T14	Item 300-250-A14SL	Item 300-252-A14P, T14P	Item 300-253-A16
Exradin	Model 14	Model 14SL	Model 14P	Model 16
Collecting Volume:	0.009 cm^3	0.009 cm^3	0.002 cm^3	0.007 cm^3
Nominal Calibration Factor:	365 R/nC (TG-21) 3.2 Gy/nc (Air Kerma)	365 R/nC(TG-21) 3.2 Gy/nc (Air Kerma)	1430 R/nC(TG-21) 12.6 Gy/nc (Air Kerma)	400 R/nC (TG-21), 3.5 Gy/nC (Air Kerma)
Centroid of Collecting Volume:	2.0 mm from tip of shell	2 mm from tip of shell	1.5 mm from tip of shell	1.7 mm from tip of Shell
Collector Diameter / Length:	1.5 mm x 0 Length	1.5 mm x 0 Length	1.5 mm x 0 Length	0.3 mm x 1.3 mm Long
Outside Diameter Sensitive Region:	6.0 mm	6.25 mm	6.0 mm	3.4 mm
Wall Thickness:	1.0 mm	1.1 mm	1.0 mm	0.5 mm
Wall, Collector and Guard Material:	A or T	A	A or T	A
Maximum Polarizing Potential:	< 1000 volts			
Inherent Leakage Currents:	-10^{-15} Amps			
Cable:	50 Ohms, 29 pF/f, 1.5 m			
Signal Connector:	Triaxial BNC-M			
High Voltage Connector:	Integral with Triaxial Connectors			
Venting:	Vented to ambient via the flexible vent tube surrounding the triaxial cable			
Stem:	12.7 mm OD Black Phenolic, two piece 10.1 and 12.7 cm L. ; removable.			6.4 O.D. aluminum, one piece 10.1 cm L, not removable

SCANDATRONIX / WELLHOFER FARMER TYPE CHAMBERS

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Includes Build-up Cap, with individual factory calibration certificate and user's guide**

Item #	Description
300-720	Farmer Type Chamber FC65-P

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Includes Build-up Cap, with individual factory calibration certificate and user's guide**

Item #	Description
300-722	Farmer Type Chamber FC65-G

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Includes Build-up Cap, with individual factory calibration certificate and user's guide**

Item #	Description
300-725	Farmer Type Chamber FC23-C

Specifications	Item 300-720	Item 300-722	Item 300-725
Scanditronix / Wellhofer	FC65-P	FC65-G	FC23-C
Volume (Nominal)	0.65 cm^3	0.65 cm^3	0.23 cm^3
Total Active Length	23.1 mm	23.1 mm	8.8 mm
Wall Thickness	0.4 mm	0.4 mm	0.4 mm
Central Electrode Material	Aluminum	Aluminum	C552
Diameter of Inner Electrode	1.0 mm	1.0 mm	1.0 mm
Wall Thickness of Build-Up Cap for ^{60}Co	3.9 mm	3.9 mm	3.9 mm
Connector	BNC-M	BNC-M	BNC-M
Cable	1.4 m	1.4 m	1.4 m

SCANDATRONIX / WELLHOFER PARALLEL PLATE CHAMBERS

- **Waterproof**
- **Air ionization chamber**
- **High spatial resolution**
- **Fully guarded**
- **Vented through waterproof sleeve**
- **Suitable for phantoms and holders designed for Markus chamber**
- **Supplied with individual factory calibration certificate and user's guide**

Item #	Description
300-735	Parallel Plate Chamber PPC05

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Superior physics characteristics:**
  - **stabilization time after polarity change approx. 30 s**
  - **polarity effect < 1% for all usable energies, field sizes and depths at linear accelerators**
- **Supplied with individual factory calibration certificate and user's guide**

Item #	Description
300-740	Parallel Plate Chamber PPC40

- **Waterproof**
- **Air-vented**
- **Fully guarded**
- **Low polarity effect**
- **Thin front wall minimizes contamination of the beam and allows measurements at shallow depth**
- **High accuracy even at low electron energies (perturbation factor very close to unity due to large guard ring)**
- **Supplied with an individual factory calibration certificate and scientific papers**
- **Specify BNC or TNC connector**

Item #	Description
300-745	Parallel Plate Chamber NACP

Specifications	Item 300-735	Item 300-740	Item 300-745
Scanditronix / Wellhofer	PPC05	PPC40	NACP
Volume (Nominal)	0.05 cm^3	0.4 cm^3	0.16 cm^3
Cylinder Height	0.6 mm	2.0 mm	2.0 mm
Front Window Thickness	1.0 mm	1.0 mm	-
Graphite	-	-	0.5 mm
Mylar Foil	-	-	0.1 mm
Diameter of Inner Electrode	9.9 mm	16.0 mm	10.0 mm
Guard Ring Width	3.5 mm	4.0 mm	3.0 mm
Polarity Effect	-	-	0.5%
Connector	BNC-M	BNC-M	BNC-M
Cable	1.4 m	1.4 m	2.0 m

SCANDATRONIX / WELLHOFER COMPACT CHAMBERS

- **Waterproof**
- **Air ionization chamber**
- **High uniform spatial resolution**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Supplied with individual factory calibration certificate and user's guide**

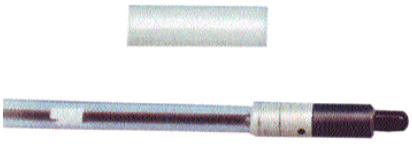
Item #	Description
300-750	Compact Chamber CC01

- **Waterproof**
- **Air ionization chamber**
- **High uniform spatial resolution**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Supplied with individual factory calibration certificate and user's guide**

Item #	Description
300-755	Compact Chamber CC04

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Supplied with individual factory calibration certificate and user's guide**
- **Designed for axial beam entrance**
- **Sphere-symmetrically designed to obtain resolution for all beam directions. (axial and radial, according to ICRU)**

Item #	Description
300-760	Compact Chamber CC08



- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **Used for radial and axial beam incidence**

Item #	Description
300-767	Compact Chamber CC13-S
300-768	CC13-S Holder for RFA Phantoms

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **PTB approved [15.101 / 97.01]**
- **Used for radial and axial beam incidence**
- **Supplied with individual factory calibration certificate and user's guide**

Item #	Description
300-765	Compact Chamber CC13

- **Waterproof**
- **Air ionization chamber**
- **Vented through waterproof sleeve**
- **Fully guarded**
- **PTB approved [15.101 / 98.01]**
- **Supplied with individual factory calibration certificate and user's guide**

Item #	Description
300-770	Compact Chamber CC25

Specifications	Item 300-750	Item 300-755	Item 300-760	Item 300-767	Item 300-765	Item 300-770
Scanditronix / Wellhofer	CC01	CC004	CC08	CC13-S	CC13	CC25
Volume (Nominal)	0.01 cm^3	0.04 cm^3	0.08 cm^3	0.13 cm^3	0.13 cm^3	0.25 cm^3
Total Active Length	3.6 mm	3.6 mm	4.0 mm	5.8 mm	5.8 mm	10.0 mm
Wall Thickness	0.5 mm	0.4 mm	0.4 mm	0.88mm	0.4 mm	0.4 mm
Diameter of Inner Electrode	0.35 mm	1.0 mm	1.0 mm	1 mm	1.0 mm	1.0 mm
Connector	BNC-M	BNC-M	BNC-M	BNC-Banana Plug	BNC-M	BNC-M
Cable	1.4 m	1.4 m	1.4 m	1.4 m	1.4 m	1.4 m

PS-033 THIN-WINDOW PARALLEL PLATE CHAMBER

The PS-033 Thin-Window Parallel Plate Chamber has excellent spatial resolution due to its small active volume of 0.5 ml. This unit has an ultra-thin mylar 0.5 mg/cm^2 window. The chamber is connected to triaxial cable terminating with a BNC-M connector. (TNC connector is available upon request.)

The PS-033 chamber is designed to be used for electron beam studies and skin-dose measurements. This chamber is supplied with mammo calibration and can be delivered calibrated with electron radiation for absolute electron dosimetry.

Specifications

Sensitivity (nC/R, nominal: 0.160
Resolution (MAX) (R, R/min.): 0.001
Maximum Display (R, R/min.): 2000
Stability: (% per year): ±1
Stem Effect (%): <±0.5
Leakage Current (1): 10^{-14}
Recommended Polarization Voltage (V): 300
Chamber Volume (ml): 0.5
Wall Thickness (mm): 0.0036
Material: PET Al
Vented: Yes
Chamber Connection: BNC-M Triax
Averaging Area (cm^2): 2

Item #	Description
300-125-BNC-M	PS-033 Parallel Plate Chamber BNC-M

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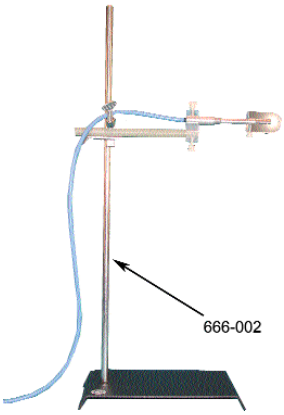
PS-033 BUILD-UP DISK

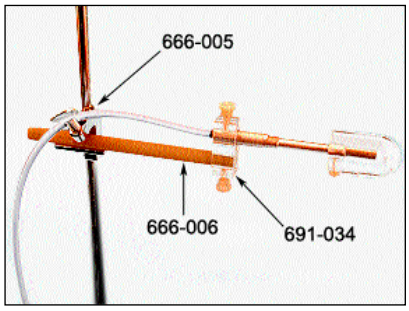
For PS-033 Thin Window Parallel Plate Chamber.

Material: Polystyrene
Size: 1 1/4” x 1 1/4” x 4 7/8 mm

Item #	Description
664-000	Capintec PS-033 Build-Up Disk

CHAMBER SUPPORT STAND





The steel chamber support stand will hold an ion chamber for "in air" measurements. The base of the stand is 6" x 9" (15.24 x 22.86 cm) and the vertical post is 24" (61 cm). The support stand includes a 90° clamp which holds a 15 cm rod. A farmer style chamber holder is also included and attaches to the 15 cm fiberglass rod.

Item 666-000 Chamber Support Stand Includes

- Item 666-002 Support Base and Post
- Item 666-005 90° Clamp
- Item 666-006 Rod for Chamber Support
- Item 691-034 Farmer Style Chamber Holder

Item	Description
666-000	Chamber Support Stand

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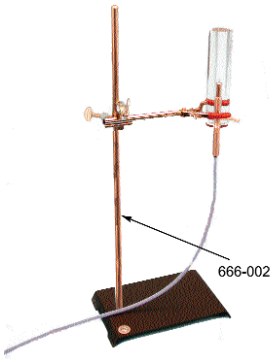
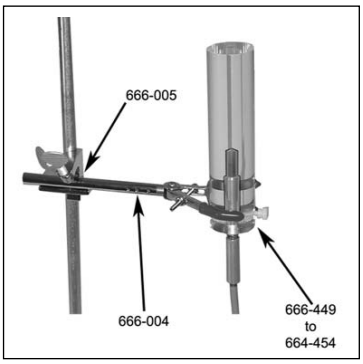
CYLINDRICAL SCATTER PHANTOMS AND STAND





The Cylindrical Scatter Phantom is used vertically to check the collimator scatter.

The steel Cylindrical Scatter Phantom Support Stand will hold a Cylindrical Scatter Phantom vertically. The base of the stand is 6" x 9" (15.24 x 22.86 cm) and the vertical post is 24" (61 cm). The support stand includes a three prong adjustable clamp that attaches to the vertical post using a 90° clamp.

Item 664-448 Cylindrical Scatter Phantom Support Stand Includes

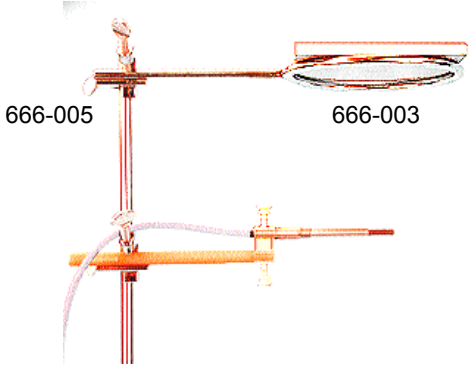
- Item 666-002 Support Base and Post
- Item 666-005 90° Clamp
- Item 666-004 Three Prong Adjustable Clamp

Item	Description
664-448	Cylindrical Scatter Phantom Support Stand

Item	Cylindrical Scatter Phantom	Material
664-449	for PTW 31002 / 31010	Acrylic
664-450	for PTW Farmer Chamber	Acrylic
664-451	for Exradin A-12 Chamber	Polystyrene
664-452	for Exradin A-2 Chamber	Acrylic
664-454	for Exradin A-14 Chamber	Acrylic

Items are Custom Made and Nonreturnable

EXTENSION RING



The steel extension ring has a 6" (15.24 cm) inside diameter and an overall length of 13.75" (35 cm). It attaches to the support stand using a 90° clamp.

Item	Description
666-003	Extension Ring, 6" (15.24 cm) ID
666-0034	Extension Ring, 4" (10.16 cm) ID
666-005	90° Clamp, Three-Prong Adjustable

PROBE HOLDER

NASA Space Shuttle engineering assures smooth and effortless operation. Performs like a robot arm in zero gravity. Fingertip control raises, lowers, and pivots (360°) the perfectly balanced holder wherever desired. Moves in all directions and the arm articulates at three points. Weighted die-cast metal base and spring counterbalance permit fluid movement with superior stability.

Item 666-010 Probe Holder Includes

- 21" (53.34 cm) Metal Arm
- 8" (20.32 cm) Diameter Metal Base
- Probe Holder

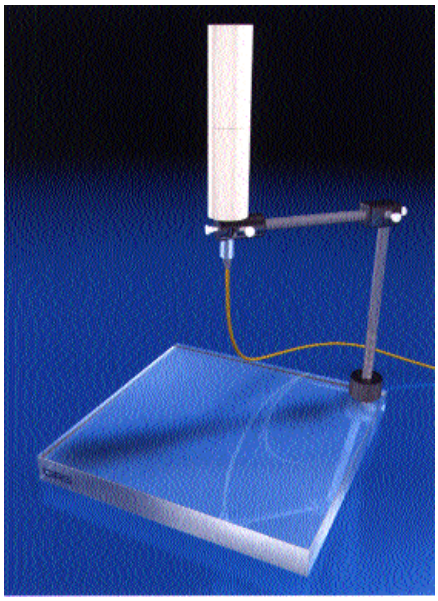
Specifications

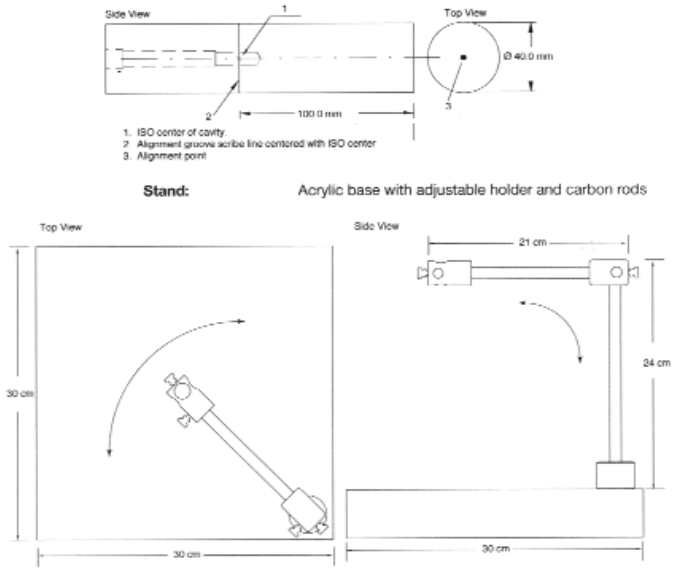
Metal Arm: 21" (53.34 cm)
Metal Base: 8" (20.32 cm) Diameter
Diameter: 10 mm and 14 mm
Weight: 6 lb (2.8 kg)

Item	Description
666-010	Probe Holder

WATER EQUIVALENT MINI PHANTOM

Permits Precise Evaluation of Scatter





The Water Equivalent Mini Phantom for Radiotherapy eliminates scatter radiation and X-Ray beam electron contamination during the ion chamber measurements at a reference depth of 10 cm. Phantom material is Plastic Water® and precise machining improves the dosimetric accuracy and reliability of LINAC beam MU calibrations.

The phantom satisfies the requirements of ESTRO Booklet 3 “Monitor unit calculation for high energy photon beams” for Output, Volume-Scatter and Scatter Primary Ratio measurements.

The Mini Phantom provides an excellent tissue simulation and opportunity of true dose comparison with the 30 x 30 cm Plastic Water® slab phantom. By positioning the ion chamber at a reference depth of 10 cm, the Mini Phantom allows the physicist to isolate and investigate the influence of scatter radiation on a reference dose measured in a slab phantom.

The Mini Phantom stand allows for vertical or horizontal positioning of a 0.6 cc Farmer and smaller diameter chambers. Precise three axis rotation improves measurement accuracy.

Specifications

Characteristics: Water-Equivalent for photon beams 150 keV - 100 MeV
Composition: Plastic Water®
Shape: Cylindrical
Dimensions: As per drawing
Standard Cavity: Farmer 0.6 cc Ion Chamber
Optional Cavities: By request

Item #	Description
664-500	Water Equivalent Mini Phantom
664-502	Stand for Mini Phantom

S_c BRASS MINI PHANTOM

S_c for Multivoltage Photon Beams

Item #	Description
664-475	Sc Brass Mini Phantom

Task Group 74

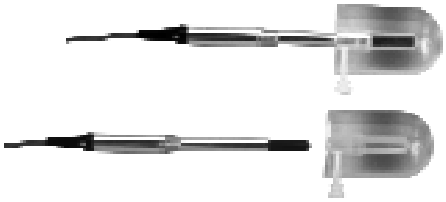
In-Air output ratio (S_c) is defined as the ratio of primary collision water kerma in free-space, K_p, per monitor unit between an arbitrary collimator setting and the reference collimator setting at the same location. Mini phantoms with sufficient lateral and longitudinal thickness to eliminate electron contamination and maintain transient electron equilibrium are recommended for the measurement of S_c. Mini phantoms made of high-Z material are used to measure S_c for small fields (e.g. IMRT or sterotactic radiosurgery).

Reference: Report of AAPM Therapy Physics Committee Task Group 74: In-air output ratio, S_c, for megavoltage photon beams - Timothy C Zhu[a)] - University of Pennsylvania, Philadelphia, PA; Andres Ahnesjö - Uppsala University, 751 85 Uppsala, Sweden and Nucletron AB, Box 1704, 751 47 Uppsala, Sweden; Kwok Leung Lam - University Michigan, Ann Arbor, MI 48109; X. Allen Li - Medical College of Wisconsin, Milwaukee, WI 53226; Chang-Ming Charlie Ma - Fox Chase Cancer Center, Philadelphia, PA 19111; Jatinder R. Palta - University of Florida, Gainsville, FL 32610; Michael B. Sharpe - Princess Margret Hospital, Toronto, ON M5G 2M9, Canada; Bruce Thomadsen - University of Wisconsin, Madison, WI 53705; Ramesh C. Tailor - RPD, UT MD Anderson Cancer Center, Houston, TX 77030 - Med. Phys. 36 (11), November 2009.

BUILD-UP CAPS FOR 'IN AIR' MEASUREMENTS

Custom Caps Available

Acrylic | Aluminum | Brass | Lead | Plastic Water



Build-up Caps for the **Capintec PR-06C or G, 0.6cm³ Farmer Style Chamber** with a 0.28 mm wall thickness of air equivalent plastic and a density of 1.785 g/cm³.

These build-up caps **fit over the Cobalt 60 polystyrene** (density 1.04 g/cm³) build-up cap that has a wall thickness of 5.2 mm and a **17.5 mm outside diameter**.

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		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Polystyrene Density 1.05 g/cm³		Brass Density 8.515 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	660-104	4.30 mm	660-404	1.87 mm	660-604	4.85 mm	660-704	0.60 mm
15 mm	6MV	660-106	7.7 mm	660-406	3.40 mm	660-606	8.74 mm	660-706	1.07 mm
24 mm	10MV	660-110	15.3 mm	660-410	6.70 mm	660-610	17.4 mm	660-710	2.12 mm
27 mm	15MV	660-115	17.8 mm	660-415	7.80 mm	660-615	20.28 mm	660-715	2.48 mm
30 mm	18MV	660-118	20.3 mm	660-418	8.90 mm	660-618	23.17 mm	660-718	2.83 mm
35 mm	20MV	660-120	24.6 mm	660-420	10.70 mm	660-620	27.97 mm	660-720	3.42 mm

		Lead Density 11.35 g/cm³		Copper Density 8.90 g/cm³		Plastic Water Density 1.02 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	660-1404	0.45 mm	660-1504	0.57 mm	660-1704	4.99 mm
15 mm	6MV	660-1406	0.80 mm	660-1506	1.02 mm	660-1706	8.91 mm
24 mm	10MV	660-1410	1.59 mm	660-1510	2.03 mm	660-1710	17.74 mm
27 mm	15MV	660-1415	1.86 mm	660-1515	2.37 mm	660-1715	20.68 mm
30 mm	18MV	660-1418	2.12 mm	660-1518	2.71 mm	660-1718	23.62 mm
35 mm	20MV	660-1420	2.56 mm	660-1520	3.27 mm	660-1720	28.52 mm

These build-up caps fit over the Cobalt 60 acrylic build-up cap with a 16.4 mm outside diameter.

Build-up caps for the following 0.6 cm³ Farmer Style Chambers:
PTW 23333 / 233633, PTW 30001 / 30010, PTW 30002 / 30011, PTW 30004 / 30012, PTW 30006 / 30013, NEL 2505/3 (A or B), Victoreen 580-006 or Victoreen 0.6 cm³ Farmer Style Chamber With 0.5 mm Acrylic Wall

		Acrylic Density 1.85 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Polystyrene Density 1.05 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	660-004	4.2 mm	660-304	1.8 mm	660-804	0.6 mm	660-904	4.8 mm
15 mm	6MV	660-006	7.6 mm	660-306	3.3 mm	660-806	1.1 mm	660-906	8.6 mm
20 mm	8MV	660-008	11.8 mm	660-308	5.2 mm	660-808	1.7 mm	660-908	13.4 mm
24 mm	10MV	660-010	15.2 mm	660-310	6.6 mm	660-810	2.1 mm	660-910	17.2 mm
27 mm	15MV	660-015	17.7 mm	660-315	7.7 mm	660-815	2.5 mm	660-915	20.0 mm
30 mm	18MV	660-018	20.3 mm	660-318	8.8 mm	660-818	2.8 mm	660-918	22.9 mm
35 mm	20MV	660-020	24.5 mm	660-320	10.7 mm	660-820	3.4 mm	660-920	27.6 mm
40 mm	24MV	660-024	28.7 mm	660-324	12.5 mm	660-824	4.0 mm	660-924	32.4 mm
50 mm	26MV	660-026	37.1 mm	660-326	16.2 mm	660-826	5.2 mm	660-926	41.9 mm

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.

BUILD-UP CAPS FOR 'IN AIR' MEASUREMENTS

The Following Build-Up Caps fit over the **0.6 cm³ Farmer Style Chambers *Without Build-up Cap:***
PTW 23333 / 233633 / 30001 / 30010, PTW 30002 / 30011, PTW 30004 / 30012, PTW 30006 / 30013, NEL 2505/3 (A or B), NE 2571 (A), NE 2581 (A), Exradin A-19, RMI 448, Nuclear Associates 30-351, Capintec PR06-G, Victoreen 580-006
There is no compensation for chamber wall thickness.

		Copper Density 8.9 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	661-004	1.2 mm	661-104	4.0 mm	661-204	1.3 mm	661-304	1.0 mm
15 mm	6MV	661-006	1.7 mm	661-106	5.5 mm	661-206	1.8 mm	661-306	1.3 mm
20 mm	8MV	661-008	2.3 mm	661-108	7.4 mm	661-208	2.3 mm	661-308	1.8 mm
24 mm	10MV	661-010	2.7 mm	661-110	8.8 mm	661-210	2.8 mm	661-310	2.1 mm
27 mm	15MV	661-015	3.0 mm	661-115	9.9 mm	661-215	3.2 mm	661-315	2.4 mm
30 mm	18MV	661-018	3.4 mm	661-118	11.0 mm	661-218	3.5 mm	661-318	2.6 mm
35 mm	20MV	661-020	3.9 mm	661-120	12.9 mm	661-220	4.1 mm	661-320	3.1 mm
40 mm	24MV	661-024	4.5 mm	661-124	14.7 mm	661-224	4.7 mm	661-324	3.5 mm
50 mm	26MV	661-026	5.6 mm	661-126	18.4 mm	661-226	5.9 mm	661-326	4.4 mm

		Acrylic Density 1.185 g/cm³		Polystyrene Density 1.05 g/cm³		Solid Water Density 1.03 g/cm³		Plastic Water Density 1.02 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	661-404	9.3 mm	661-504	10.78 mm	661-604	10.84 mm	661-704	10.8 mm
15 mm	6MV	661-406	12.7 mm	661-506	14.71 mm	661-606	14.78 mm	661-706	14.7 mm
20 mm	8MV	661-408	16.9 mm	661-508	19.61 mm	661-608	19.70 mm	661-708	19.6 mm
24 mm	10MV	661-410	20.3 mm	661-510	23.53 mm	661-610	23.65 mm	661-710	23.5 mm
27 mm	15MV	661-415	22.8 mm	661-515	26.47 mm	661-615	26.60 mm	661-715	26.5 mm
30 mm	18MV	661-418	25.3 mm	661-518	29.41 mm	661-618	29.56 mm	661-718	29.4 mm
35 mm	20MV	661-420	29.5 mm	661-520	34.31 mm	661-620	34.48 mm	661-720	34.3 mm
40 mm	24MV	661-424	33.8 mm	661-524	29.22 mm	661-624	39.41 mm	661-724	39.2 mm
50 mm	26MV	661-426	42.2 mm	661-526	49.02 mm	661-626	49.26 mm	661-726	49.0 mm

The Following Build-Up Caps fit over a **0.015cc Pinpoint Chamber PTW 31006 / 31014**

		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	662-31006-04-2	3.80 mm	662-31006-04-3	1.21 mm	662-31006-04-4	0.91 mm
15 mm	6MV	662-31006-06-2	5.27 mm	662-31006-06-3	1.68 mm	662-31006-06-4	1.26 mm
24 mm	10MV	662-31006-10-2	8.59 mm	662-31006-10-3	2.74 mm	662-31006-10-4	2.06 mm
27 mm	15MV	662-31006-15-2	9.69 mm	662-31006-15-3	3.09 mm	662-31006-15-4	2.32 mm
30 mm	18MV	662-31006-18-2	10.79 mm	662-31006-18-3	3.45 mm	662-31006-18-4	2.58 mm
35 mm	20MV	662-31006-20-2	12.63 mm	662-31006-20-3	4.03 mm	662-31006-20-4	3.03 mm

The Following Build-Up Caps fit over a **0.016cc Pinpoint Chamber PTW 31016**

		Brass Density 8.515 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness
11 mm	4MV	662-31016-04-3	
15 mm	6MV	662-31016-06-3	1.66 mm
20 mm	8MV	662-31016-08-3	
24 mm	10MV	662-31016-10-3	
27 mm	15MV	662-31016-15-3	
30 mm	18MV	662-31016-18-3	3.42 mm

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.

BUILD-UP CAPS FOR 'IN AIR' MEASUREMENTS

The following build-up caps fit over the **0.3 cm³ semiflex chamber** with an acrylic wall thickness of 0.75 mm.
Caps fit on the following chambers: **PTW 23332 / 233641 / 31003 / 31013, Nuclear Associates 30-316 and 30-317**

		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³		Polystyrene Density 1.05 g/cm³		Solid Water Density g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
5.0 mm	1.25MV Co-60	662-001	3.5 mm	662-101		662-201		662-301					
11 mm	4MV	662-004	8.5 mm	662-104	3.72 mm	662-204	1.19 mm	662-304	0.89 mm	662-604	9.63 mm	662-804	
15 mm	6MV	662-006	11.9 mm	662-106	5.19 mm	662-206	1.66 mm	662-306	1.21 mm	662-606	13.44 mm	662-806	
20 mm	8MV	662-008	16.1 mm	662-108	7.03 mm	662-208	2.24 mm	662-308	1.68 mm	662-608	18.20 mm	662-808	
24 mm	10MV	662-010	19.5 mm	662-110	8.50 mm	662-210	2.71 mm	662-310	2.04 mm	662-610	22.01 mm	662-810	
27 mm	15MV	662-015	22.0 mm	662-115	9.61 mm	662-215	3.07 mm	662-315	2.30 mm	662-615	24.87 mm	662-815	
30 mm	18MV	662-018	24.6 mm	662-118	10.71 mm	662-218	3.42 mm	662-318	2.56 mm	662-618	27.72 mm	662-818	
35 mm	20MV	662-020	28.8 mm	662-120	12.55 mm	662-220	4.01 mm	662-320	3.01 mm	662-620	32.49 mm	662-820	
40 mm	24MV	662-024	33.0 mm	662-124	14.39 mm	662-224	4.59 mm	662-324	3.45 mm	662-624	37.25 mm	662-824	

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The following build-up caps fit over the **0.125 cm³ semiflex chamber** with a wall thickness of 0.75 mm and short stem.
Caps fit on the following chambers: **PTW 233642 / 31002 / 31010, PTW 233643 / 31005 / 31011**

		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	662-2004	8.53 mm	662-2104	3.72 mm	662-2204	1.19 mm	662-2404	0.89 mm
15 mm	6MV	662-2006	11.91 mm	662-2106	5.19 mm	662-2206	1.66 mm	662-2406	1.24 mm
24 mm	10MV	662-2010	19.50 mm	662-2110	8.50 mm	662-2210	2.71 mm	662-2410	2.04 mm
30 mm	18MV	662-2018	24.57 mm	662-2118	10.71 mm	662-2218	3.42 mm	662-2418	2.56 mm
35 mm	20MV	662-2020	28.79 mm	662-2120	12.55 mm	662-2220	4.01 mm	662-2420	3.01 mm
40 mm	24MV	662-2024	33.01 mm	662-2124	4.59 mm	662-2224	4.59 mm	662-2424	3.45 mm

		Copper Density 8.90 g/cm³		Polystyrene Density 1.05 g/cm³		Plastic Water Density 1.02 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	662-2504	1.14 mm	662-2604	9.63 mm	662-2804	9.91 mm
15 mm	6MV	662-2506	1.59 mm	662-2606	13.44 mm	662-2806	13.83 mm
24 mm	10MV	662-2510	2.60 mm	662-2610	22.01 mm	662-2810	22.66 mm
27 mm	15MV	662-2515	2.93 mm	662-2615	24.87 mm	662-2815	25.60 mm
30 mm	18MV	662-2518	3.27 mm	662-2618	27.72 mm	662-2818	28.54 mm
35 mm	20MV	662-2520	3.83 mm	662-2620	32.49 mm	662-2820	33.44 mm

MARKUS CHAMBER BUILD-UP DISK

664-320

664-401

The Markus Chamber (PTW 23343) Build-up Disk is made of acrylic and available in 2 styles.

Item 664-320 is a Cobalt 60 Disk that is placed over the chamber's acrylic screw on cap. The disk has a 2.99 cm diameter and is 3.2 mm thick.

Item 664-401 is a Cobalt 60 disk with a shoulder placed over the chamber's mylar window. It has a 3.2 cm diameter and is 4 mm thick.

Item #	Description	Thickness
664-320	Cobalt 60 Disk	3.2 mm
664-401	Cobalt 60 w/Shoulder	4.01 mm

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.

BUILD-UP CAPS FOR "IN AIR" MEASUREMENTS

The following build-up caps fit on the **Exradin Model A2 0.5cm³ Spokas Thimble Chamber** with a wall thickness of 1.0 mm.
Material: Shonka air equivalent plastic C552**. Density:** 1.76 g/cm³

		Acrylic Density 1.185 g/cm³		Polystyrene Density 1.05 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-2-04-1	7.80 mm	659-2-04-6	8.80 mm	659-2-04-2	3.40 mm	659-2-04-3	1.09 mm
15 mm	6MV	659-2-06-1	11.17 mm	659-2-06-6	12.61 mm	659-2-06-2	4.87 mm	659-2-06-3	1.55 mm
20 mm	8MV	659-2-08-1	15.39 mm	659-2-08-6	17.37 mm	659-2-08-2	6.71 mm	659-2-08-3	2.14 mm
24 mm	10MV	659-2-10-1	18.77 mm	659-2-10-6	21.18 mm	659-2-10-2	8.18 mm	659-2-10-3	2.61 mm
27 mm	15MV	659-2-15-1	21.30 mm	659-2-15-6	24.04 mm	659-2-15-2	9.29 mm	659-2-15-3	2.96 mm
30 mm	18MV	659-2-18-1	23.83 mm	659-2-18-6	26.90 mm	659-2-18-2	10.39 mm	659-2-18-3	3.32 mm
35 mm	20MV	659-2-20-1	28.05 mm	659-2-20-6	31.66 mm	659-2-20-2	12.23 mm	659-2-20-3	3.90 mm
40 mm	24MV	659-2-24-1	32.27 mm	659-2-24-6	36.42 mm	659-2-24-2	14.07 mm	659-2-24-3	4.49 mm
50 mm	26MV	659-2-26-1	40.71 mm	659-2-26-6	45.94 mm	659-2-26-2	17.75 mm	659-2-26-3	5.67 mm

The following build-up caps fit over the **Exradin Model A12 Farmer type chamber** with a wall thickness of 0.5 mm.
Material: Shonka Air-Equivalent Plastic C552 **Density:** 1.76 g/cm³

		Acrylic Density 1.185 g/cm³		Polystyrene Density 1.05 g/cm³		Aluminum Density 2.718 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-12-04-1	8.54 mm	659-12-04-6	9.64 mm	659-12-04-2	3.72 mm
15 mm	6MV	659-12-06-1	11.92 mm	659-12-06-6	13.45 mm	659-12-06-2	5.19 mm
20 mm	8MV	659-12-08-1	16.14 mm	659-12-08-6	18.21 mm	659-12-08-2	7.03 mm
24 mm	10MV	659-12-10-1	19.51 mm	659-12-10-6	22.02 mm	659-12-10-2	8.51 mm
27 mm	15MV	659-12-15-1	22.04 mm	659-12-15-6	24.88 mm	659-12-15-2	9.61 mm
30 mm	18MV	659-12-18-1	24.57 mm	659-12-18-6	27.73 mm	659-12-18-2	10.71 mm
35 mm	20MV	659-12-20-1	28.79 mm	659-12-20-6	32.50 mm	659-12-20-2	12.55 mm
40 mm	24MV	659-12-24-1	33.01 mm	659-12-24-6	37.26 mm	659-12-24-2	14.39 mm
50 mm	26MV	659-12-26-1	41.45 mm	659-12-26-6	46.78 mm	659-12-26-2	18.07 mm

		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-12-04-3	1.19 mm	659-12-04-4	1.14 mm
15 mm	6MV	659-12-06-3	1.66 mm	659-12-06-4	1.59 mm
20 mm	8MV	659-12-08-3	2.25 mm	659-12-08-4	2.15 mm
24 mm	10MV	659-12-10-3	2.72 mm	659-12-10-4	2.60 mm
27 mm	15MV	659-12-15-3	3.07 mm	659-12-15-4	2.93 mm
30 mm	18MV	659-12-18-3	3.42 mm	659-12-18-4	3.27 mm
35 mm	20MV	659-12-20-3	4.01 mm	659-12-20-4	3.83 mm
40 mm	24MV	659-12-24-3	4.59 mm	659-12-24-4	4.40 mm
50 mm	26MV	659-12-26-3	5.77 mm	659-12-26-4	5.52 mm

We Manufacture Build-Up Caps for All Ionization Chambers - Please Call for More Information

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.

BUILD-UP CAPS FOR "IN AIR" MEASUREMENTS

Build-up caps for the **NE 2571**, **0.6cm³ Farmer Style Chamber** with a 0.36 mm graphite (density 1.857 g/cm³) wall thickness.

These build-up caps **fit over the Cobalt 60 delrin (density 1.415 g/cm³) build-up cap** that has a wall thickness of 4.13 mm and an **outside diameter of 15.14 mm**.

		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	660-204	4.08 mm	660-504	1.78 mm	660-5304	0.57 mm	660-5404	0.43 mm
15 mm	6MV	660-206	7.2 mm	660-506	3.1 mm	660-5306	1.04 mm	660-5406	0.78 mm
24 mm	10MV	660-210	14.8 mm	660-510	6.4 mm	660-5310	2.09 mm	660-5410	1.57 mm
27 mm	15MV	660-215	17.3 mm	660-515	7.5 mm	660-5315	2.45 mm	660-5415	1.84 mm
30 mm	18MV	660-218	19.8 mm	660-518	8.6 mm	660-5318	2.80 mm	660-5418	2.10 mm

		Copper Density 8.90 g/cm³		Polystyrene Density 1.05 g/cm³		Plastic Water Density 1.02 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	660-5504	0.54 mm	660-5604	4.60 mm	660-5704	4.74 mm
15 mm	6MV	660-5506	0.99 mm	660-5606	8.41 mm	660-5706	8.66 mm
20 mm	8MV	660-5508	1.55 mm	660-5608	13.17 mm	660-5708	13.56 mm
24 mm	10MV	660-5510	2.00 mm	660-5610	16.98 mm	660-5710	17.48 mm
27 mm	15MV	660-5515	2.34 mm	660-5615	19.84 mm	660-5715	20.42 mm
30 mm	18MV	660-5518	2.68 mm	660-5618	22.70 mm	660-5718	23.37 mm
35 mm	20MV	660-5520	3.24 mm	660-5620	27.46 mm	660-5720	28.27 mm
40 mm	24MV	660-5524	3.80 mm	660-5624	32.22 mm	660-5724	33.17 mm

The following build-up caps fit on the **IBA (Scanditronix/Wellhofer) CC13, IC-15, and IC-10 Chamber**

		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	663-901-04	8.69 mm	663-902-04	3.79 mm	663-903-04	1.21 mm
15 mm	6MV	663-901-06	12.07 mm	663-902-06	5.26 mm	663-903-06	1.68 mm
20 mm	8MV	663-901-08	16.29 mm	663-902-08	7.10 mm	663-903-08	2.27 mm
24 mm	10MV	663-901-10	19.66 mm	663-902-10	8.57 mm	663-903-10	2.74 mm
27 mm	15MV	663-901-15	22.19 mm	663-902-15	9.68 mm	663-903-15	3.09 mm
30 mm	18MV	663-901-18	24.73 mm	663-902-18	10.78 mm	663-903-18	3.44 mm
35 mm	20MV	663-901-20	28.95 mm	663-902-20	12.62 mm	663-903-20	4.03 mm
40 mm	24MV	663-901-24	33.16 mm	663-902-24	14.46 mm	663-903-24	4.62 mm
50 mm	26MV	663-901-26	41.60 mm	663-902-26	18.14 mm	663-903-26	5.79 mm

		Polystyrene Density 1.05 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness
11 mm	4MV	663-906-04	9.81 mm
15 mm	6MV	663-906-06	13.62 mm
20 mm	8MV	663-906-08	18.38 mm
24 mm	10MV	663-906-10	22.19 mm
27 mm	15MV	663-906-15	25.05 mm
30 mm	18MV	663-906-18	27.90 mm
35 mm	20MV	663-906-20	32.67 mm
40 mm	24MV	663-906-24	37.43 mm
50 mm	26MV	663-906-26	46.95 mm

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.

BUILD-UP CAPS FOR "IN AIR" MEASUREMENTS

The following build-up caps fit on the **Exradin A16**

		Aluminum Density 2.718 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-A16-04-2	3.72 mm	659-A16-04-4	0.89 mm
15 mm	6MV	659-A16-06-2	5.19 mm	659-A16-06-4	1.24 mm
20 mm	8MV	659-A16-08-2	7.03 mm	659-A16-08-4	1.68 mm
24 mm	10MV	659-A16-10-2	8.51 mm	659-A16-10-4	2.04 mm
27 mm	15MV	659-A16-15-2	9.61 mm	659-A16-15-4	2.30 mm
30 mm	18MV	659-A16-18-2	10.71 mm	659-A16-18-4	2.57 mm
35 mm	20MV	659-A16-20-2	12.55 mm	659-A16-20-4	3.01 mm
40 mm	24MV	659-A16-24-2	14.39 mm	659-A16-24-4	3.45 mm
50 mm	26MV	659-A16-26-2	18.07 mm	659-A16-26-4	4.33 mm

The following build-up caps fit on the **Exradin A14**

		Acrylic Density 1.185 g/cm³		Aluminum Density 2.718 g/cm³		Brass Density 8.515 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-A14-04-1	7.80 mm	659-A14-04-2	3.40 mm	659-A14-04-3	1.09 mm
15 mm	6MV	659-A14-06-1	11.17 mm	659-A14-06-2	4.87 mm	659-A14-06-3	1.55 mm
20 mm	8MV	659-A14-08-1	15.39 mm	659-A14-08-2	6.71 mm	659-A14-08-3	2.14 mm
24 mm	10MV	659-A14-10-1	18.77 mm	659-A14-10-2	8.18 mm	659-A14-10-3	2.61 mm
27 mm	15MV	659-A14-15-1	21.30 mm	659-A14-15-2	9.29 mm	659-A14-15-3	2.96 mm
30 mm	18MV	659-A14-18-1	23.83 mm	659-A14-18-2	10.39 mm	659-A14-18-3	3.32 mm
35 mm	20MV	659-A14-20-1	28.05 mm	659-A14-20-2	12.23 mm	659-A14-20-3	3.90 mm
40 mm	24MV	659-A14-24-1	32.27 mm	659-A14-24-2	14.07 mm	659-A14-24-3	4.49 mm

The following build-up caps fit on the **Exradin A14SL**

		Brass Density 8.515 g/cm³		Lead Density 11.35 g/cm³	
D-Max In Water	Nominal Energy	Item #	Wall Thickness	Item #	Wall Thickness
11 mm	4MV	659-A14SL-04-3	1.06 mm	659-A14SL-04-4	0.80 mm
15 mm	6MV	659-A14SL-06-3	1.53 mm	659-A14SL-06-4	1.15 mm
20 mm	8MV	659-A14SL-08-3	2.12 mm	659-A14SL-08-4	1.59 mm
24 mm	10MV	659-A14SL-10-3	2.59 mm	659-A14SL-10-4	1.94 mm
27 mm	15MV	659-A14SL-15-3	2.94 mm	659-A14SL-15-4	2.21 mm
30 mm	18MV	659-A14SL-18-3	3.30 mm	659-A14SL-18-4	2.47 mm
35 mm	20MV	659-A14SL-20-3	3.88 mm	659-A14SL-20-4	2.91 mm
40 mm	24MV	659-A14SL-24-3	4.47 mm	659-A14SL-24-4	3.35 mm

Note: At energies above 10 MV metal Build-Up Caps may become slightly activated, please check and take appropriate precautions.