

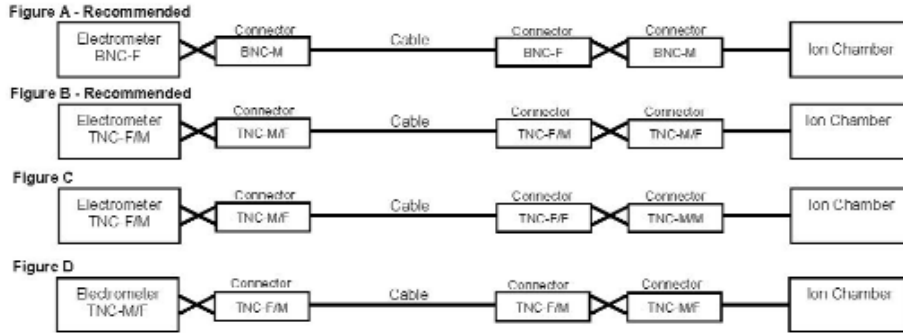
CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

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



CONNECTIONS ADAPTERS



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 Adapters
323-320	Triax BNC-M to Triax TNC-F/M Connectors
323-323	Triax BNC-M to Triax TNC-F/F Connectors w/Cable
323-324	Triax BNC-F to Triax TNC-M/F Connectors
323-328	Triax BNC-F to Triax BNC-F Connectors
323-329	Triax BNC-M to Triax BNC-M Connectors
323-334	Triax BNC-M to Triax BNC-F Connectors w/Cable
323-336	Triax BNC-M to PTW M-Type F Connector w/Cable

NOTE: Standard cable length is 1 meter.
 Cable length can be from 6" (15.2cm) to 1 m (100cm).
 Must specify cable length for length shorter than 1 meter

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

Item	Coax Adapters
323-341	Coax BNC-F and BNC-F Connectors
323-342	Coax BNC-F and BNC-F Panel Mount Connectors
323-343	Coax BNC-M and BNC-M Connectors

Item	Custom Connector Adapter
323-350	Custom Adapter - Specify Connectors 1 Meter Cable between connectors is Standard - Specify Length if another length is needed Cable Adapters are MTO, no exchanges or refunds

See Connector Example Page

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

CABLE CONNECTOR REFERENCE



A. Triax BNC Plug
(M/F) [2-Lug]



B. Triax BNC Jack
(F/M) [2-Lug]



C. Triax TNC Plug
(M/F)



D. Triax TNC Jack
(F/M)



E. Triax TNC Jack
(M/M)



F. Triax TNC Plug
(F/F)



G. Coax BNC Plug
(M/F) [2-Lug]



H. Coax BNC Jack
(F/M) [2-Lug]



I. Coax SHV Plug
(F/F) [2-Lug]



J. Coax MHV Plug
(M/F) [2-Lug]



K. Triax Type M
(M/M)



L. Triax Type M
(F/F)



M. Triax BNC Plug
(M/F) [3-Lug]



N. Banana Plug



O. Banana Jack



P. Triax LEMO Plug
(F/M)



Q. Triax LEMO Plug
(M/F)

Naming Standard: Connector Type (Center Pin Gender / Outer Housing Gender).
Letters are for reference only.

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

CONNECTOR DUST CAPS



The Dust Caps with chains prevent dirt and dust from accumulating in the connectors. Dust and dirt accumulations will 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 Connectors
323-363	Female Dust Cap for TNC-M/F or TNC-F/F Connector

TRIAIX EXTENSION CABLES

The triaxial cable assemblies are made of Microdot flexible white, 3 mm diameter, shielded, low-noise, high impedance, 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 cable connector reference pages to determine correct connectors for triax cables.



For Keithly or PTW

Item	BNC Triax Cable with Dust Caps	Length
323-1303	BNC-F and BNC-M Connectors	33' (10 Meters)
323-1304	BNC-F and BNC-M Connectors	40' (12 Meters)
323-1305	BNC-F and BNC-M Connectors	50' (15 Meters)
323-1306	BNC-F and BNC-M Connectors	59' (18 Meters)



For NE America (Nuclear Enterprise)

Item	TNC Triax Cable	Length
323-1313	TNC-M/F and TNC-F/M Connector	33' (10 Meters)
323-1314	TNC-M/F and TNC-F/M Connector	40' (12 Meters)
323-1315	TNC-M/F and TNC-F/M Connector	50' (15 Meters)
323-1316	TNC-M/F and TNC-F/M Connector	59' (18 Meters)

Dust Caps Must Be Purchased Separately



For Capintec or Wellhofer

Item	TNC Triax Cable	Length
323-1323	TNC-M/F and TNC-F/F Connector	33' (10 Meters)
323-1324	TNC-M/F and TNC-F/F Connector	40' (12 Meters)
323-1325	TNC-M/F and TNC-F/F Connector	50' (15 Meters)
323-1326	TNC-M/F and TNC-F/F Connector	59' (18 Meters)

Dust Caps Must Be Purchased Separately

CUSTOM TRIAX EXTENSION CABLES

These cables are made to order, no exchanges or refunds are available. When ordering, please specify the following:

- Connection 1 and Connection 2
- Length of the Cable in Meters
- Cable Type - 3mm Diameter White (Standard) or 5.3mm Diameter Suhner Swiss Gray (Heavy Duty)
- Cable on Reel - if Yes, Specify the Connection at the Hub

Item	Description
323-1300	Custom Cable

COAX EXTENSION CABLES



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

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

TRIAX EXTENSION CABLE ON SMALL REEL

Extended End (Ion Chamber Connection)



Hub End (Electrometer Connection)
Normally connected to Electrometer
outside of treatment room.

Cable reel assemblies offer a great convenience in winding and storage of extension cables. A cable reel will extend the life of a cable significantly by eliminating kinks and providing protection during storage. Reel out only as much cable as needed. The extended end is where the cable reels out. The hub end has 18" (45.7 cm) of fixed triax cable. Connector type and location is determined by where the reel will be used, inside or outside of room.

The reel can be purchased without a cable. The small reel can be used with cables 50' (15 meters) or less in length. This reel can not be used for cable lengths greater than 50' (15 meters).

See reference guide and cable connector reference pages to determine correct connectors for triax cable on reel.

Item	Description
323-2400	Small Cable Reel without Cable

For Keithly or PTW
Connector Ends WILL Mate

Item	BNC Triax Cable Reel w/Dust Caps	Length
323-2402	Hub End - BNC-F Connector Extended End - BNC-M Connector	40' (12 Meters)
323-2403	Hub End - BNC-F Connector Extended End - BNC-M Connector	50' (15 Meters)
323-2412	Hub End - BNC-M Connector Extended End - BNC-F Connector	40' (12 Meters)
323-2413	Hub End - BNC-M Connector Extended End - BNC-F Connector	50' (15 Meters)

For NE America (Nuclear Enterprise) and (New) Wellhofer
Connector Ends WILL Mate

Item	TNC Triax Cable Reel	Length
323-2424	Hub End - TNC-M/F Connector Extended End - TNC-F/M Connector	40' (12 Meters)
323-2423	Hub End - TNC-M/F Connector Extended End - TNC-F/M Connector	50' (15 Meters)
323-2432	Hub End - TNC-F/M Connector Extended End - TNC-M/F Connector	40' (12 Meters)
323-2433	Hub End - TNC-F/M Connector Extended End - TNC-M/F Connector	50' (15 Meters)

Dust Caps Must Be Purchased Separately

For Capintec and (Old) Wellhofer
Connector Ends WILL NOT Mate

Item	TNC Triax Cable Reel	Length
323-2444	Hub End - TNC-M/F Connector Extended End - TNC-F/F Connector	40' (12 Meters)
323-2443	Hub End - TNC-M/F Connector Extended End - TNC-F/F Connector	50' (15 Meters)
323-2454	Hub End - TNC-F/F Connector Extended End - TNC-M/F Connector	40' (12 Meters)
323-2453	Hub End - TNC-F/F Connector Extended End - TNC-M/F Connector	50' (15 Meters)

Dust Caps Must Be Purchased Separately

WALL PLATES FOR TRIAX CABLE CONNECTOR



These wall plates grip a standard BNC or TNC triax cable connector. The wall plates are made to replace a standard single or double electrical wall plate. There is an adjustable collar in the opening that can be tightened to the connector to prevent movement. An allen wrench for the collar adjustment is included with each wall plate.

Item 323-3802 will replace a standard single wall plate and has two (2) openings to hold two (2) cable connectors. The openings are one on top and one on bottom.

Specifications

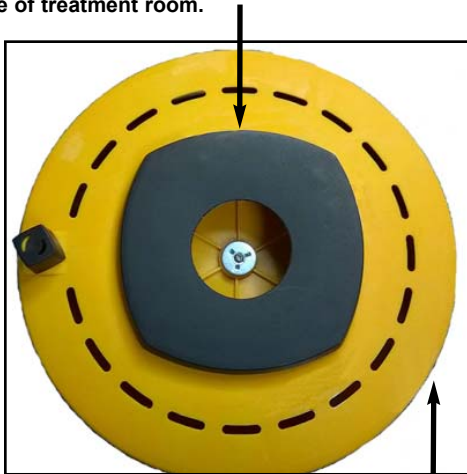
Material: Stainless Steel

Item	Description
323-380	Wall Plate, Single for Triax Cable Connector
323-381	Wall Plate, Double for Triax Cable Connector
323-3802	Wall Plate, Single for 2 Triax Cable Connectors

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TRIAx EXTENSION CABLE ON LARGE REEL

Hub End (Electrometer Connection)
Normally connected to Electrometer outside of treatment room.



Extended End (Ion Chamber Connection)

Cable reel assemblies offer a great convenience in winding and storage of extension cables. A cable reel will extend the life of a cable significantly by eliminating kinks and providing protection during storage. Reel out only as much cable as needed. The extended end is where the cable reels out. The hub end has 18" (45.7 cm) of fixed triax cable. Connector type and location is determined by where the reel will be used, inside or outside of room.

The reel can be purchased without a cable. The large reel can be used with any cable length but must be used on all cable lengths over 15 meters.

See reference guide and cable connector reference pages to determine correct connectors for triax cable on reel.

Item	Description
323-2401	Large Cable Reel without Cable

For Keithly or PTW Connector Ends WILL Mate

Item	BNC Triax Cable Reel w/Dust Caps	Length
323-2404	Hub End - BNC-F Connector Extended End - BNC-M Connector	40' (12 Meters)
323-2405	Hub End - BNC-F Connector Extended End - BNC-M Connector	50' (15 Meters)
323-2406	Hub End - BNC-F Connector Extended End - BNC-M Connector	65' (20 Meters)
323-2414	Hub End - BNC-M Connector Extended End - BNC-F Connector	40' (12 Meters)
323-2415	Hub End - BNC-M Connector Extended End - BNC-F Connector	50' (15 Meters)
323-2416	Hub End - BNC-M Connector Extended End - BNC-F Connector	65' (20 Meters)

For NE America (Nuclear Enterprise) and (New) Wellhofer Connector Ends WILL Mate

Item	TNC Triax Cable Reel	Length
323-2422	Hub End - TNC-M/F Connector Extended End - TNC-F/M Connector	40' (12 Meters)
323-2425	Hub End - TNC-M/F Connector Extended End - TNC-F/M Connector	50' (15 Meters)
323-2426	Hub End - TNC-M/F Connector Extended End - TNC-F/M Connector	65' (20 Meters)
323-2434	Hub End - TNC-F/M Connector Extended End - TNC-M/F Connector	40' (12 Meters)
323-2435	Hub End - TNC-F/M Connector Extended End - TNC-M/F Connector	50' (15 Meters)
323-2436	Hub End - TNC-F/M Connector Extended End - TNC-M/F Connector	65' (20 Meters)

Dust Caps Must Be Purchased Separately

For Capintec and (Old) Wellhofer Connector Ends WILL NOT Mate

Item	TNC Triax Cable Reel	Length
323-2442	Hub End - TNC-M/F Connector Extended End - TNC-F/F Connector	40' (12 Meters)
323-2445	Hub End - TNC-M/F Connector Extended End - TNC-F/F Connector	50' (15 Meters)
323-2446	Hub End - TNC-M/F Connector Extended End - TNC-F/F Connector	65' (20 Meters)
323-2452	Hub End - TNC-F/F Connector Extended End - TNC-M/F Connector	40' (12 Meters)
323-2455	Hub End - TNC-F/F Connector Extended End - TNC-M/F Connector	50' (15 Meters)
323-2456	Hub End - TNC-F/F Connector Extended End - TNC-M/F Connector	65' (20 Meters)

Dust Caps Must Be Purchased Separately

PTW FARMER® IONIZATION CHAMBERS

Thimble chambers for measuring high-energy photon, electron and proton beams



- Fully guarded chamber
- Sensitive volumes of 0.6 cm³, vented to air
- Flat energy response
- Correction factors needed to determine absorbed dose to water or air kerma are published in the pertinent dosimetry protocols
- The chambers are designed for the use in solid state phantoms and are not waterproof

The 0.6 cm³ PTW Farmer chambers are designed for absolute dosimetry in high-energy photon, electron and proton beams.

Item 300-640: The 30010 is a Classical therapy chamber, it is a wide spread ionization chamber for absolute dose measurements in radiation therapy. The acrylic chamber wall ensures the ruggedness of the chamber. The wall material is graphite with a protective acrylic cover, and the electrode is made of Al. The nominal photon energy range is from 30 kV to 50 MV.

- Acrylic wall, graphited
- Aluminum central electrode

Item 300-645: The 30011 is a pure graphite therapy chamber. The 30011 all graphite Farmer chamber is used for absolute dose measurements in radiation therapy in cases where a minimum of different materials in the radiation field is desired. Due to the sole use of graphite the energy response of the chamber at energies below ⁶⁰Co varies stronger than that of chambers with an aluminum electrode. The 30011 is used for therapy dosimetry, where a completely graphite-built chamber is required. The nominal photon energy range is from 140 kV to 50 MV.

Item 300-650: The 30012 Farmer chamber with graphite wall is intended for absolute dose measurements in radiation therapy. The graphite wall makes the chamber almost water-equivalent, the aluminum central electrode improves the energy response at energies below ⁶⁰Co. The 30012 is used where a chamber with graphite wall and Al electrode is required. The nominal photon energy range is from 60 kV to 50 MV.

The electron energy range of all chambers is from 10 MeV to 45 MeV. The chambers type 30011 and 30012 with their graphite caps are of delicate construction and should be handled with extreme care. The guard rings of all chamber types are designed up to the measuring volume an acrylic build-up cap for in-air measurement in ⁶⁰Co beams is included with each chamber, as well as a calibration certificate.

Item	Description
300-640	PTW 30010, 0.6cc Farmer® Chamber
300-645	PTW 30011, 0.6cc Graphite Farmer® Chamber
300-650	PTW 30012, 0.6cc C/A1 Farmer® Chamber

Specify Connection

WATERPROOF PTW FARMER® IONIZATION CHAMBER

Waterproof therapy chamber for absolute dosimetry in high-energy photon, electron and proton beams



- Waterproof, fully guarded chamber
- Sensitive volumes of 0.6 cm³, vented to air
- Flat energy response
- Acrylic wall, graphited
- Aluminum central electrode
- Correction factors needed to determine absorbed dose to water or air kerma are published in the pertinent dosimetry protocols

- The chamber is waterproof and can be used in water or solid state phantoms
- The acrylic chamber wall ensures the ruggedness of the chamber

Item 300-655 has a nominal photon energy range from 30 kV to 50 MV, the electron energy range is from 10 MeV to 45 MeV. This chamber type is of rugged construction, since the wall material is graphite with a protective acrylic cover and the electrode is made of aluminum. The guard ring is designed up to the measuring volume. A calibration certificate for calibration in absorbed dose to water or air kerma is included with each chamber. Air density correction is required for each measurement

Item	Description
300-655	PTW 30013, 0.6cc Waterproof Farmer® Chamber

Specify Connection

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

PTW FARMER® IONIZATION CHAMBERS

Specifications	Item 300-640	Item 300-645	Item 300-650	Item 300-655 (Waterproof)
PTW Model	30010	30011	30012	30013
Type of Product	vented cylindrical ionization chamber acc. IEC 60731	vented cylindrical ionization chamber acc. IEC 60731	vented cylindrical ionization chamber acc. IEC 60731	vented cylindrical ionization chamber acc. IEC 60731
Application	absolute dosimetry in radiotherapy beams	absolute therapy dosimetry in solid state phantoms and air	absolute therapy dosimetry in solid state phantoms and air	absolute therapy dosimetry in water, solid state phantoms and air
Measuring Quantities	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure
Reference Radiation Quality	⁶⁰ Co	⁶⁰ Co	⁶⁰ Co	⁶⁰ Co
Nominal Sensitive Volume	0.6 cm ³	0.6 cm ³	0.6 cm ³	0.6 cm ³
Design	NOT waterproof, vented fully guarded	NOT waterproof, vented fully guarded	NOT waterproof, vented fully guarded	Waterproof, vented fully guarded
Reference Point	on chamber axis, 13mm from tip	on chamber axis, 13mm from tip	on chamber axis, 13mm from tip	on chamber axis, 13mm from tip
Direction of Incidence	radial	radial	radial	radial
Nominal Response	20 nC/Gy	20 nC/Gy	20 nC/Gy	20 nC/Gy
Long-term Stability	≤ 0.5 % per year	≤ 0.5 % per year	≤ 0.5 % per year	≤ 0.5 % per year
Chamber Voltage	400 V nominal ± 500 V maximal	400 V nominal ± 500 V maximal	400 V nominal ± 500 V maximal	400 V nominal ± 500 V maximal
Polarity Effect at ⁶⁰Co	< 0.5%	< 0.5%	< 0.5%	< 0.5%
Photon Energy Response	± ± 2% (70 kV to 280 kV) ± ± 4% (200 kV to ⁶⁰ Co)	± ± 2% (70 kV to 280 kV) ± ± 4% (200 kV to ⁶⁰ Co)	± ± 2% (70 kV to 280 kV) ± ± 4% (200 kV to ⁶⁰ Co)	± ± 2% (70 kV to 280 kV) ± ± 4% (200 kV to ⁶⁰ Co)
Directional Response in Solid State Phantom	± ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 5°	± ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 5°	± ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 5°	± ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 5°
Directional Response in Water				± ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 5°
Leakage Current	± ± 4 fA	± ± 4 fA	± ± 4 fA	± ± 4 fA
Cable Leakage	≤ 1 pC/(Gy·cm)	≤ 1 pC/(Gy·cm)	≤ 1 pC/(Gy·cm)	≤ 1 pC/(Gy·cm)
Materials and Measures				
Wall of Sensitive Volume	0.335 mm PMMA, 1.19 g/cm ³ 0.09 mm graphite, 1.85 g/cm ³	0.425 mm graphite, 1.85 g/cm ³	0.425 mm graphite, 1.85 g/cm ³	0.335 mm PMMA, 1.19 g/cm ³ 0.09 mm graphite, 1.85 g/cm ³
Total Wall Area Density	56.5 mg/cm ²	79 mg/cm ²	79 mg/cm ²	56.5 mg/cm ²
Dimension of Sensitive Volume	radius 3.05 mm length 23.0 mm	radius 3.05 mm length 23.0 mm	radius 3.05 mm length 23.0 mm	radius 3.05 mm length 23.0 mm
Central Electrode	Al 99.98, diameter 1.15 mm	Graphite, diameter 1.0 mm	Al 99.98, diameter 1.15 mm	Al 99.98, diameter 1.15 mm
Build-up Cap	PMMA, thickness 4.55 mm	PMMA, thickness 4.55 mm	PMMA, thickness 4.55 mm	PMMA, thickness 4.55 mm
Ion Collection Efficiency at Nominal Voltage				
Ion collection time	140µs	140µs	140µs	140µs
Max. dose rate for ≥ 99.5 % saturation	5 Gy/s	5 Gy/s	5 Gy/s	5 Gy/s
> 99.0 % saturation	10 Gy/s	10 Gy/s	10 Gy/s	10 Gy/s
Max. dose per pulse for ≥ 99.5 % saturation	0.46mGy		0.46mGy	0.46mGy
> 99.0 % saturation	0.91mGy		0.91mGy	0.91mGy
Useful Ranges				
Chamber voltage	± 100 to 400 V	± 100 to 400 V	± 100 to 400 V	± 100 to 400 V
Radiation quality	30 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons	140 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons	80 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons	30 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons
Field size	(5 x 5) cm ² to (40 x 40) cm ²	(5 x 5) cm ² to (40 x 40) cm ²	(5 x 5) cm ² to (40 x 40) cm ²	(5 x 5) cm ² to (40 x 40) cm ²
Temperature	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)
Humidity	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³
Air pressure	700 - 1060 hPa	700 - 1060 hPa	700 - 1060 hPa	700 - 1060 hPa

PTW SEMIFLEX® IONIZATION CHAMBERS

Waterproof thimble chambers for measuring high-energy photon and electron radiation



- **Waterproof, semiflexible design for easy mounting in scanning water phantoms**
- **Sensitive volumes of 0.125 cm³ and 0.3 cm³, vented to air**
- **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 nominal useful energy range is from 140 kV to 50 MV photons and 10 MeV to 50 MeV electrons. The wall material is graphite with a protective acrylic cover. The guard rings are designed up to the measuring volume. An acrylic build-up cap for in air measurement in ⁶⁰Co beams is included with each chamber, as well as a calibration certificate for calibration in absorbed dose to water or in air kerma. Air density correction is required for each measurement. Both chambers are shaped cylindrically with an inner diameter of 5.5 mm; they differ only in the length of the measuring volume.

Item 300-660

- **Minimized directional response**

The 31010 semiflexible chamber is the ideal compromise between small size for reasonable spatial resolution and large sensitive volume for precise dose measurements. This makes the 31010 chamber to one of the most commonly used chambers in scanning water phantom systems. The chamber volume of 0.125 cm³ gives enough signal to use the chamber also for high precision absolute dose measurements. The sensitive volume is approximately spherical resulting in a flat angular response and a uniform spatial resolution along all three axes of a water phantom.

Item 300-662

- **Increased sensitive volume for low level measurements**

The 31013 semiflexible chamber is ideal for precise dose measurements and for the measurement of dose distributions in scanning water phantom systems. The chamber is used as an alternative for the 31010 chamber in cases where increased signal levels are required and spatial resolution along the axis of the chamber can be compromised.

Item	Description
300-660	PTW 31010, 0.125cc Semiflex® Chamber
300-662	PTW 31013, 0.3cc Semiflex® Chamber

Specify Connection

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

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Specifications	Item 300-660	Item 300-662
PTW Model	31010	31013
Type of Product	vented cylindrical ionization chamber	vented cylindrical ionization chamber
Application	absolute dosimetry in radiotherapy beams	absolute dosimetry in radiotherapy beams
Measuring Quantities	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure
Reference Radiation Quality	⁶⁰ Co	⁶⁰ Co
Nominal Sensitive Volume	0.125 cm ³	0.3 cm ³
Design	Waterproof, vented fully guarded	Waterproof, vented fully guarded
Reference Point	on chamber axis, 4.5mm from chamber tip	on chamber axis, 9.5mm from chamber tip
Direction of Incidence	radial	radial
Nominal Response	3.3 nC/Gy	10 nC/Gy
Long-term Stability	≤ 1% per year	≤ 1% per year
Chamber Voltage	400 V nominal ± 500 V maximal	400 V nominal ± 500 V maximal
Polarity Effect at ⁶⁰ Co	< 2%	< 1%
Photon Energy Response	≤ ± 2% (140 kV to 280 kV) ≤ ± 4% (140 kV to ⁶⁰ Co) ≤ ± 5% (50 kV to 150 kV)	≤ ± 2% (140 kV to 280 kV) ≤ ± 4% (100 kV to ⁶⁰ Co)
Directional Response in Water	≤ ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 10°	≤ ± 0.5% for rotation around the chamber axis and for tilting of the axis up to ± 10°
Leakage Current	≤ ± 4 fA	≤ ± 4 fA
Cable Leakage	≤ 1 pC/(Gy·cm)	≤ 1 pC/(Gy·cm)
Materials and Measures		
Wall of Sensitive Volume	0.55 mm PMMA, 1.19 g/cm ³ 0.15 mm graphite, 0.82 g/cm ³	0.55 mm PMMA, 1.19 g/cm ³ 0.15 mm graphite, 0.82 g/cm ³
Total Wall Area Density	78 mg/cm ²	78 mg/cm ²
Dimension of Sensitive Volume	radius 2.75 mm length 6.5 mm	radius 2.75 mm length 16.25 mm
Central Electrode	Al 99.98, diameter 1.1 mm	Al 99.98, diameter 0.9 mm
Build-up Cap	PMMA, thickness 3mm	PMMA, thickness 3mm
Ion Collection Efficiency at Nominal Voltage		
Ion collection time	121 μs	121 μs
Max. dose rate for ≥ 99.5 % saturation	6 Gy/s	14 Gy/s
> 99.0 % saturation	12 Gy/s	28 Gy/s
Max. dose per pulse for ≥ 99.5 % saturation	0.5 mGy	0.8 mGy
> 99.0 % saturation	1.0 mGy	1.5 mGy
Useful ranges		
Chamber voltage	± 100 to 400 V	± 100 to 400 V
Radiation quality	140 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons	100 kV to 50 MV photons (10 to 45) MeV electrons (50 to 270) MeV protons
Field size	(3 x 3) cm ² to (40 x 40) cm ²	(4 x 4) cm ² to (40 x 40) cm ²
Temperature	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)
Humidity	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³
Air pressure	700 - 1060 hPa	700 - 1060 hPa

PTW PINPOINT® IONIZATION CHAMBERS

PTW 31015, 0.03 cc WATERPROOF PINPOINT CHAMBER Small-sized therapy chambers for dosimetry in high-energy photon beams



- Small-sized sensitive volume of only 0.03 cm³ and 2.9 mm in diameter, vented to air
- Very high spatial resolution when used for scans perpendicular to the chamber axis
- Aluminum central electrode

The 31015 PinPoint chamber is ideal for dose measurements in small fields as encountered e.g. in IORT, IMRT and stereotactic beams. Relative dose distributions can be measured with very high spatial resolution when the chamber is moved perpendicular to the chamber axis.

The waterproof, fully guarded chamber can be used in air, solid state phantoms and in water.

Item	Description
300-673	PTW 31015, 0.03 cc Waterproof PinPoint Chamber

Specify Connection

PTW 31022, 0.016 cc PINPOINT® 3D CHAMBER

Ultra small-sized therapy chamber with 3D characteristics for dosimetry in high-energy photon beams



- Small-sized cylindrical ion chamber with vented sensitive volume of only 0.016 cm³
- Small polarity effect
- Minimal cable irradiation effect
- Minimal directional response
- Short ion collection time, low pre irradiation dose
- Suitable for field sizes from 2 cm x 2 cm to 40 cm x 40 cm

The 31022 3D PinPoint 3D chamber is ideal for dose measurements in small fields as encountered e.g. in IORT, IMRT and stereotactic beams but can also be used for measurements in large fields. Designed for radial beam orientation, the small-sized chamber shows excellent 3D characteristics. Relative dose distributions can be measured with high spatial resolution in any direction.

The waterproof, fully guarded chamber can be used in air, solid state phantoms and in water.

Item	Description
300-676	PTW 31022, 0.016 cc PinPoint 3D Chamber, Waterproof

Specify Connection

PTW 31023, 0.015 cc PINPOINT CHAMBER

Ultra small-sized therapy chamber for dosimetry in high-energy photon beams



- Small-sized cylindrical ion chamber with sensitive volume of only 0.015 cm³ and 2 mm in diameter, vented to air
- Very high spatial resolution when used for scans perpendicular to the chamber axis
- Small polarity effect
- Minimal cable irradiation effect

The 31023 PinPoint chamber is ideal for dose measurements in small fields as encountered e.g. in IMRT and stereotactic beams as well as for FFF. Relative dose distributions can be measured with very high spatial resolution when the chamber is moved perpendicular to the chamber axis.

The waterproof, fully guarded chamber can be used in air, solid state phantoms and in water.

Item	Description
300-677	PTW 31023, 0.015 cc PinPoint Chamber

Specify Connection

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

Specifications	Item 300-673	Item 300-676	Item 300-677
PTW Model	31015	31022	31023
Type of Product	vented cylindrical ionization chamber	vented cylindrical ionization chamber	vented cylindrical ionization chamber
Application	dosimetry in high-energy photon beams with high spatial resolution	dosimetry in photon beams	dosimetry in high-energy photon beams with high spatial resolution
Measuring Quantities	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure	absorbed dose to water, air kerma, exposure
Reference Radiation Quality	⁶⁰ Co	⁶⁰ Co	⁶⁰ Co
Nominal Sensitive Volume	0.03 cm ³	0.016 cm ³	0.015 cm ³
Design	Waterproof, vented, fully guarded	Waterproof, vented, guarded	Waterproof, vented, fully guarded
Reference Point	on chamber axis, 3.4mm from chamber tip	on chamber axis, 2.4mm from chamber tip	on chamber axis, 3.4mm from chamber tip
Direction of Incidence	radial	radial	radial, axial
Pre-Irradiation Dose	2 Gy	1 Gy	1 Gy
Nominal Response	800 pC/Gy	400 pC/Gy	400 pC/Gy
Long-term Stability	≤ 1% per year	≤ 0.5 % per year	≤ 1% per year
Chamber Voltage	400 V nominal ± 500 V maximal	300 V nominal ± 500 V maximal	300 V nominal ± 500 V maximal
Polarity Effect at ⁶⁰ Co	≤ ± 2%	≤ ± 0.8 %	≤ ± 1%
Directional Response in Water	≤ ± 0.5% for rotation around the chamber axis, ≤ ± 1% for tilting of the axis up to ± 20° (radial incidence) ± 15° (axial incidence)	≤ ± 0.5% for rotation around the chamber axis, ≤ ± 1% for tilting of the axis up to ± 10°	≤ ± 0.5% for rotation around the chamber axis, ≤ ± 1% for tilting of the axis up to ± 10°
Leakage Current	≤ ± 4 fA	≤ ± 4 fA	≤ ± 4 fA
Cable Leakage	≤ 1 pC/(Gy·cm)	≤ 100 fC/(Gy·cm)	≤ 100 fC/(Gy·cm)

Materials and Measures

Wall of Sensitive Volume	0.57 mm PMMA, 1.19 g/cm ³ 0.09 mm graphite, 1.85 g/cm ³	0.57 mm PMMA, 1.19 g/cm ³ 0.09 mm graphite, 1.85 g/cm ³	0.57 mm PMMA, 1.19 g/cm ³ 0.09 mm graphite, 1.85 g/cm ³
Total Wall Area Density	85 mg/cm ²	84 mg/cm ²	85 mg/cm ²
Dimension of Sensitive Volume	radius 1.45 mm length 5 mm	radius 1.45 mm length 2.9 mm	radius 1 mm length 5 mm
Central Electrode	Al 99.98, diameter 0.3 mm	Al 99.98, diameter 0.6 mm	Al 99.98, diameter 0.6 mm
Build-up Cap	PMMA, thickness 3mm	PMMA, thickness 3mm	PMMA, thickness 3mm

Ion Collection Efficiency at Nominal Voltage

Ion collection time	50 μs	45 μs	13 μs
Max. dose rate for ≥ 99.5 % saturation	29 Gy/s	46 Gy/s	557 Gy/s
≥ 99.0 % saturation	55 Gy/s	91 Gy/s	1.1 kGy/s
Max. dose per pulse for ≥ 99.5 % saturation	1.2 mGy	0.8 mGy	4.8 mGy
≥ 99.0 % saturation	2.3 mGy	2.2 mGy	9.6 mGy

Useful ranges

Chamber voltage	± 100 to 400 V	± 100 to 400 V	± 100 to 400 V
Radiation quality	⁶⁰ Co - 50 MV photons	⁶⁰ Co - 25 MV photons	⁶⁰ Co - 25 MV photons
Field size	2x2 cm ² to 30x30 cm ²	2x2 cm ² to 40x40 cm ²	2x2 cm ² to 40x40 cm ²
Temperature	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)	50°-104°F (10°-40°C)
Humidity	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³	10 - 80%, max 20 g/m ³
Air pressure	700 - 1060 hPa	700 - 1060 hPa	700 - 1060 hPa

PTW 23343 MARKUS® ELECTRON CHAMBER

Classic plane parallel chamber for absolute dosimetry in high-energy electron beams



- Thin entrance window and waterproof protection cap
- Small-sized for high spatial resolution
- Sensitive volume 0.055 cm³, vented to air

The 23343 Markus chamber is manufactured in the original famous Markus design. Absorbed dose to water can be measured by applying correction factors for perturbation effects as published in pertinent dosimetry protocols. The thin entrance window allows measurements in solid state phantoms up to the surface. The protection cap makes the chamber waterproof for measurements in water phantoms.

Item	Description
300-625	PTW 23343 - Markus (0.055cc) Chamber
664-401	Co-60 Build-Up Cap, 4.0 mm Acrylic

Specify Connection

PTW 34045 ADVANCED MARKUS® ELECTRON CHAMBER

Perturbation-free version of the famous classic Markus chamber for absolute dosimetry in high-energy electron beams



- Perturbation-free electron chamber
- Thin entrance window and waterproof protection cap
- Small-sized for high spatial resolution
- Sensitive volume 0.02 cm³, vented to air
- Suitable for relative and absolute electron dosimetry

The Advanced Markus chamber features 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 with 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 from 2 MeV to 45 MeV. With the very thin membrane of only 0.03 mm polyethylene, the chamber is suitable for use in solid state phantoms. The chamber comes with a protective acrylic cover of 0.87 mm thickness (1 mm water equivalence) for use in water. A calibration certificate with a ⁶⁰Co calibration factor given in absorbed dose to water is included. Air density correction is required for each measurement. The chamber cable length is 1.05 m.

Item	Description
300-626	PTW 34045 - Advanced Markus Electron Chamber
664-401	Co-60 Build-Up Cap, 4.0 mm Acrylic

Specify Connection

PTW 34001 ROOS® ELECTRON CHAMBER

Waterproof plane parallel chamber for absolute dosimetry in high energy electron and proton beams



- Perturbation-free, minimized polarity effect
- Reference chamber for precise absolute electron dosimetry
- Waterproof, wide guard ring design
- Sensitive volume 0.35 cm³, vented to air
- Suitable for use in water and in solid state phantoms

The 34001 Roos chamber is the golden standard for absolute dose measurements in high-energy electron beams. Modern dosimetry protocols refer to the chamber's design and provide dosimetric correction factors. Its waterproof design allows the chamber to be used in water or in solid state phantoms. The Roos chamber is also well suited for the measurement of high-energy photon depth dose curves. The chamber can be used for dose measurements of proton beams.

The Roos electron chamber¹ is used as a reference electron chamber. It is recommended by the IAEA² 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 chamber is waterproof for absolute dose and depth dose measurements in a water phantom. The coated acrylic entrance window has a thickness of 1.1 mm. The nominal useful energy range is from 2 MeV to 45 MeV. A calibration certificate with a ⁶⁰Co calibration factor given in absorbed dose to water is included. Air density correction is required for each measurement. The chamber cable length is 1.08 m.

¹ The Roos electron chamber was developed in cooperation with Dr. Roos, PTB-Braunschweig, German Federal Institute 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

Item	Description
300-675	PTW 34001 - Roos Ion Chamber

Specify Connection

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

Specifications	Item 300-625	Item 300-626	Item 300-675
PTW Model	23343 Markus	34045 Advanced Markus	34001 Roos
Type of Product	vented plane parallel ionization chamber		vented plane parallel ionization chamber acc IEC 60731
Application	absolute dosimetry in high-energy electron beams		absolute dosimetry in high-energy electron and proton beams
Measuring Quantity	absorbed dose to water		
Reference Radiation Quality	^{60}Co		
Nominal Sensitive Volume	0.055cm ³	0.02cm ³	0.35cm ³
Design	waterproof with protection cap, vented		waterproof, vented
Reference Point	in chamber center on entrance foil, or 1.3 mm below surface of protection cap		in chamber center, 1.12 mm below surface
Direction of Incidence	perpendicular to chamber plane		perpendicular to chamber plane, see label 'FOCUS'
Nominal Response	2 nC/Gy	0.67 nC/Gy	12 nC/Gy
Long-term Stability	< 1 % per year		< 0.5 % per year
Chamber Voltage	300 V nominal \pm 400 V maximal		200 V nominal \pm 400 V maximal
Polarity Effect	< 1 % for electrons > 9 MeV		< 0.5 %
Directional Response in Water	< \pm 0.1 % for chamber tilting < \pm 10°		
Leakage Current	< \pm 4 fA		
Cable Leakage	< 3.5 pC/(Gy·cm)	< 1 pC/(Gy·cm)	
Materials and Measures			
Entrance Foil	0.03 mm PE (polyethylene CH ₂), 2.76 mg/cm ²		
Protection Cap	0.87 mm PMMA, 1.19 g/cm ³ , 0.4 mm air		
Entrance window			1.01 mm PMMA, 1.19 g/cm ³ 0.02 mm graphite, 0.82 g/cm ³ 0.1 mm varnish, 1.19 g/cm ³
Total window area density	106 mg/cm ² , 1.3 mm (protection cap included)		132 mg/cm ²
Water-equivalent window thickness	1.06 mm (protection cap included)		1.3 mm
Sensitive Volume	radius 2.65 mm depth 2 mm	radius 2.5 mm depth 1 mm	radius 7.5 mm depth 2 mm
Guard ring width	< 0.2 mm	2 mm	4 mm
Ion Collection Efficiency at Nominal Voltage			
Ion collection time	90 μ s	22 μ s	125 μ s
Max. dose rate for \geq 99.5 % saturation	12 Gy/s	187 Gy/s	5.2 Gy/s
\geq 99.0 % saturation	24 Gy/s	375 Gy/s	10.4 Gy/s
Max. dose per pulse for \geq 99.5 % saturation	0.7 mGy	2.78 mGy	0.46 mGy
\geq 99.0 % saturation	1.4 mGy	5.56 mGy	0.93 mGy
Useful ranges			
Chamber voltage	\pm 100 - 300 V	\pm 50 - 300 V	\pm 50 - 300 V
Radiation quality	2 - 45 MeV electrons 50 - 270 MeV protons		2 - 45 MeV electrons ^{60}Co - 25 MV photons 50 - 270 MeV protons
Field size	3 x 3 cm ² to 40 x 40 cm ²		4 x 4 cm ² to 40 x 40 cm ²
Temperature	50° to 104°F, 10° to 40°C		
Humidity	10 to 80 %, max 20 g/m ³		
Air pressure	700 - 1060 hPa		

PTW 30016 - 0.3 cm³ Rigid Stem Chamber

Therapy chamber for absolute dosimetry in high-energy photon and electron beams



- Fully guarded chamber
- Sensitive volume 0.3 cm³, vented to air
- Acrylic wall, graphited
- Aluminum central electrode

The 30016 chamber is used for absolute dose measurements in radiation therapy in cases where the high volume of the 30015 chamber is not needed and a higher spatial resolution is needed. Correction factors needed to determine absorbed dose to water or air kerma are published in the pertinent dosimetry protocols. The acrylic chamber wall ensures the ruggedness of the chamber. The chamber is designed for the use in solid state phantoms and is therefore not waterproof.

Specifications	Item 300-615
PTW Model	30016
Type of Product	vented cylindrical ionization chamber
Application	absolute dosimetry in radiotherapy beams
Measuring Quantity	absorbed dose to water, air kerma, exposure
Reference Radiation Quality	⁶⁰ Co
Nominal Sensitive Volume	0.3 cm ³
Design	not waterproof, vented, fully guarded
Reference Point	in chamber axis, 9.5 mm from chamber tip
Direction of Incidence	radial
Nominal Response	10.5 nC/Gy
Long-term Stability	≤ 1 % per year
Chamber Voltage	400 V nominal ± 600 V maximal
Polarity Effect	≤ 1%
Photon Energy Response	≤ ± 2 %, 70kV - 250 kV ≤ ± 4 %, 200kV - 60Co
Directional Response in Solid State Phantom	≤ ± 0.5 % for rotation around the chamber axis, ≤ ± 1 % for tilting of the axis up to ± 20°
Leakage Current	≤ ± 4 fA
Cable Leakage	≤ 1 pC/(Gy·cm)

Materials and Measures	
Wall of Sensitive Volume	0.35 mm PMMA, 1.19 g/cm ³ 0.135 mm graphite, 1.85 g/cm ³
Total Window Area Density	67 mg/cm ²
Dimension of Sensitive Volume	radius 2.5 mm length 18 mm
Central Electrode	Al 99.98, diameter 0.85 mm
Build-Up Cap	PMMA, thickness 3 mm

Ion Collection Efficiency at Nominal Voltage	
Ion collection time	84 μs
Max. dose rate for ≥ 99.5 % saturation	11.5 Gy/s
≥ 99.0 % saturation	23.1 Gy/s
Max. dose per pulse for ≥ 99.5 % saturation	0.69 mGy
≥ 99.0 % saturation	1.38 mGy

Useful ranges	
Chamber voltage	± 100 - 600 V
Radiation quality	70 kV - 50 MV Photons 6 - 25 MeV electrons
Field size	5 x 5 cm ² to 40 x 40 cm ²
Temperature	50° to 104°F, 10° to 40° C,
Humidity	20 to 80 %, max 20 g/m ³
Air pressure	700 - 1060 hPa

Item	Description
300-615	PTW 30016 - 0.3 cm ³ Rigid Stem Ion Chamber

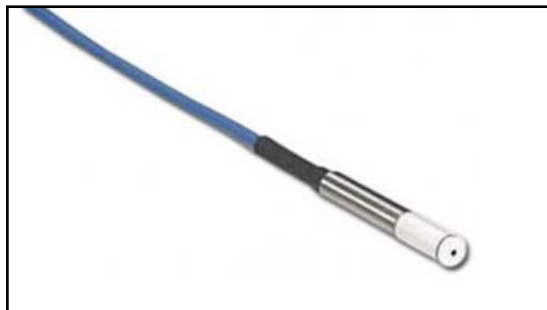
Specify Connection

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

PTW 60016 DOSIMETRY DIODE P - PHOTONS

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



- Waterproof, disk-shaped silicon diode detector with sensitive volume of only 0.03 mm³
- 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 has been designed for dose measurements in small photon fields as encountered in IORT, IMRT and stereotactic beams. The excellent spatial resolution allows for very precise beam profile measurements even in the penumbra region of small fields. Due to its superior energy response accurate percentage depth dose (PDD) measurements can be performed which are field size independent up to field sizes of 40 x 40 cm².

The waterproof diode detector can be used in air, solid state phantoms and in water.

Specifications	Item 300-681
PTW Model	60016
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 , radius 0.6 mm, shielded
Design	waterproof, disk-shaped sensitive volume perpendicular to detector axis
Reference Point	on detector axis, 2.42 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	≤ 4 %/K
Energy Response	at higher depths than d _{max} , the percentage depth dose curves match curves measured with ionization chambers within ± 0.5%
Bias Voltage	0 V
Signal Polarity	negative
Directional Response in Solid State Phantom	≤ ± 0.5 % for rotation around the chamber axis, ≤ ± 1 % for tilting ≤ ± 40 °
Leakage Current	≤ ± 50 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	250 mg/cm ²
Water-equivalent window thickness	2.42 mm
Sensitive Volume	1 mm ² circular 30 μm thick
Outer dimensions	diameter 7 mm, length 47 mm
Useful ranges	
Radiation quality	⁶⁰ Co - 25 MV Photons
Field size	1 x 1 cm ² to 40 x 40 cm ²
Temperature	10° to 40°C, 50° to 104°F
Humidity	10 to 80 %, max 20 g/m ³

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

PTW SOFT X-RAY IONIZATION CHAMBERS

Thin window plane parallel chamber for dose measurements in superficial radiation therapy

PTW 23342 - 0.02 cm³ Soft X-Ray Chamber



- Ultra thin entrance window
- For low-energy photons from 15 kV to 70 kV
- Sensitive volume 0.02 cm³, vented to air

The 23342 soft X-ray chamber is the golden standard for absolute dose measurements in low-energy photon beams as used in superficial radiation therapy. Correction factors needed for the determination of absorbed dose to water are available. The chamber is designed for the use in solid state phantoms.

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

PTW 23344 - 0.2 cm³ Soft X-Ray Chamber



- Ultra thin entrance window
- For low-energy photons from 15 kV to 70 kV
- Sensitive volume 0.2 cm³, vented to air

The 23344 soft X-ray chamber is used for absolute dose measurements in low-energy photon beams as used in superficial radiation therapy. The sensitive volume is larger than that of the 23342 chamber, giving a higher signal at the cost of a lower spatial resolution. Correction factors needed for the determination of absorbed dose to water are available. The chamber is designed for the use in solid state phantoms.

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

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CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

Specifications	Item 300-620	Item 300-630
PTW Model	23342	23344
Type of Product	vented plane parallel ionization chamber acc. IEC 60731	
Application	absolute dosimetry in low-energy photon beams	
Measuring Quantity	absorbed dose to water, air kerma, exposure	
Reference Radiation Quality	30 kV, HVL 0.37 mm Al (T30)	
Nominal Sensitive Volume	0.02 cm ³	0.2 cm ³
Design	not waterproof, vented	
Reference Point	in chamber center of entrance foil underside	
Direction of Incidence	perpendicular to chamber plane	
Nominal Response	1 nC/Gy	10 nC/Gy
Long-Term Stability	≤ 1 % per year	
Chamber Voltage	300 V nominal, ± 500 V maximal	
Directional Response	≤ ± 1 % for chamber tilting up to ± 20°	
Leakage Current	≤ ± 10 fA	
Cable Leakage	≤ 1 pC/(Gy·cm)	
Materials and Measures		
Entrance Foil	0.03 mm PE	
Total Window Area Density	2.76 mg/cm ²	
Sensitive Volume	radius 1.5 mm depth 1 mm	radius 6.5 mm depth 1.5 mm
Ion Collection Efficiency at Nominal Voltage		
Ion collection time	30 μs	
Max. dose rate for ≥ 99.5 % saturation	175 Gy/s	60 Gy/s
≥ 99.0 % saturation	350 Gy/s	120 Gy/s
Max. dose per pulse for ≥ 99.5 % saturation	1.8 mGy	1.1 mGy
≥ 99.0 % saturation	4.5 mGy	2.7 mGy
Useful Ranges		
Chamber Voltage	± 100 - 400 V	
Radiation Quality	15 - 70 kV x-rays	
Field Size	1 x 1 cm ² to 40 x 40 cm ²	2 x 2 cm ² to 40 x 40 cm ²
Temperature	10° to 40°C, 50° to 104°F	
Humidity	20 to 80 %, max 20 g/m ³	
Air pressure	700 to 1060 hPa	

EXRADIN ION CHAMBERS

THE EXRADIN ADVANTAGE

Better Components

- Waterproof construction eliminates the need for sleeves or protective coatings.
- Robust materials are more durable than typical chambers (i.e. PMMA thimble tips), and therefore are more suitable for routine measurements.
- Excellent inherent conductivity negates the need for coatings found in other chambers, which can flake off and require careful handling.
- Collector, guard and shell are made of conductive material developed by Dr. Francis Shonka, the creator of A150 tissue-equivalent, C552 air-equivalent and D400 polystyrene-equivalent plastics

Superior Stability

- Advanced guard design creates a consistent collecting volume with uniform field lines, providing a stable, repeatable signal.
- Exradin detectors feature some of the quickest settling times of any manufacturer.
- Exceptionally wide guard rings on all parallel plate chambers eliminate perturbation volume effects.

Ideal Design for Improved Accuracy

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

Quick Response upon hookup

- Ionization currents can be read immediately after electrometer and extension cable transients subside because Exradin Ion Chambers do not exhibit voltage soakage or stem effect.
- Exradin chambers typically have $\pm 10 \times 10^{-15}$ amp leakage.

EXRADIN THIMBLE ION CHAMBERS

Strict manufacturing tolerances and waterproof construction makes these detectors ideal for dosimetry calibrations in water, air and other phantom materials.

- **Waterproof construction backed by five-year warranty.**
- **Rugged Shonka plastic provides years of reliable use and excellent conductivity.**
- **Lack of stem-effect and low leakage provides precise, consistent measurements.**
- **Proven guard design stabilizes measurements and reduces settling time.**
- **Homogeneous material throughout the chamber minimizes perturbation of the beam.**

Exradin A1 Ion Chamber
0.053 cc Miniature Shonka



The Exradin A1 has the same internal dimensions and collecting volume as the A1SL, yet the larger diameter is ideal for use in solid phantoms. This chamber is characterized in TG-51 and TRS-398.

- Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for versatility of operation and additional length when needed

Item #	Description
300-205-A1	Exradin A1, 0.053 cc Miniature Shonka
300-205-T1	Exradin T1, 0.053 cc Miniature Shonka

Exradin A1SL Ion Chamber
0.053 cc Slimline Miniature Shonka



The A1SL, available in air or tissue equivalent plastic, provides a perfect balance between fast scanning and point-dose measurements within 1cm in water, air or phantom materials. This chamber is characterized for TG-51 and TRS-398 procedures.

- The Exradin A1SL Ion Chamber has a one-piece, non-removable 5.6 cm stem made of black anodized aluminum for use in plastic phantoms with small cavities or confined water tank mounting scenarios
- 6x7mm field size

Item	Description
300-205-A1SL	Exradin A1SL, 0.053 cc Slimline Miniature Shonka

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

Exradin A2
0.53 cc Spokas



The A2 is ideal for precise measurement of exposure and air kerma in photon beams and absorbed dose in photon, electron, proton and other beams. This chamber is available in air, polystyrene and tissue equivalent plastic. It is also available in magnesium equivalent plastic.

- Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for flexibility of operation and additional length when needed

Item	Description
300-210-A2	Exradin A2, 0.53 cc Spokas Chamber
300-210-P2	Exradin P2, 0.53 cc Spokas Chamber
300-210-T2	Exradin T2, 0.53 cc Spokas Chamber

Exradin A12
0.64 Farmer-Type



Characterized in TG-51 and TRS-398, the A12 has fast settling time and a removable stem for superior absolute dosimetry calibrations in water, air or phantoms.

- Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for flexibility of operation and additional length when needed
- Matching 2.8 mm thick Cobalt-60 build-up cap of C552 Shonka air-equivalent plastic included

Item	Description
300-240-A12	Exradin A12, 0.64 cc Farmer-Type Chamber

Exradin A12S
0.24 cc Farmer - Type



The A12S is designed for absolute dosimetry calibrations in water, air or phantoms. The collector of the A12S is approximately one-third the size of the A12, confining collecting volume to the tip of the chamber.

- Two separate stem pieces of 5.1 cm and 12.7 cm can be coupled together for flexibility of operation and additional length when needed
- Matching 2.8 mm thick Cobalt-60 build-up cap of C552 Shonka air-equivalent plastic included

Item	Description
300-240-A12S	Exradin A12S, 0.24 cc Farmer-Type Chamber

Exradin A19
0.62 cc Classic Farmer®



The A19 fits existing plastic phantom cavities and build-up caps, limiting perturbation and minimizing settling time in absolute dosimetry calibration. This chamber is characterized for TG-51 procedures.

- One-piece, non-removable 4.6 cm stem made of black anodized aluminum styled after traditional Farmer-type chambers
- Matching 2.8 mm thick Cobalt-60 build-up cap of C552 Shonka air-equivalent plastic included

®Farmer is a registered trademark of PTW Freiburg GmbH

Item	Description
300-240-A19	Exradin A19, 0.62 cc Classic Farmer® Chamber

Exradin A28
0.125cc Scanning



The Model A28 Chamber features exceptional omni-directional spatial resolution for relative dosimetry scanning in water phantoms and use in minute field measurements.

Item	Description
300-255-A28	Exradin A28, 0.125 cc Scanning Chamber

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

SPECIFICATIONS FOR EXTRADIN THIMBLE ION CHAMBERS

Specifications	Item 300-205-A1 Item 300-205-T1	Item 300-205-A1SL	Item 300-210-A2 Item 300-210-P2 Item 300-210-T2	Item 300-240-A12	Item 300-240-A12S	Item 300-240-A19	Item 300-240-A28
Exradin Model	A1	A1SL	A2	A12	A12S	A19	A28
Collecting Volume	0.053 cm ³	0.053 cm ³	0.53 cm ³	0.64 cm ³	0.24 cm ³	0.62 cm ³	0.125 cm ³
Centroid of Collecting Volume from exterior tip of shell	3.86 mm	4.06 mm	6.96 mm	12.9 mm	5.79 mm	13.0 mm	4.47 mm
Outside Diameter of Shell Collecting Volume	6.0 mm	6.35 mm	11.4 mm	7.1 mm	7.1 mm	7.1 mm	8.0 mm
Inside Diameter of Shell Collecting Volume	4.0 mm	4.0 mm	9.5 mm	6.1 mm	6.1 mm	6.1 mm	5.8 mm
Shell Wall Thickness	1.0 mm	1.1 mm	1.0 mm	0.5 mm	0.5 mm	0.5 mm	1.1 mm
Collector Diameter	1.0 mm	1.0 mm	4.6 mm	1.0 mm	1.0 mm	1.0 mm	1.0 mm
Collector Length	4.4 mm	4.4 mm	8.4 mm	21.6 mm	7.5 mm	21.6 mm	6.4 mm
Shell, Collector and Guard Material*	A, T	A	A, P, T	A	A	A	A
Nominal Air Kerma Calibration Factor†	5.4E+8 Gy/C	5.4E+8 Gy/C	5.4E+7 Gy/C	4.4E+7 Gy/C	1.2E+8 Gy/C	4.5E+7 Gy/C	2.3E+8 Gy/C
Recommended Polarizing Voltage	300 V						
Nominal Leakage	+ 10 x 10 ⁻¹⁵ amp						
Maximum Polarizing Voltage	1000 VDC						
Waterproof	YES						
Included Buildup Cap	None	None	None	⁶⁰ Co	⁶⁰ Co	⁶⁰ Co	⁶⁰ Co

* Material: A – C552 Shonka air-equivalent plastic P – D400 polystyrene-equivalent plastic T – A150 Shonka tissue-equivalent plastic
 † Nominal calibration factor for Co-60 at 22° C

E

EXRADIN MICRO ION CHAMBERS

Superior small-field dosimetry to assess pinpoint radiation in IMRT, stereotactic, orthovoltage, x-rays and superficial skin therapy

- Inherently waterproof construction eliminates the need for sleeves or protective coatings.
- Rugged conductive plastic provides years of reliable use.
- Lack of stem-effect and low leakage provides precise, reliable measurements.

**Exradin A14 Ion Chamber
0.015 cc Microchamber**



**Exradin A14SL Ion Chamber
0.015 cc Slimline Microchamber**



The Model A14 microchamber has the exact internal dimensions and collecting volume as the Model A14SL, yet a larger diameter is ideal for use in solid phantoms.

The Model A14SL is capable of measuring extremely small field sizes, allowing for exceptional spatial resolution and exact pinpoint beam profile characterization. This helps assess radiation fields during IMRT and stereotactic radiosurgery

Item	Description
300-250-A14	Exradin A14, 0.015 cc Microchamber

Item	Description
300-250-A14SL	Exradin A14SL, 0.015 cc Slimline Microchamber

**Exradin A16 Ion Chamber
0.007 cc Micropoint**



The Model A16 microchamber measures extremely small field sizes (3.4 mm x 3.4 mm); allowing for exceptional spatial resolution and exact pinpoint beam profile characterization. These attributes make the A16 ideal for stereotactic radiosurgery and IMRT applications.

**Exradin A26 Ion Chamber
0.015 cc Reference-Class Microchamber**



Experience the same measurement quality in a microchamber you have come to expect from your reference-class chamber.

- Rapid settling
- Stable, reproducible measurements
- Realistic and meaningful ion recombination corrections
- Minimal polarity dependence
- Minimal energy dependence
- **The only microchamber that was designed to meet reference class criteria**

Item	Description
300-253-A16	Exradin A16, 0.007 cc Micropoint

Item	Description
300-254-A26	Exradin A26, 0.015 cc Reference-Class Microchamber

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

SPECIFICATIONS FOR EXRADIN THIMBLE ION CHAMBERS

Specifications	Item 300-250-A14	Item 300-250-A14SL	Item 300-253-A16	Item 300-253-A26
Exradin Model	A14	A14SL	A16	A26
Collecting Volume	0.015 cm ³	0.015 cm ³	0.007 cm ³	0.015 cm ³
Centroid of Collecting Volume from exterior tip of shell	2.21 mm	2.39 mm	1.65 mm	1.98 mm
Outside Diameter of Shell Collecting Volume	6.0 mm	6.35 mm	3.4 mm	4.3 mm
Inside Diameter of Shell Collecting Volume	4.0 mm	4.0 mm	2.4 mm	3.3 mm
Shell Wall Thickness	1.0 mm	1.1 mm	0.5 mm	0.5 mm
Collector Diameter	0.3 mm	0.3 mm	0.3 mm	0.75 mm
Collector Length	1.5 mm	1.5 mm	1.27 mm	1.78 mm
Shell Material*	A	A	A	A
Nominal Air Kerma Calibration Factor	1.9E+9 Gy/C	1.9E+9 Gy/C	4.1E+9 Gy/C	1.85E+9 Gy/C
Recommended Polarizing Voltage	300 V			
Nominal Leakage	+ 10 Fa			
Maximum Polarizing Voltage	1000 VDC			
Waterproof	YES			
Included Buildup Cap	None	None	⁶⁰ Co	⁶⁰ Co

* Material: A – C552 Shonka air-equivalent plastic

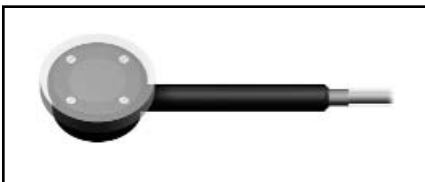
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EXRADIN PARALLELE PLATE CHAMBERS

Exradin Parallel Plate Chambers ensure precision in depth-dose measurements by providing uniform field lines even at low energies

- Exceptionally wide guard rings exceed 3mm widths recommended in TG-39.
- Rigid stem allows accurate positioning of chamber.
- Chamber vents through a flexible tube sealed to the chamber body, ideal for use in water or plastic phantoms.

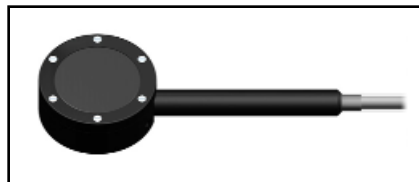
Exradin A10
0.050 cc Markus®-type Parallel Plate



The A10 Markus-type chamber provides excellent spatial resolution for dose distribution measurements in a water phantom. An acrylic waterproof cap is included with this chamber for use in TG-51 electron beam protocols.

Item	Description
300-225-A10	Exradin A10, 0.050 cc Markus®-type Chamber

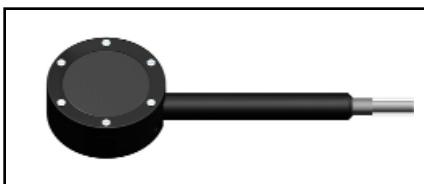
Exradin A11
0.62 cc Parallel Plate



Waterproof A11 Roos-type chamber may be operated while fully submerged without any protective sheath; ideal for repeated TG-51/TRS-398 dose distribution measurements in a water phantom.

Item	Description
300-230-A11	Exradin A11, 0.62 Parallel Plate Chamber
300-230-P11	Exradin P11, 0.62 Parallel Plate Chamber
300-230-T11	Exradin T11, 0.62 Parallel Plate Chamber

Exradin A11TW
0.93 cc Thin Window Parallel Plate



The 11TW is tailored for use in superficial therapy and low energy diagnostic beams. The thin-window design provides nearly constant response over the entire diagnostic energy range.

Item	Description
300-232-A11TW	Exradin A11TW, 0.93 Thin Window Parallel Plate Chamber
300-232-P11TW	Exradin P11TW, 0.93 Thin Window Parallel Plate Chamber
300-232-T11TW	Exradin T11TW, 0.93 Thin Window Parallel Plate Chamber

Exradin A20
0.074 Low Energy X-ray



The A20 is a low-energy x-ray chamber for assessing and calibrating pinpoint radiation fields for x-rays, stereotactic and TG-61 compliant superficial skin therapy.

Item	Description
300-235-A20	Exradin A26, 0.015 cc Reference-Class Microchamber

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

SPECIFICATIONS FOR EXTRADIN PARALLEL PLATE ION CHAMBERS

Specifications	Item 300-225-A10	Item 300-230-A11 Item 300-230-P11 Item 300-230-T11	Item 300-232-A11TW Item 300-232-P11TW Item 300-232-T11TW	Item 300-254-A26
Exradin Model	A10	11	11TW	A20
Collecting Volume	0.050 cm ³	0.62 cm ³	0.93 cm ³	0.074 cm ³
Centroid of Collecting Volume from exterior surface of window	1.0 mm	2.0 mm	1.5 mm	1.8 mm
Window Collector Gap	2.0 mm	2.0 mm	1.5 mm	1.8 mm
Collector Diameter	5.4 mm	20.0 mm	20.0 mm	1.93 mm
Guard Ring Width (Radial)	4.3 mm	4.4 mm	4.4 mm	1.2 mm
Window Material	3.86 mg/cm ² Kapton	1.0 mm A, P or T	3.86 mg/cm ² Kapton	7.72 mg/cm ² Kapton
Window or Support Rings, Collector and Guard Material	A	A, P, T	A, P, T	A
Nominal Air Kerma Calibration Factor	5.6E+8 Gy/C	4.6E+8 Gy/C	3.0E+7 Gy/C	3.85E+8 Gy/C
Nominal Leakage	+ 10 nA			
Maximum Polarizing Voltage	1000 VDC			
Waterproof	Yes, with included 1.0 mm PMMA Cap	Yes	Yes, with included 1.0 mm PMMA Cap	No
Included Buildup Cap	None			

* **Material:** A – C552 Shonka air-equivalent plastic P – D400 polystyrene-equivalent plastic T – A150 Shonka tissue-equivalent plastic

E

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

IBA 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

Applications

All farmer type chambers are designed for measurements with high reproducibility in air, in solid or in water phantoms. They are suitable for absolute dosimetry of photon, electron and proton beams in radiotherapy.

300-720 FC65-P

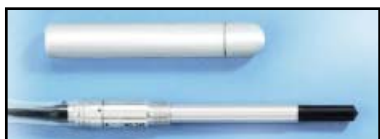


300-720, the FC65-P can be used for all routine applications.

- Robust plastic construction for daily beam check

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

300-222 FC65-G



300-722, the FC65-G is the standard reference detector for reference dosimetry and scientific applications

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

300-725 FC23-C



300-725, the FC23-C yields higher precision in measuring of isodose contours.

- Robust plastic construction for daily beam check
- Higher spatial resolution

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

Specifications	Item 300-720	Item 300-722	Item 300-725
IBA	FC65-P	FC65-G	FC23-C
Cavity Volume	0.65 cm ³	0.65 cm ³	0.23 cm ³
Cavity Length	23.1 mm	23.1 mm	8.8 mm
Cavity Radius	3.1 mm	3.1 mm	3.1 mm
Wall Material	POM ¹	Graphite	C552
Wall Thickness	0.057 g/cm ²	0.073 g/cm ²	0.070 g/cm ²
Central Electrode Material	Aluminum	Aluminum	C552
Connector	BNC-M	BNC-M	BNC-M
Cable	1.4 m	1.4 m	1.4 m

¹ Poly Oxy Methylene (CH₂O). A trade name is Delrin.

IBA PLANE PARALLEL CHAMBERS

300-735 PPC05

- Waterproof
- Vented through waterproof sleeve
- Fully guarded
- Supplied with individual factory calibration certificate and user's guide

Applications

All plane parallel chambers are designed for measurements with high reproducibility in air, in solid or in water phantoms.



PPC05 is suitable for absolute dosimetry of electron, photon and proton beams in radiotherapy.

- Higher spatial resolution (depth dose)
- Suitable for phantoms and holders designed for Markus chamber.

Item #	Description
300-735	Plane Parallel Chamber PPC05

300-740 PPC40



PPC40 is suitable for absolute dosimetry of electron, photon and proton beams in radiotherapy

- **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

Item #	Description
300-740	Plane Parallel Chamber PPC40

300-745 NACP



The NACP is designed according to recommendations of the Nordic Association of Clinical Physicists (NACP), Acta Radiologica Oncology 19,55. The chamber is used for absolute dosimetry of electron beams 2-50 MeV. A thinner front wall minimizes contamination of the beam and allows measurements at shallow depth and high accuracy even at low electron energies is guaranteed

- Low polarity effect

Item #	Description
300-745	Plane Parallel Chamber NACP

Specifications	Item 300-735	Item 300-740	Item 300-745
IBA	PPC05	PPC40	NACP
Materials	Window and body C552; graphited (PEEK) electrode	PMMA	Mylar foile and graphite window; Body PMMA; electrode graphited
Window Thickness	176 mg/cm ² 1 mm	118 mg/cm ² 1 mm	104 mg/cm ² 0.6 mm
Active Volume	0.05 cm ³	0.4 cm ³	0.16 cm ³
Electrode Spacing	0.5 mm	2.0 mm	2.0mm
Collecting Electrode Diameter	10.0 mm	16.0 mm	10.0 mm
Guard Ring Width	3.5 mm	4.0 mm	3.0 mm
Connector	BNC-M	BNC-M	BNC-M
Cable	1.4 m	1.4 m	2.0 m

CABLES, CONNECTORS, ION CHAMBERS, ACCESSORIES

IBA COMPACT CHAMBERS

- Waterproof
- Vented through waterproof sleeve
- Fully guarded
- Supplied with individual factory calibration certificate and user's guide

Applications

All compact chambers are designed for measurements with high reproducibility in air, in solid or in water phantoms. They are suitable for relative dosimetry of photon, electron and proton fields in radiotherapy.

300-751 RAZOR



300-755 CC04



The RAZOR and CC04 chambers are the conventional ionization chambers for measurements of small fields and of ranges with high dose gradients, e.g. stereotactic fields.

- High uniform spatial resolution

Item #	Description
300-751	RAZOR Chamber
300-755	Compact Chamber CC04

300-760 CC08



CC08 is used for customized applications during manufacturing and installation of linear accelerators (e.g. "Buddelship")

- Used for radial and axial beam incidence

Item #	Description
300-760	Compact Chamber CC08

300-765 CC13



CC13 is the standard chamber for clinical use in water phantoms and for output factor measurements.

- Used for radial and axial beam incidence

Item #	Description
300-765	Compact Chamber CC13

300-767 CC13-S



The CC13-S is replacement for RK chamber used in RFA phantoms. Parameters of the CC13-S are similar to CC13.

- Used for radial and axial beam incidence

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

300-770 CC25



CC25 is mainly used for quality assurance in air and for low dose measurements in water phantoms.

Item #	Description
300-770	Compact Chamber CC25

Specifications	Item 300-751	Item 300-755	Item 300-760	Item 300-765	Item 300-767	Item 300-770
IBA	RAZOR	CC004	CC08	CC13	CC13-S	CC25
Cavity Volume	0.01 cm ³	0.04 cm ³	0.08 cm ³	0.13 cm ³	0.13 cm ³	0.25 cm ³
Cavity Length	3.6 mm	3.6 mm	4.0 mm	5.8 mm	5.8 mm	10.0 mm
Cavity Radius	1.0 mm	2.0 mm	3.0 mm	3.0 mm	3.0 mm	3.0 mm
Wall Material	C552	C552	C552	C552	PEEK/C552	C552
Wall Thickness	0.088 gm/cm ²	0.070 gm/cm ²	0.070 gm/cm ²	0.070 gm/cm ²	0.154 gm/cm ²	0.070 gm/cm ²
Central Electrode Material	Graphite	C552	C552	C552	C552	C552
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

IBA DOSIMETRY DIODE DETECTORS



322-600



322-605



322-610

- **Waterproof**
- **Have a proven dose rate and energy independence**
- **Have a high uniform spatial resolution in the beam plane and precise definition of the measurement depth (accurately shaped penumbras in the whole beam plane using the same detector orientation)**
- **Independent of bias, pressure and moisture, very robust, always reliable, no "warm-up" time**
- **High durability: 3 year warranty - low lifetime costs**

Applications

The IBA Dosimetry Diode Detectors are designed for depth dose and profile measurements in water and in air and for output factor measurements in small photon beams.

The IBA Dosimetry Diode Detectors are an excellent choice in relative field analysis as well as output factor measurements. They are based on the 3rd generation of p Si semiconductors. The high doped p -type silicon detector chips, specifically designed for radiation therapy applications, have been the natural choice for measurements where high spatial resolution is required. The accuracy and lifetime of the diode detectors is unsurpassed in the field of radiation therapy today.

Item 300-605 EFD^{3G} Electron Diode provides direct electron depth dose, no need for ionization to dose conversion.

Diode	Item 322-600	Item 322-605	Item 322-610
IBA	PFD	EFD	RFD
Effective Measurement Point	< 0.9 mm	< 0.9 mm	NA
Chip Size (Side / Thickness)	2.5 / 0.5 mm	2.5 / 0.5 mm	2.5 / 0.5 mm
Geometric Form of Active Area	Circled	Circled	Circled
Diameter of Active Area	2 mm	2 mm	2 mm
Thickness of Active Volume	0.06 mm	0.06 mm	0.06 mm

Item #	Description
322-600	PFD ^{3G} Photon Diode Detector
322-605	EFD ^{3G} Electron Diode Detector
322-610	RFD ^{3G} Reference Diode Detector

E

IBA DOSIMETRY RAZOR DETECTOR



High Performance Diode Detector for Small Field Dosimetry

The RAZOR Diode Detector is designed for Relative Dosimetry of Photon and Electron Beams in Radiotherapy

- Depth dose and profile measurements "in air" (i.e. inside a solid phantom) and in a water phantom
- Output factor measurements in small to medium sized photon beams
- Verified performances in the range of photon beam qualities ⁶⁰Co, 6-15 MV and 6-15 MeV
- Rigid and long-lasting semiconductor
- Based on p-type silicon diode chip

Specifications

Stem Material: Stainless steel

Enclosure Material: ABS plastic and epoxy

Position of Measurement Point: Indicated by a cross-hair at the top of the detector

Effective Measurement Point: 0.8 ± 0.2 mm from surface

Chip Size: 0.95 x 0.95 x 0.4 mm

Active Detector Diameter: 0.6 mm

Active Detector Thickness: 0.02 mm

Head Diameter: 4.0 mm

Head Length: 15 mm

Stem Diameter: 4.0 mm

Total Length: 60 mm

Cable length: 2 m

Cable: Low-noise coaxial

Connector: Triaxial¹ BNC (with 2 lugs) or TNC

(¹ On the TNC connector the inner and outer screens are connected)

Dosimetric Performance

Parameter	Value		Conditions	Notes
	Typ.	Max.		
Sensitivity	4.1 nC/Gy		⁶⁰ Co	
Dose Linearity	<0.2%	0.5%	0.02– 40 Gy, ⁶⁰ Co	Absolute deviation from endpoint fit
Dose per pulse dependence	±0.5%	±1%	D _p = 0.1– 2.3 mGy	Normalization at 0.4 mGy
 dS/dD 	1% / kGy	2% / kGy	⁶⁰ Co	Very worst case: real time sensitivity measurement during irradiation, no annealing ~1month between irradiation and measurement
	1% / kGy	4% / kGy	6 MV	
	2% / kGy	4% / kGy	15 MV	
	0.1% / kGy	0.2% / kGy	10 MeV electrons	
PRF Dependency		0.5%	12– 400 Hz D _p = 0.1– 2.3 mGy	Absolute sensitivity change
Energy Dependence	0.5%	1%	5 x 5 cm ² , 6 MV, 30 cm depth	Absolute deviation between PDDs measured with the Razor and CC08 chambers
Lifetime	>/=200 kGy		10 MeV electrons	
Temperature Dependence	0.05% / °C		15– 40°C	

Item #	Description
322-620	Razor Detector, BNC connector
322-622	Razor Detector, TNC connector