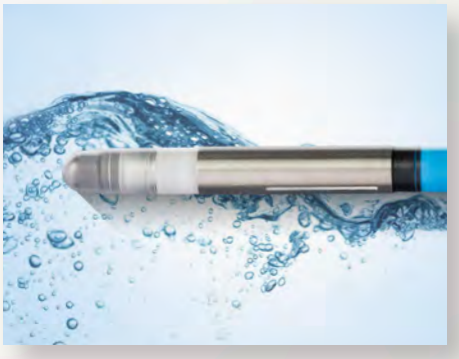
Always perfectly oriented.

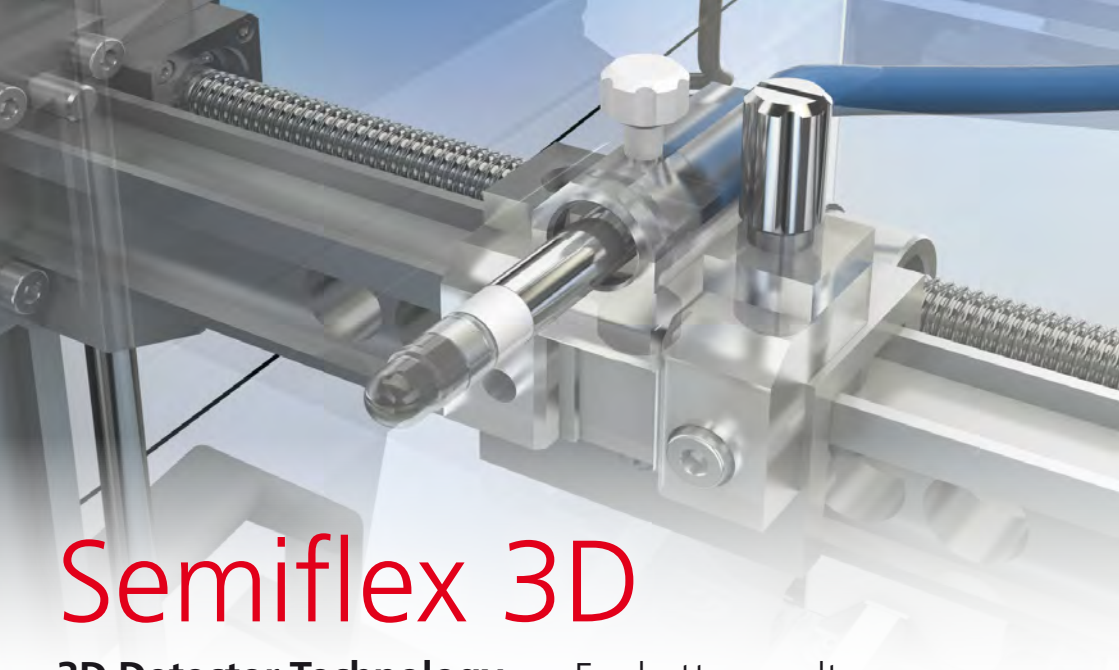


The New Reference Class
Full 3D Geometry
For FFF and FF Beams

Semiflex 3D

3D Thimble Ionization Chamber for Relative and Absolute Dosimetry

PTW



Semiflex 3D

3D Detector Technology

For better results.
For faster scans.

Semiflex 3D combines the advantages of a three-dimensional chamber design with advanced manufacturing technology.

For Multiple Applications

- LINAC Acceptance Testing
- TPS Beam Data Commissioning
- Clinical Reference Dosimetry
- Point Dose Measurements

Highlights

- As flexible as its name – waterproof reference-class thimble ionization chamber for relative and absolute dosimetry measurements in water, air or any solid state phantom
- Accurate measurements of standard and non-standard fields down to a field size of 2.5 cm x 2.5 cm
- True 3D geometry – fast scanning in cross-plane and in-plane directions without tank rotation
- Vertical chamber holder with convenient stop thimble for quick detector setup and accurate, high-resolution scanning in axial orientation
- Small size, minimal volume averaging, high spatial resolution – ideal for absolute dose measurement in small and FFF fields
- Exceptional dosimetric characteristics – meets or exceeds all requirements of AAPM TG-51 and IEC 60731
- Absolute dose calibration according to all major dosimetry protocols, such as IAEA TRS-398, AAPM TG-51, DIN 6800-2

Relative Dosimetry and Point Dose Measurements

Flexible Orientation

Semiflex 3D has been designed for axial and radial beam incidence, offering greater flexibility and helping to reduce positioning errors that might occur by repeated tank and detector setups. A vertical chamber holder with a convenient stop thimble makes it very easy to quickly mount Semiflex 3D

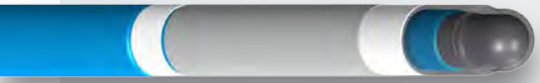
Perfect for axial and radial profile measurements

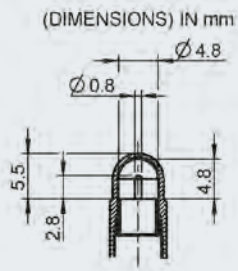
perpendicular to the radiation beam. Minimizing stem and cable effects, it allows high-resolution profile measurements in axial orientation.

Detector setup can be easily changed from axial to radial orientation within a few seconds.

Full 3D Geometry

Uniform response in any direction

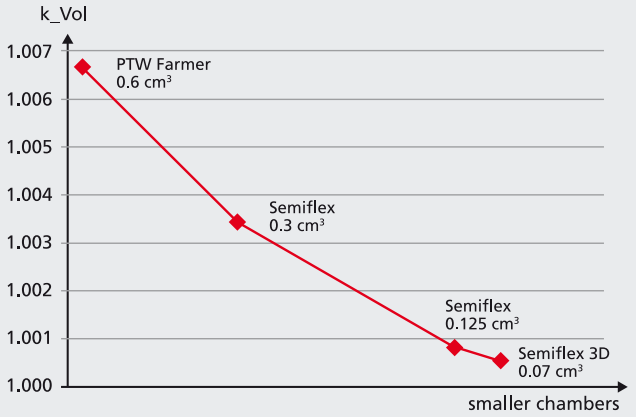




With its true 3D geometry, which provides a high resolution independent of detector orientation, Semiflex 3D allows you to measure in-plane and cross-plane beam profiles much faster and more conveniently.

Using Semiflex 3D, you no longer need to rotate the water tank or change the detector setup to achieve a uniform response, helping you to save setup time and eliminate potential positioning errors.

Clinical Reference Dosimetry in Small and FFF Fields



Minimal Volume Averaging: Better than a PTW Farmer®

Illustration comparing estimated volume averaging correction factors (k_{Vol}) for different PTW ionization chambers calculated for 10 MV FFF at D_{max} depth using the geometrical method of [Kawachi2008].

[Kawachi2008]: T. Kawachi et al., Reference dosimetry condition and beam quality correction factor for CyberKnife beam, Med. Phys. **35** (2008), 4591

Compared to a 0.6 cm³ PTW Farmer® chamber typically used for absolute dose calibration, the small-size 0.07 cm³ Semiflex 3D has reduced volume averaging to a minimum, making it particularly suitable for high-resolution dose measurements in unflattened (FFF) beams.

The New Reference Class

Exceptional dosimetric characteristics – outstanding accuracy

Well engineered and reliably produced, Semiflex 3D has been designed to meet and exceed all requirements of a reference-class ionization chamber as defined in AAPM TG-51 and IEC 60731.

- Minimal polarity effect (< 0.4 % correction, < 0.5 % maximum variation)
- Extremely low volume effect (est. ≤ 0.05 % correction in FFF field)
- Excellent settling time (< 0.3 %)
- Very low post-irradiation leakage – far below IEC 60731 requirements
- Significantly reduced cable effects (< 100 fC / (Gy * cm))
- Minimal chamber-to-chamber variation – reliable k_Q and k_S values

Specifications

Semiflex 3D Type 31021

Detector type:	Vented cylindrical ionization chamber
Design:	waterproof, fully guarded
Measuring quantities:	absorbed dose to water, air kerma, exposure
Reference radiation quality:	^{60}Co
Nominal sensitive volume:	0.07 cm³
Reference point:	on chamber axis, 3.45 mm from chamber tip
Direction of incidence:	axial, radial
Nominal response:	2 nC/Gy
Long-term stability:	≤ 0.3 % over 2 years
Chamber voltage:	± (50 ... 400) V useful range, ± 500 V max.
Polarity effect:	Photons ≤ ± 0.8 % Electrons ≤ ± 1 %
Directional response:	≤ ± 0.5 % for rotation around chamber axis ≤ ±1 % for tilting of axis up to ± 70°
Leakage current:	≤ ± 4 fA
Cable leakage:	≤ 100 fC/(Gy·cm)
Wall of sensitive volume:	0.57 mm PMMA, 1.19 g/cm³ 0.09 mm graphite, 1.85 g/cm³
Total wall area density:	84 mg/cm²
Dimension of sensitive volume:	radius 2.4 mm, length 4.8 mm
Central electrode:	Al 99.98, diameter 0.8 mm
Build-up cap:	PMMA, thickness 3 mm

Ion collection efficiency at nominal voltage	
Ion collection time:	118 µs
Max. dose rate:	≥ 99.5 % saturation 6.7 Gy/s ≥ 99.0 % saturation 13.4 Gy/s
Max. dose per pulse:	≥ 99.5 % saturation 0.68 mGy ≥ 99.0 % saturation 1.42 mGy
Radiation quality:	^{60}Co ... 50 MV photons (9 ... 45) MeV electrons
Field size:	(2.5 x 2.5) cm² ... (40 x 40) cm² (3.0 x 3.0) cm² ... (40 x 40) cm² ≥ 18 MV
Temperature:	(10 ... 40) °C, (50 ... 104) °F
Humidity:	(10 ... 80) %, max. 20 g/m³
Air pressure:	(700 ... 1060) hPa
Connecting system:	BNT, TNC, M

Options & Accessories	
T48012	^{90}Sr Radioactive Check Device
T48002.1.004	Semiflex 3D Chamber Holder for Check Device
T41023.1.280	Adapter for PTW Water Phantom 41023 for horizontal beams
T2967/U6	Acrylic PMMA Chamber Plate 30 cm x 30 cm
T29672/U33	RW3 Chamber Plate 30 cm x 30 cm

TRUFIX and TRUFIX^{BS} Holders, Build-up caps, Chamber Plates for OCTAVIUS® 4D and more upon request

Dosimetry Pioneers since 1922.

It all started with a brilliant invention – the revolutionary Hammer dosemeter in 1922. Ingenuity coupled with German engineering know-how shaped the company's history and led to innovative dosimetry solutions that later became an industry standard. Over the years, PTW has maintained its pioneering spirit, growing into a global market leader of dosimetry applications well known for its outstanding quality and precision. Today, PTW dosimetry is one of the first choices for healthcare professionals in radiation therapy, diagnostic radiology, nuclear medicine and health physics.

For more information on PTW dosimetry products, visit www.ptw.de or contact your local PTW representative:

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PTW

Knowing what responsibility means