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**RPD is an  
authorized distributor**

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**RPD Product Information**

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**Item Number Description**

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**300-680-BNC-M      \* PTW T60003 - Riga Diamond Detector**

# THE PTW/RIGA DIAMOND DETECTOR

for relative dosimetry of  
photon and electron beams

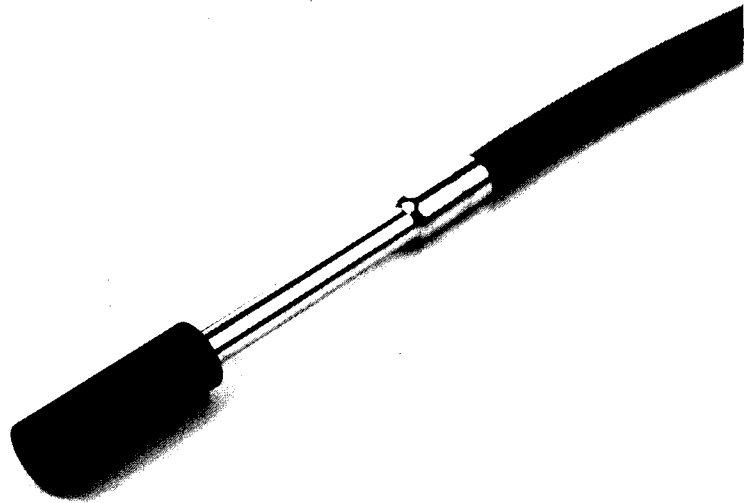
## Characteristics

- *General:*  
Excellent spatial resolution, very low energy and temperature dependence, water resistant, no irradiation damage up to  $10^5$  Gy.
- *Energy range:*  
(0.08 ... 20) MeV Photons  
(4 ... 20) MeV Electrons
- *Sensitive volume:*  
(1 ... 6) mm<sup>3</sup>
- *Thickness of sensitive volume:*  
(0.1 ... 0.4) mm
- *Dose rate range:*  
(0.05 ... 30) Gy/min
- *Directional dependence:*  
less than 2 % in the range of  
0° ... 170° in a water phantom  
for the depths larger than  $d_{\max}$   
( $d_{\max}$  = depth of dose maximum)

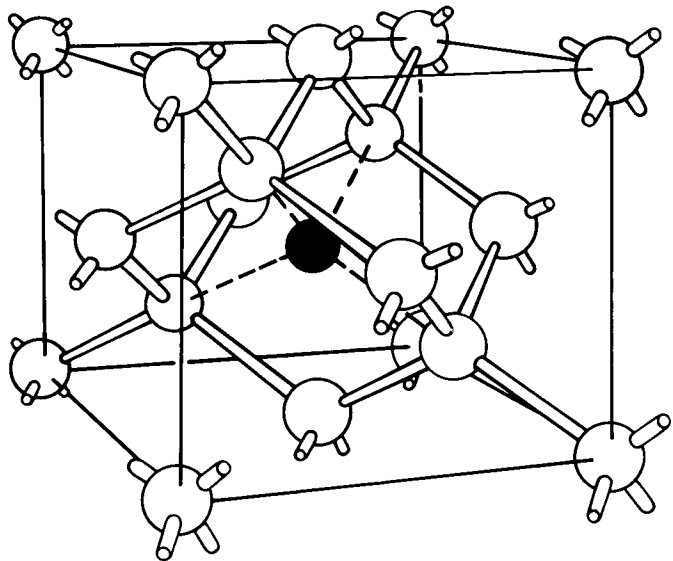
The Diamond Detector has the advantage of excellent spatial resolution, low energy and temperature dependence, high sensitivity, high resistance to radiation damage and nearly no directional dependence.

The Diamond Detector is used for relative dosimetry. It can be connected to the dual channel electrometer TANDEM of the PTW-MP3 Therapy Beam Analyser and to the PTW-UNIDOS Universal Dosimeter (with „M“ plug).

The Diamond Detector is typically used for dose and dose rate measurements in high energy photon and electron beams, where the fields are very small or have steep gradients.

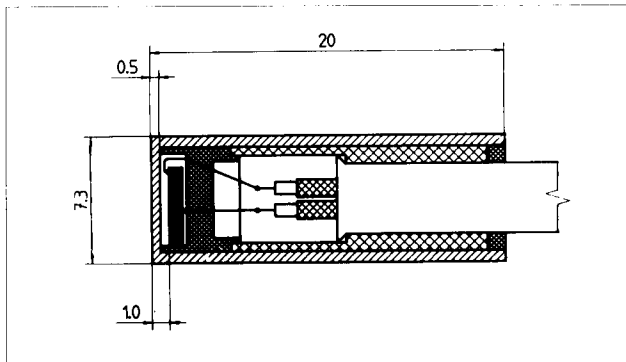


Diamond Detector



Diamond Structure

# THE PTW/RIGA DIAMOND DETECTOR



Location of sensitive volume in detector housing

## Technical Details

- Photon energy range: (0.08 ... 20) MeV
- Electron energy range: (4 ... 20) MeV
- Dose rate range: (0.05 ... 30) Gy/min
- Linearity of response:  $\pm 2\%$
- Pre-irradiation dose: (5 ... 10) Gy
- Operating bias: + 100 V  $\pm 1\%$
- Sensitivity to  $^{60}\text{Co}$  radiation:  $(0.5 \dots 5.0) \cdot 10^{-7} \text{ C/Gy}$
- Dark current:  $< 5 \cdot 10^{-12} \text{ A}$
- Charge collection time:  $< 10^{-8} \text{ s}$
- Sensitive area: (3 ... 15)  $\text{mm}^2$
- Thickness of sensitive volume: (0.1 ... 0.4) mm
- Sensitive volume: (1 ... 6)  $\text{mm}^3$
- Radiation resistance:  $> 10^5 \text{ Gy}$
- Outer probe diameter: 7.3 mm
- Weight incl. cable and connector: approx. 170 g

Since the Diamond Detector uses a naturally grown diamond the exact dimensions of the sensitive volume slightly differ. The exact data of each individual probe are specified in the calibration certificate.

## Ordering information

PTW-Freiburg / RNIIRP Diamond Detector, Type 60003  
Ordering number L991031  
PTW-M connector, cable 1.5 m, firmly attached

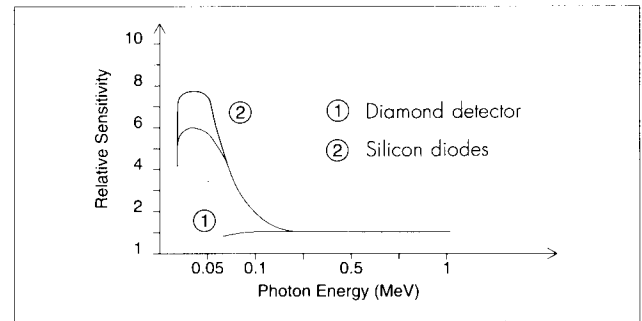
## Literature:

- [1] Khrunov, Martynov, Vainitsky, Ermakov, Chervjadov, Karlin, Fominyeh and Tabeyev, „Diamond Detectors in Relative Dosimetry of Photon, Electron and Proton Radiation Fields”, Radiation Protection Dosimetry Vol. 33, No. 1/4 pp. 155–157 (1990) Nuclear Technology Publishing.
- [2] S. Vainitsky and H. Jarvinen, Application of a natural diamond detector for the measurement of relative dose distributions in radiotherapy. Phys.Med.Biol., 38 (1993) 173–184.

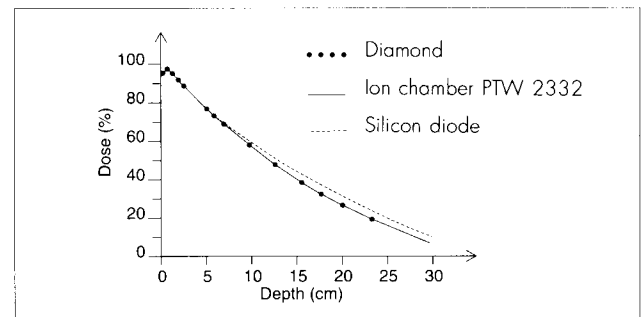
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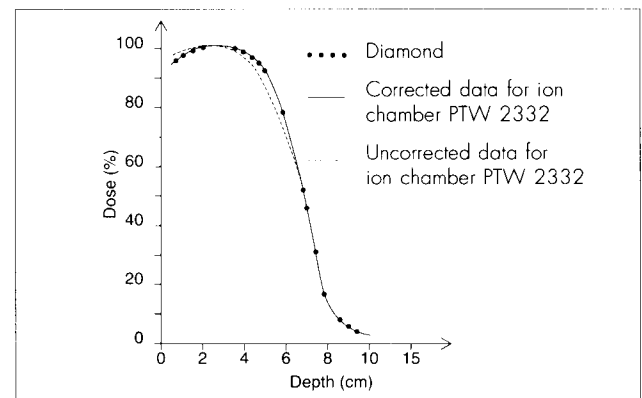
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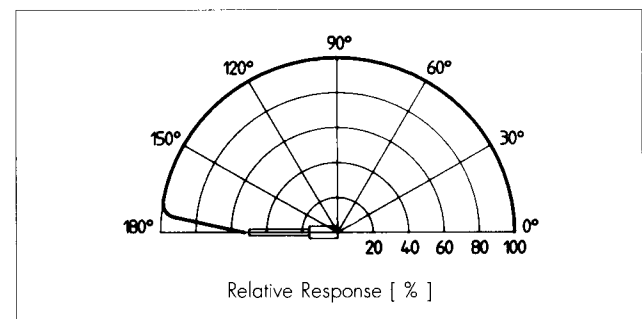
Relative Photon Sensitivity



$^{60}\text{Co}$  Depth Dose Curve



1.5 MeV Electron Depth Dose Curve



Directional Response

The relative output of the diamond is given in %. Measurements were made in a  $^{60}\text{Co}$  beam, field  $20 \times 20 \text{ cm}^2$ , source distance 75 cm, free in air with spherical PMMA build-up cap of 20 mm diameter.

PTW FREIBURG

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