

# Advanced Markus™ Electron Ionization Chamber, 0.02 cm<sup>3</sup>, Waterproof

Model 30-331



- Vented sensitive volume of 0.02 cm<sup>3</sup>
- Same dimensions as the Markus chamber
- Suitable for relative and absolute electron dosimetry
- Very thin entrance window
- The chamber is waterproof when used with protective cap

The 0.02 cc Advanced Markus Chamber is our newest development in plane-parallel electron ion chambers. This chamber combines the advantages of both Roos™ and Markus chamber types into one truly exceptional plane-parallel electron chamber. Developed for relative and absolute electron dosimetry in water or solid type phantoms, the advanced design of this chamber makes it possible to perform absolute electron dosimetry without perturbation effects.

This chamber is designed in strict accordance with the recommendations of IEC 60731 and it is waterproof. Since the outer shape is identical to that of the Markus chamber, all existing Markus chamber phantom plates and adapters can be used with the Advanced Markus chamber. The small sensitive volume makes this chamber ideal for dose distribution measurements in a water phantom, giving a good spatial resolution. An improved design of the guard ring reduces the influence of scattered radiation from the housing, and makes it possible to perform absolute electron dosimetry without perturbation effects. The chamber features a flat energy response within the nominal useful range from 2 to 45 MeV. The membrane material is polyethylene of 0.03 mm thickness. The Advanced Markus chamber comes with a protective acrylic cover 0.87 mm thick (1 mm water equivalence) for use in water. In addition, the chamber includes a 3.4 ft (1.05 m) cable and BNC Triax connector. Air density correction is required for each measurement. A radioactive check device is available as an option.

*Note: The Advanced Markus chamber was developed in cooperation with Prof. Rosenow, Göttingen University, Germany IEC 60731: "Medical electrical equipment - Dosimeters with ionization chambers as used in radiotherapy."*

## Specifications

**Type of product** Vented plane-parallel chamber type 34045 with guard ring

**Application** Dose and dose rate measurements in high-energy electron beams

**Measuring quantities and units** Absorbed dose to water (Gy); absorbed dose rate to water (Gy/min)

**Radiation quality** Electrons 2 to 45 MeV

**Response** 670 pC/Gy

**Sensitive volume** 0.02 cm<sup>3</sup>

**Directional dependence** The deviation of the response following tilting of the chamber by up to 10° is smaller than 0.1%

**Entrance window** Polyethylene (CH<sub>2</sub>) foil with 0.03 mm thickness

**Electrode** Acrylic (PMMA), graphite coated 5 mm Ø

**Area density** 2.5 mg/cm<sup>2</sup>

**Reference point** Center of entrance foil

**Chamber voltage** Maximum 400 V

**Leakage current** ± 4 fA

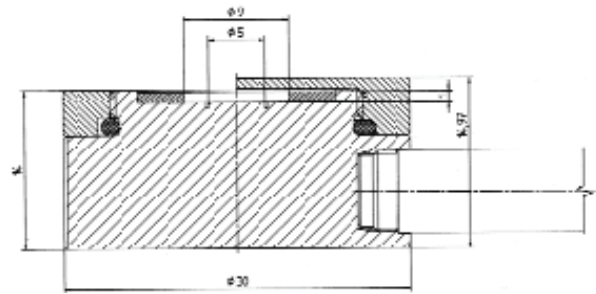
**Cable leakage** Less than or equal to 1 PC/(Gy • cm)

**Ion collection time**

150 V 44 μs

300 V 22 μs

400 V 17 μs



**Range of temperature** 10° to 40°C, 50° to 104°F

**Range of relative humidity** 10 to 80%, max 20 g/m<sup>3</sup>

**Range of air pressure** 700 to 1060 hPa

**Temperature equilibrium** 2 to 3 min/K

**Pressure equilibrium** Less than or equal to 10 s

**Available model(s)**

**30-331** Advanced Markus Electron Ionization Chamber, 0.02 cm<sup>3</sup>, Waterproof, includes BNC Triax connector and PMMA buildup cap

*Other types of triaxial cable connectors available*