

## Features

- Very light (3.5 kg) dual sphere device
- Excellent ICRP21 curve fitting from 0.025 eV to 15 MeV
- Measurement ranges:  
0.25 mrem/h to 9999 mrem/h  
0.0001 mrem to 9999 mrem
- Measurement resolution:  
0.1 mrem/h (0.001 mSv/h)
- Large choice of units: Sv, Gy, rem, rad
- Displays quality factor and accuracy
- Meets IEC 1005 standard; CTHIR N°026 qualification

# DINEUTRON Portable Unit for Neutron Dosimetry

## Description

The DINEUTRON is a portable device for measuring neutron dose equivalent rates and integrated dose equivalents.

The unit is based on an innovative dual-sphere concept developed by the CEA (French Atomic Energy Commission); this concept confers an excellent performance for a very reduced weight: 3.5 kg only. The device comes in a self-contained case including two  $^3\text{He}$  detectors with different diameter moderating spheres, the charge amplifiers, the processing circuits and power supply. A keypad allows to easily select the type of measurement and measurement unit. An alphanumeric backlit LCD display shows the equivalent dose rate, the integrated equivalent dose, the selected unit, the statistical accuracy, the quality factor, and the time of exposure when applicable.

Particular care has been taken in its design to the ergonomics (handle and balancing) to ensure a great ease of use and comfortable handling.

The DINEUTRON is the favored device for neutron ambient measurements in the scope of health physics and particularly in nuclear power plants, reactors and reprocessing facilities.



## Specifications

### NUCLEAR

- DETECTORS – Two compact  $^3\text{He}$  isotropic neutron detectors, CANBERRA 0.5NH1/1KD type.
  - Two different diameter polyethylene moderating spheres: 2.5 and 4.2 in.
  - The geometric center of the measurement is indicated by a white cross and the limits between white and green areas.
- ENERGY RANGE – 0.025 eV to 15 MeV; excellent fitting to the ICRP 21 curve.
- DOSE RATE DISPLAY RANGE – Dose equivalent rate: 0.01 to 9999 mrem/h or 0.01 to 99.99 mSv/h.
- DOSE RATE MEASUREMENT RANGE – 0.25 mrem/h to 9999 mrem/h or 0.03 mSv/h to 99.99 mSv/h.
- DOSE DISPLAY/MEASUREMENT RANGE – Integrated dose equivalent: 0.0001 to 9999 mrem or 0.0001 to 99 mSv.
- UNIT SELECTION – mSv/h, mGy/h, mrem/h, mrad/h; mSv, mGy, mrem, mrad; mn.
- OPERATING CONDITIONS – The minimum measurement distance recommended to obtain a convenient accuracy is 50 cm (19.7 in.): contactless measurement only.
  - A 12-keys keypad allows to easily select the type of measurement and the unit, to display the quality factor and the elapsed time from the switching on of the instrument (1 to 99 minutes).
  - Dineutron should be used preferably when gamma field represents less than 10 times the neutron field.

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- **DISPLAY** – LCD screen with automatic lighting adjustment depending on luminosity.
  - One line of 16 alphanumeric characters: measured value, measurement unit, statistical accuracy, alarms.
  - Magnifying glass for easier reading of the LCD.
- **QUALITY FACTOR** – Calculation of the quality factor value of the incident neutrons, based on the counting rates of the two detector/spheres ratio and on a transfer function which depends on this ratio; display of the quality factor “FQ” on the screen.
- **ACCURACY** –  $\pm 20\%$  for typical PWR neutron field;  $\pm 30\%$  with direct and scattered neutrons over entire energy range;  $\pm 40\%$  with only direct neutrons over entire energy range.

30 seconds is necessary to achieve 1 mrem/h measurement of  $^{252}\text{Cf}$  within  $\pm 25\%$  accuracy.

  - Indication of the statistical accuracy of the measurement with a five level indicator (probability of 95% at  $2\sigma$ ).
  - Display of the message “MES<” when the counting rates of the two detector/spheres ratio is low and might lead to undervalued doses.
- **NON LINEARITY** –  $<15\%$ ; “SAT” saturation indicator when the dead time correction is greater than 100% on the larger sphere.
- **GAMMA REJECTION RATE** –  $>100$  at 0.01 Sv/h  $^{137}\text{Cs}$ .

## ELECTRICAL

- **POWER SUPPLY** – Eight alkaline batteries, R14 type (1.5 V); 180 mA consumption; 25 h battery life.
- **OPTIONAL RECHARGEABLE BATTERIES** – Eight Cd-Ni cells, 1.2 V/2 Ah, 11 h battery life, “BAT?” low battery level indicator.

## MECHANICAL

- **DIMENSIONS** – 260 x 367 x 140 mm (10.2 x 14.4 x 5.5 in.) (H x L x W).
- **WEIGHT** – 3.2 kg (7.1 lb), well balanced around the handle.

## ENVIRONMENTAL

- **OPERATION TEMPERATURE RANGE** – -10 to +55 °C (+14 to +122 °F); maximum hygrometry: 80% at 45 °C.
- Light alloy case, trickling proof, painted with decontaminable painting.
- **STANDARDS** – CEA (French Atomic Energy Commission) system, in conformity to the IEC 1005 standard – French authority CTHIR N°026 qualification.

## ORDERING REFERENCES

- **DINEUTRON** – EM18327.
- **CARRYING CASE** – EM18409.
- **SET OF EIGHT RECHARGEABLE BATTERIES** – EM18380.
- **240 V ac BATTERY CHARGER** – EM18317.
- **120 V ac BATTERY CHARGER** – On Request.

