New Personal Electronic Dosimeter

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DMC 3000

Introduction

Nuclear industry and medical professionals have constantly provided constructive feedback on Mirion Technologies electronic personal dosimeters (EPDs). This feedback includes the need for more accurate dose measurements and robust alarm capabilities to better guarantee user safety.

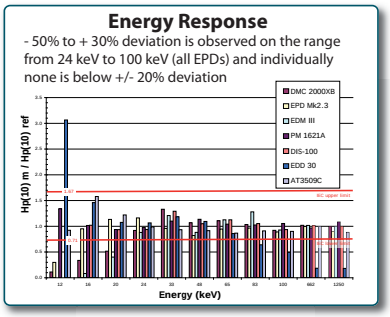
In order that today's EPDs more accurately measure personal dose equivalent and personal dose equivalent rate in real time for nuclear, medical, and security professionals, it is essential that the main detection characteristics as energy response, angular response and dose rate linearity are perfectly characterized.

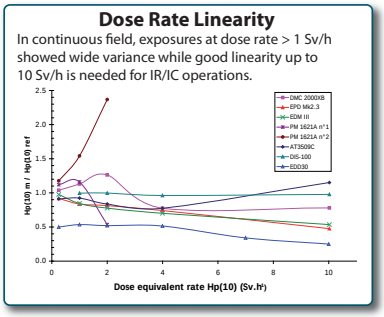
Although all the EPD's comply with international standards (1), a joint IAEA/EURADOS (2) international intercomparison of EPDs on the market noted significant differences in the performances of different models.
More recently, medical publications also demonstrated that EPD's did not give accurately assess of doses encountered during Interventional Radiology and Cardiology (IR/IC).

To better respond to these needs, Mirion Technologies has developed the DMC 3000 personal electronic dosimeter, providing better dose assessment and enhanced alarming features.

State-of-the-Art EPDs

Based on comparison of selected dosimeters (3), three major detection characteristics have been identified as key factors influencing dose assessment: energy and angular responses and dose rate linearity.
Other factors like temperature, mechanical shocks and electromagnetic effects must also be taken into consideration.



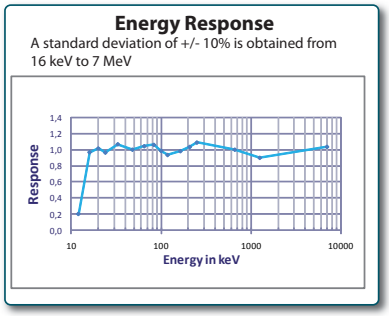


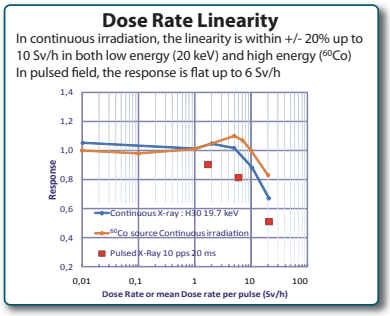
Improvements

Future add-on module will offer neutron and shallow dose Hp(0.07) measurement and telemetry capabilities.

The first major improvement is the DMC 3000's energy and angular response, which remains flat from **16 keV to 7 MeV** without any deviances for angles up to +/- 60°.
The second major difference is at high dose rates above 1 Sv/h where deviation is lower than +/-20% up to 10 Sv/h tested in the X-rays energy range (19.7 keV) and with a ^{137}Cs or ^{60}Co source .

This performance is due to an advanced quick-detection pre-amplifier in addition to an automatic dead time correction system. Thus, the response in pulsed X-rays fields encounter during IR/IC operations is very good up to 6 Sv/h with lengths of the radiation pulses of about 20 ms generated at a rate of 10 pps (pulse per second) or higher.





In addition to improvements in measurement capabilities, the DMC 3000 also has enhanced alarm capabilities, alerting users through the use of **vibrating alarms, dual LEDs and a high-decibel speaker**.

Furthermore, with its two push buttons and large-format, 8-digit, high-contrast, backlit display, users have easy and comfortable access to all necessary data and parameters. This data can be accessed even more quickly through customizable configuration of the DMC 3000.

Conclusion

The DMC 3000 has improved detection characteristics (energy/isotropy response) and strong dose rate linearity. These qualities give the DMC 3000 more accurate dose assessment capabilities during extended exposures and in the kind of pulse X-ray fields encountered during IR/IC operations.
Add to this more robust alarming features and clear and efficient access to critical data and you have the DMC 3000 – the latest tool in personal radiation safety.

References

1 International Electrotechnical Commission. Radiation protection instrumentation. Measurement of personal dose equivalent Hp(10) and Hp(0.07) for X, gamma, neutron & beta radiations: direct reading personal dose equivalent and/or dose equivalent rate dosimeters IEC 61526 Geneva.

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