RADOS TwoStep™-Exit

Whole Body Contamination Monitor

The use of radioactive materials can cause radioactive contamination spots in buildings and working areas. An important task of Health Physics is to prevent spread of contamination to other work areas, in particular out of controlled areas. Contamination itself can be carried by workers on their clothes, tools and even on their bodies. CheckPoint:Body™ mainly concerns the checking of people before they enter or leave an area, building or site. Their typical deployment is at the boundaries between controlled and clean areas.

The TwoStep™-Exit is a new breed of body monitor to check for beta contamination on personnel leaving the controlled areas of nuclear facilities. The TwoStep™-Exit is the product of development at the cutting edge of technology, based on years of experience in building body monitors. TwoStep™-Exit utilizes advances in BetaFibre™ detector technology paired with a radical redesign of monitor geometry.

FEATURES...

- A breakthrough in technology for gas free body monitors
- Setting new standards for measurement performance with economic and robust operation
- Superior performance due to radically improved geometry and advanced measurement chain
- Reduced operation and maintenance cost compared to standard body monitors
- Increased detector robustness
- Improved operation in noisy electronic environments and increased gamma background
- Tested according to IEC61098
- Large detector door for quick and easy access to all parts of the monitor
- No tools required for detector replacement
- Consequent standardization of parts
- Simple detector design allows the repair by customer technicians, resulting in lower maintenance costs
- Spare detectors can be stored inside the monitor
- MOVIN calibration switch

health physics
A Mirion Technologies Division

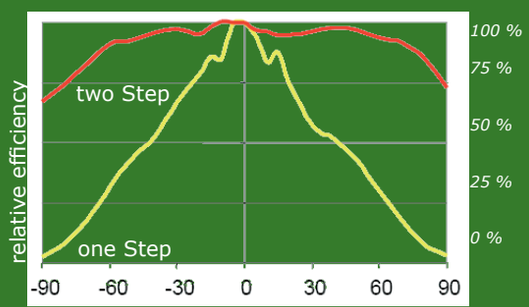
Featuring:
RADOS

FEATURES OVERVIEW

- Improved geometry detectors shaped around the body while at the same time systematically decreasing dead zones
- Radically new BetaFibre™ scintillation detector design
  Durable, low gamma sensitivity, improved light collection properties
  (GammaFibre™ scintillation detectors as an option)
- TwoStep™ methodology
  Proven during generations of Rados body monitors to present the best coverage around the entire body
- Real time multitasking operating system QNX
  Graphical user interface, calibration tool, P^2 accelerator and optional detector test programme
- Designed for performance in nuclear environment
  Stainless steel housing, easily decontaminated, easy maintenance

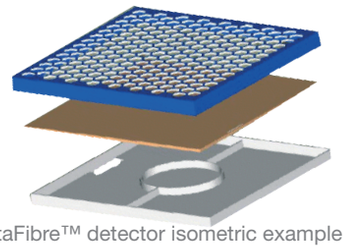
TWO-STEP MEASUREMENT

FIRST STEP	SECOND STEP
Front of body	Back of body
Left hand and arm	Right hand and arm
Left foot	Right foot
Front and top of head	Back of head



Variation of the horizontal response with source position (around the body)
Performance of TwoStep™-Exit versus one-step contamination monitor (Ellipse test)
acc. to IEC61098

FIBRE DETECTORS



BetaFibre™ detector isometric example

Features

- Improved detector geometry and positioning leads to a further increased detection probability while decreasing detector to body distance
- Plug & play properties for the detectors
- Maintenance-free detectors
- Much improved overall detection probability due to homogeneous detection response over the length of the monitor
- Detector connections by light fibre without electronics on detectors
- BetaFibre™ detectors
  - Low sensitivity to increased or fluctuating gamma background
  - very homogeneous response resulting in excellent detection properties
  - leads to improved measurement results and low false alarm rates
- GammaFibre™ detectors
  - Optional separate detection of gamma sources for body, foot and small items.

OPTIONAL ENHANCEMENTS

- Manually or automatically adjustable head detector
- Sliding doors or barriers
  (with emergency exit button)
- Small-items box(es)
- Integrated card, bar code or dosimeter reader are possible
- UPS - Uninterruptible Power Supply
- Gamma contamination measurement
- Up to 4 languages selectable by push button from 24 available languages:
  Dutch, English, Finnish, French, German, Italian, Lithuanian, Mandarin, Portuguese, Romanian, Russian, Spanish, Swedish, Taiwanese.
  Further languages on request.
- PDF-Print and Network-Print

MEASUREMENT MODE

Background measurement

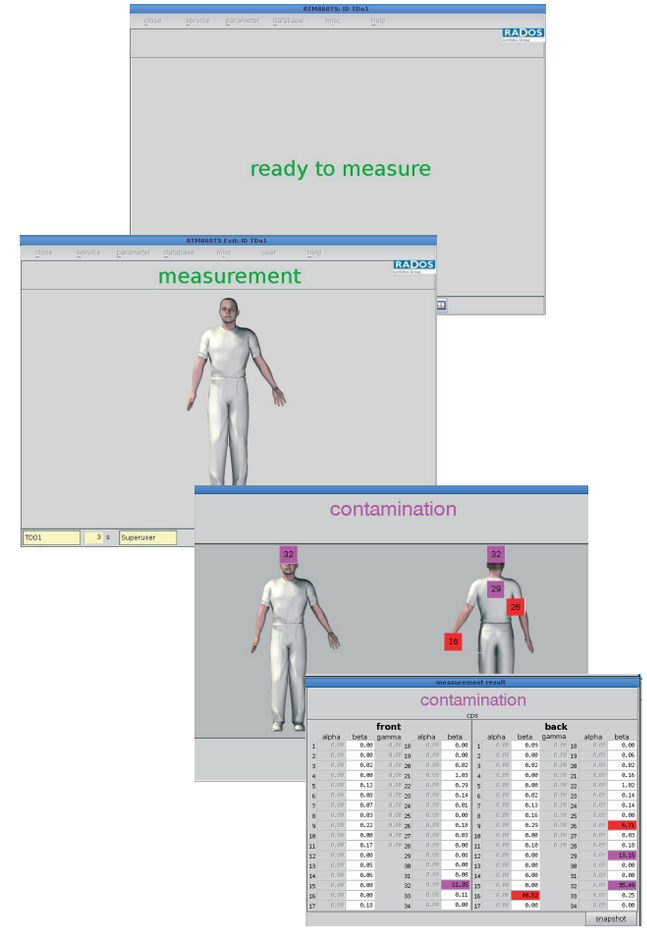
- Automatic background subtraction
- Background updated every second for each detector
- Measurement algorithm using two median filters to follow any background change in real time
- Monitor permanently ready to measure

Measurement time

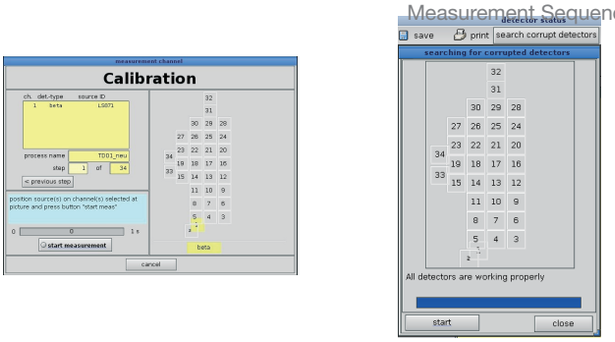
- Automatic calculation of the shortest possible measurement time
- P² accelerator to shorten measurement time for non-contaminated personnel up to 30 %
- Usage of a preset fixed measurement time possible

Measurement results

- Positioning guided by voice prompts
- Results announced by voice prompts
- Displayed graphics help to identify the contaminated parts of the body
- individual results of all detectors available via push button
- measurement results are stored in database and can be exported to an ASCII log file
- Full intranet access to database with explorer browser using CeMoSys™ (Central Monitoring System) (option).



Measurement Sequence



MAINTENANCE AND DIAGNOSTIC

Maintenance

- All functions available via graphic interface
- Set-up of all parameters and maintenance tools
- Information on current measurement status
- Detailed information on the status of all detectors
- Plug and play accessibility for the whole monitor to ease maintenance
- Check of all binary inputs and outputs
- Database with export to USB device or compact disc
- Light leak test to check function of all detectors, interfaces and connections and quickly identify faults
- Test of each detector with the optional detector alarm test to guarantee an optimized secure performance
- No need for gas refreshment means: detector replacement time <60 sec and «ready to measure» within 3 min (required for reestablishing background)

Self diagnostic

- Background count rate monitoring with minimum and maximum alarm thresholds
- Automatic return to “ready to measure” status
- Special algorithm for early detection of light leaks
- Monitoring of detector to PM board communication and status report

“system check” calibration tool

- single and multiple source calibration
- calibration of one, several or all channels
- database for calibration sources, automatic calculation of current activity
- reference calibrations automatically transferred to measurement software
- comparison of detector efficiencies with reference database for storage of calibration results
- Results can be printed and exported to USB device

Technical Specifications: CheckPoint:Body™ TwoStep™-Exit

BetaFibre™ Detector	Type	Window surface area
body	RFD485	485 cm² each
hands	RFD485	485 cm² each
head	RFD485	485 cm²
foot	RFD485	485 cm² each
small items (optional)	RFD485	485 cm²

34 +

one detector type fits all

Protection Grille	3 transparencies available: plastic grid, steel grids: T66, T81	
GammaFibre™Detector		
body	RFD13/40 (up to 6 detectors)	1275 cm² each
foot	RFD6/18 (1 detector)	600 cm²
small items (optional)	RFD4.8/4.8 (1 detector or more)	480 cm²

Detection Limit (MDA)
(Parameters: sigma (1.65 + 1.65); background:0.1 µSv/h, measurement time:10 s)

BetaFibre™Detector (in contact, per side)

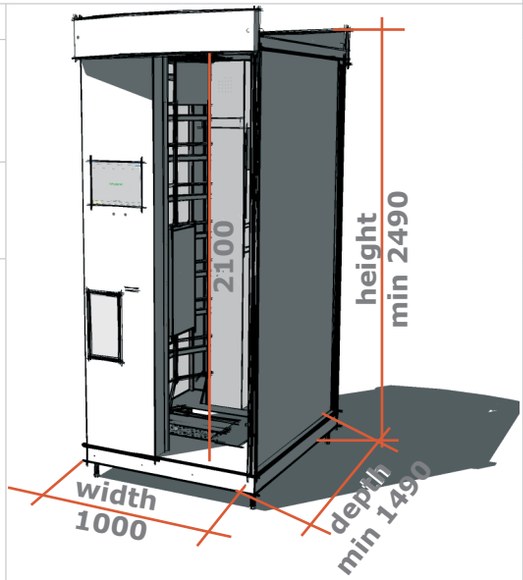
	plastic grid	81%	66% transparent
^{241}Am	20 Bq (alpha)	25 Bq	30 Bq
^{14}C	250 Bq	300 Bq	350 Bq
^{60}Co	50 Bq	70 Bq	80 Bq
^{36}Cl	25 Bq	30 Bq	40 Bq
^{90}Sr	15 Bq	20 Bq	25 Bq
^{137}Cs	35 Bq	45 Bq	50 Bq

GammaFibre™Detector (optional)
(5 cm distance to detector door, 6 x RFD13/40)

^{60}Co < 600 Bq
^{137}Cs < 2 kBq

sum channel, source middle to detectors

Electronics	industrial PC, hard disc, CD-RW disc drive, LC-display, IR-keyboard with mouse, printer interface, USB device, speech processor
Software	real time multi-tasking operating system QNX 6 (UNIX like, POSIX compliant), user software with P² accelerator, "System Check" calibration tool (formerly WKP)
Relay Outputs	standard: system fault, ready to measure, contamination, customer, optional: on request
Mains	100 - 240 V 1.0 - 2.0 A 50 – 60 Hz
Dimensions (see also figure)	height from 2490 mm to 3099 mm (depending on options) width 1000 mm depth from 1490 mm to 1584 mm weight approx. 350 kg to 550 kg
Environmental Conditions	temperature 0 °C - 45 °C relative humidity < 75 %, max. 95 % on yearly average, no condensation
EMC	compliant with European Electromagnetic Compatibility Directives: EN61326 (1997) EN61000-4-2 (2001) EN61000-4-3 (2003) EN61000-4-4 (2005) EN61000-4-5 (2001) EN61000-4-6 (2001) EN61000-4-8 (2001) EN61000-4-11 (2005)



Since norms, specifications and designs are subject to occasional change, please ask for confirmation of the information given in this publication.

MIRION TECHNOLOGIES Health Physics Division

www.mirion.com
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Mirion Technologies (MGPI) Inc
5000 Highlands Parkway
Suite 150
Smyrna Georgia 30082
USA
T +1.770.432.2744
F +1.770.432.9179

Mirion Technologies (MGPI) SA
BP 1
F-13113 Lamanon
France
T +33 (0) 4 90 59 59 59
F +33 (0) 4 90 59 55 18

Mirion Technologies (RADOS) Oy
P.O. Box 506
FIN-20101 Turku
Finland
T +358 2 4684 600
F +358 2 4684 601

Mirion Technologies (RADOS) GmbH
Ruhrstrasse 49
D-22761 Hamburg
Germany
T +49 40 85193 0
F +49 40 85193 256