Product Guide

ISSUE 1

UK BASED MANUFACTURER OF RADIATION DETECTORS

Southern Scientific is an international manufacturer and supplier of radiation detection equipment. We develop both installed and handheld systems, with the aim of providing simple but effective solutions to our customer's detection needs.

CAPABILITY

All design and manufacturing takes place at our UK offices in Henfield, where our team of highly experienced engineers work together to bring our products from conceptualisation to market, using knowledge from almost 30 years in the radiation detection industry. We have the capability for hardware and software design and are always happy to discuss special applications.

SUPPORT

Southern Scientific employs scientifically qualified technical sales staff, who can provide honest and simple advice to our customers across the different market areas in order to identify the most suitable detection solution for any requirement or project. We have a number of professional service engineers who offer installation and maintenance support to our customers in the field.

WORLDWIDE COVERAGE

We have a wide network of trusted distributors who sell and support our products to customers all over the World, covering the nuclear industry, hospitals, research facilities and defence companies. For details of your nearest Southern Scientific representative, please contact our offices.

QUALITY

Southern Scientific is fully ISO9001:2008 and ISO13485 certified, which ensures that we uphold stringent and consistent quality control procedures in the design and production of all of our instruments.

WEBSITE

Our website contains full details about our company, products and services, as well as downloadable catalogues and datasheets, and up to date news.

CONTENTS

RADHOUND

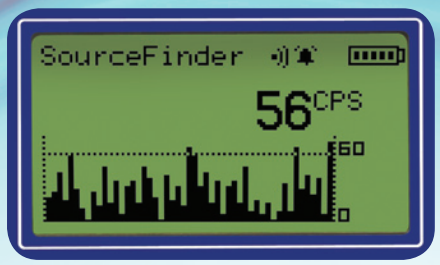
OUR SIMPLE YET VERSATILE DIGITAL RATE-METER

The Radhound bench-top monitor and Radhound X portable monitor are powerful, general purpose ratemeters, suitable for use by anyone, from professional health physicists to basic users. They are currently finding use within a large range of sectors, including the nuclear industry, hospitals, research facilities and NDT labs. A broad selection of Geiger, sodium iodide and plastic scintillator based probes covers the whole spectrum of contamination and dose rate measurement requirements.

These cost-effective, feature-packed instruments are simple and easy to use. Count rate, integrated count and source-finder modes offer a versatility that makes the Radhound series of monitors the instruments of choice for a wide variety of applications.

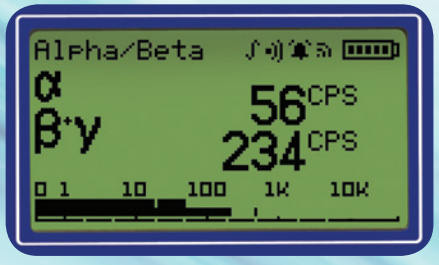
APPLICATIONS

- Health physics: for contamination monitoring on surfaces, clothing and objects
- Nuclear medicine departments, suitable for ^{125}I, ^{99m}Tc etc.
- Radiological survey work and lab use
- Emergency planning, response and clean up
- Research applications



SOURCE FINDER SCREEN

INTEGRATOR SCREEN



ALPHA/BETA-GAMMA SCREEN

ERGONOMIC

Light weight, supported by adjustable tilt stand. Big buttons for use with gloves. Bright, clear LCD display, with large characters and a motion-sensitive backlight.

VERSATILE

Suitable for bench-top use, mobile applications and for wall-mounting, using the tilt-stand base plate.

POWERED

Runs on an internal rechargeable lithium-ion cell, giving over 12 hours use, or directly from the AC charger for installed or static use. A battery level indication is given on screen.

Full type test available by request.

COMMON FEATURES

SIMPLE OPERATION

Single button toggling between modes and an easily navigable menu, which can be locked to protect user settings.

DATA TRANSFER

Connection to PC via infrared or wired link, for the real time transfer of measurements.

OVER RANGE

Message displayed in case of saturation, supported by active foldback protection.

SCALER TIMER

Scaler timer mode allows the integration of count for a preset time (or time to a preset count). Additionally in dose rate mode, time to dose can be indicated.

ALARM

Loud, audible tone suitable for use in active environments. Fully adjustable alarm thresholds, with separate settings for alpha and beta. Visual alarm indicated by flashing symbol.

SELF TEST

Integrity check is performed on start-up, covering battery, keyboard, menu configuration and high voltage.

SMART AVERAGING

Can be configured to slow, medium or fast depending on user preference. Averaging time scales automatically within these ranges to provide a steady, yet reliable reading.

ADVANCED USER MODE

Edit and lock device and probe settings in the fully configurable advanced menus

UNIQUE RADHOUND X FEATURES

FLEXIBLE

RADHOUND XI: Survey meter with internal GM detector, for probe free surveying in the field.
Measurement Range: 0.1 µSr/hr – 2 mSv/hr
Energy Range: 45 keV – 1.5 MeV

RADHOUND XE: External connector for use with the wide range of Southern Scientific probes.

PEAK READING

Can hold and display the peak count rate or dose rate.

BALANCED

Comfortable to hold, carry and operate for extended periods.

BATTERY

Runs from two standard C-cells or an internal rechargeable lithium-ion cell, as in the Radhound.

ACCESSIBLE

Probe calibration can be performed entirely from the advanced menu, without needing to remove the case.

MULTI-PROBE

The Radhound XE can be set up for use with multiple external probes. Changing the calibration is as simple as selecting the relevant entry from a list of pre-configured detectors.

RUGGED

Tough stainless steel case, waterproof to IP65 for weather resistance and safe decontamination. Impact resistant polymer ends allow the Radhound X to stand up to the rigours of daily use.

Full type test available by request.

RADHOUND/RADHOUND X OPTIONS

There are a number of options available when you order a Radhound or Radhound X that can be selected to extend the functionality of the monitor. A brief description of each option is given below:

PROBE (R/RX)

There are a wide range of probes listed on page 9-11 that can be purchased with the Radhound and Radhound X monitors to provide the radiation detection capability. The exact probe required will depend on how it is to be used and what energies and types of radiation it will need to measure. For more guidance on choosing a suitable probe, see page 8.

The Radhound is set-up and calibrated with a single probe and sold as a complete system. The Radhound must be returned to Southern Scientific or your nearest Southern Scientific Distributor if you wish to set up a new probe.

The Radhound X can be set-up and calibrated with up to 5 probes. The probe names and settings are saved as a list in the menu and can be easily selected when changing probes. Probe settings can be adjusted or new probes added by suitably trained users who have access to calibration sources.

WIRED SERIAL SOCKET (R/RX)

An RS-232 port can be added to the Radhound or Radhound X to allow connection to a Windows-based PC or tablet. Measurements can be transferred in real time and displayed on the screen through a simple communications protocol. This data can then be saved in a .csv format. A straight through 9 way female serial connector must be used, which is not included. Please be aware that adding this port removes the weatherproof status of the Radhound X.

INFRARED SERIAL (R/RX)

The Radhound can be fitted with an internal Infrared transmitter to send data without the need for a wired RS-232 serial port. for the Radhound X, this is included as standard. The IR transmitter can transfer measurement data in one direction only, over a line-of-sight distance of up to 1 metre. An IR receiver is included with the purchase of this option, which plugs into the USB drive of a Windows-based PC or tablet, to pick up real time data transmission from the meter.

PROBE CABLE (RX)

A curly probe cable is provided with the Radhound as standard and is fixed at the monitor end.

No probe cable is provided with the Radhound X as this will depend on customer preference. A 1 metre straight cable is recommended for most applications, however, different lengths and types of cable, such as coiled cable, are available. We can also provide quantity numbers of probe cables to order.

CONNECTOR TYPE (R/RX)

Please specify with your order which type of connector you would like to be used for your probe and meter. MHV connectors are now the most common for handheld devices and are used for our products as standard. Some older instruments use PET or BNC type connectors, which we can fit by request, but please note that some of these older types are not recommended due to safety concerns.

KEY: R = available for Radhound. RX = available for Radhound X.

RADHOUND/RADHOUND X OPTIONS

ALARMING BEACON (R)

For area monitoring applications, the Radhound can be fitted with a green and red LED beacon, attached to the top of the unit in the place of the handle. The beacon gives a clear indication of alarm status, showing green when the instrument is below the alarm threshold and flashing red when the alarm is activated.

The metal base plate of the Radhound can be used to easily mount the unit on a wall and with the beacon option, this provides a very low cost area monitoring solution. The SS340 is the most commonly used probe for this application. Alarm relay contacts can be added by request in order to integrate with an external safety system.

- **Bright LED Beacon**
  Alarm status is clearly indicated by a green or flashing red output.
- **Simply mounted**
  The adjustable base plate is designed to be easily fixed to a wall.
- **Sounder alarm**
  Optional sounder gives an additional indication of alarm.
- **Weatherproof**
  Can be mounted in a sealed box for operation in all weathers.
- **Networked solution**
  Can be connected to a PC, for data-logging and real-time remote monitoring. Several systems can be used to form an area monitoring network.
- **Range of probes**
  Probe can be chosen to fit the application, from the SS340 compensated Geiger probe for area monitoring to the SS600 alpha/beta probe for frisking.

TRACEABLE CALIBRATION CERTIFICATES

CONTAMINATION PROBES

INCLUDES SS300, SS315 SS404 AI, SS404 Be, SS440 B SS600, SS700

All contamination probes are tested against our in-house sources and are provided with a basic test certificate, confirming that the probe response to radiation is within the expected limits.

For a more detailed test report, carried out in a UKAS accredited lab with secondary standard sources, there is the option of a traceable calibration certificate. This tests the probe detection efficiencies for a larger number of isotopes, as well as checking the dose rate linearity. A traceable calibration may be preferred for particular applications where a better assurance of the probe performance is required.

DOSE RATE PROBES

INCLUDES SS330, SS335, SS340 RADHOUND X/I

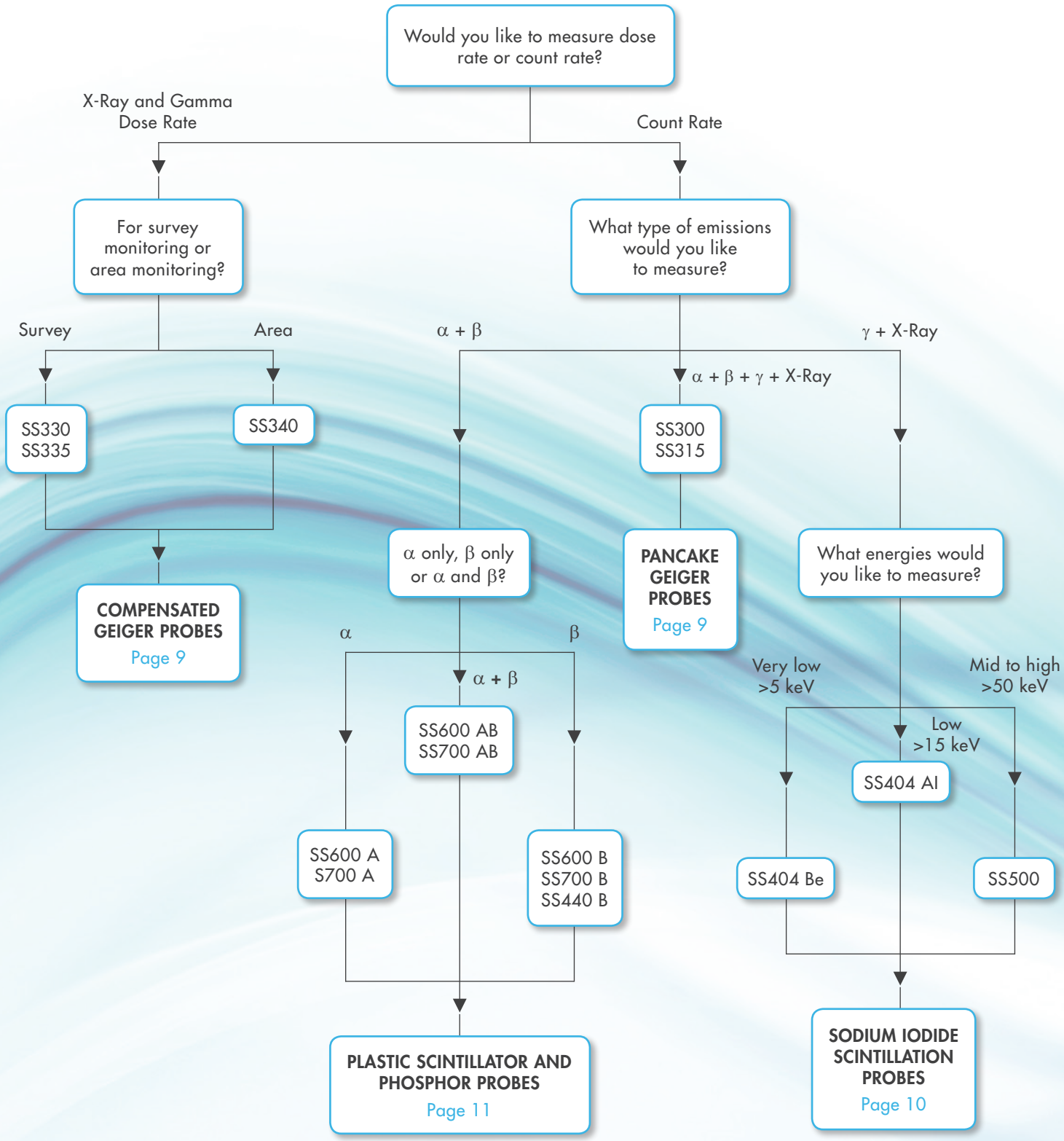
All dose rate probes are provided with a basic test certificate, with calibration carried out at a UKAS accredited lab with secondary standard sources, fulfilling minimum legal requirements for dose rate instruments.

A more detailed certificate issued directly by the accredited laboratory can be purchased as an option, which records the dose rate response for a larger number of isotopes and checks the dose rate linearity at a greater number of points. This full calibration certificate may be preferred for applications where a better assurance of dose rate response is required.

KEY: R = available for Radhound. RX = available for Radhound X.

PROBE SELECTION GUIDE

If you are unsure of the most suitable probe for your application, please use this chart to help guide your selection.
The emissions table provided on Page 15 may also be helpful.



CONTAMINATION PROBES

SS300 AND SS315 PANCAKE GEIGER PROBES

Pancake Geiger probes are an ideal, low-cost way of measuring alpha, beta and/or gamma radiation.

	SS300	SS315
OPERATING VOLTAGE	550 V	550 V
WINDOW	15.5 cm^2 1.6 to 2.0 mg/cm^2 mica	15.5 cm^2 1.6 to 2.0 mg/cm^2 mica
MEASUREMENT RANGE	0 - 5 kcps	0 - 5 kcps
PLATEAU LENGTH	150 V	150 V
TEMPERATURE RANGE	-10° to +50°C	-10° to +50°C
ENERGY RESPONSE	20 keV - 2 MeV Gamma down to 40 keV Beta above 3 MeV Alpha	20 keV - 2 MeV Gamma down to 40 keV Beta above 3 MeV Alpha
HOUSING CONNECTOR	MHV	MHV
DIMENSIONS	Ø 70 x 254 x 64 mm	Ø 70 x 180 mm
ACTIVE AREA	15.5 cm^2	15.5 cm^2
WEIGHT	280g	450 g

EFFICIENCIES Listed as percentage of 2π emission rate.

NUCLIDE	Am-241	Pu-238	Nat U	Sr-90 / Y-90	C-14	Pm-147	Pu-238	Co-60	Cs-137
EMISSION	α	α	α	β	β	β	β	β	β
EFFICIENCY	29.1%	26.6%	63.5%	56.7%	19.4%	59.1%	25.8%	36.2%	50.6%

DOSE RATE PROBES

SS330 AND SS335 COMPENSATED PANCAKE GEIGER PROBES

The SS330 provides an excellent general purpose end window GM probe with H*(10) energy compensation, which permits reliable measurements from ambient background up to 1 mSv/hr. The SS335 is functionally identical but with a different probe geometry.

SS340 SIDE WINDOW GEIGER PROBE

For ambient gamma radiation measurement, to H*(10).
Range: 0.1 µSv/hr to 2 mSv/hr. Energy: 45 keV - 2 MeV

	SS330	SS335	SS340
OPERATING VOLTAGE	550 V	550 V	450 V
MEASUREMENT RANGE*	0.1 µSv/hr - 1 mSv/hr	0.1 µSv/hr - 1 mSv/hr	0.1 µSv/hr - 2 mSv/hr
PLATEAU LENGTH	150 V minimum	150 V minimum	200 V minimum
DEAD TIME	100 µs	100 µs	110 µs
TEMPERATURE RANGE	-10°C to +50°C	-10°C to +50°C	-10°C to +50°C
GAMMA SENSITIVITY	Typically 5 cps/µSv/hr	Typically 5 cps/µSv/hr	Typically 2 cps/µSv/hr
ENERGY SENSITIVITY	H*(10) for 20 keV - 1.5 MeV	H*(10) for 20 keV - 1.5 MeV	H*(10) for 45 keV - 1.5 MeV
HOUSING CONNECTOR	MHV	MHV	MHV
DIMENSIONS	Ø 70 x 254 x 64 mm	Ø 70 x 180 mm	Ø 25 x 135 mm
ACTIVE AREA	15.5 cm^2	15.5 cm^2	40 mm
WEIGHT	300 g	470 g	100 g

* Dose rate probes are set-up to read in Sv/hr by default.
For measurements in rem/hr, please specify at point of order.

SCINTILLATION PROBES

SS404 Al PROBE

THIN-CRYSTAL NaI(Tl) PROBE FOR LOW ENERGY GAMMA MEASUREMENT

An end window scintillation probe designed to be an equivalent to the 44A.

It incorporates a Ø32 x 2.5 mm thick NaI(Tl) crystal mounted on an aluminium window and is fitted with an internal 3.15 mm lead collimator to reduce background counts.

SS 404 AL/BE	
OPERATING VOLTAGE	Typically 650V DC
DETECTOR CRYSTAL	Ø32 x 2.5 mm NaI
ENERGY RESPONSE	**SS404 Al:** 15 keV to 250 keV **SS404 Be:** 5 keV to 250 keV
HOUSING CONNECTOR	MHV
DIMENSIONS	Ø54 x 185mm
WEIGHT	820g
TEMPERATURE	-10°C to +50°C

SS404 Al/Be

SS404 Be PROBE

THIN-CRYSTAL NaI(Tl) PROBE FOR VERY LOW ENERGY GAMMA MEASUREMENT

Similar to the SS404 Al but fitted with a beryllium window, which extends the low energy response down to 5 keV, making it suitable for counting ^{55}Fe. Equivalent to 44B.

EFFICIENCIES Listed as percentage of 2π emission rate.

NUCLIDE	ENERGY	SS404 Al EFFICIENCY	SS404 Be EFFICIENCY
Fe-55	5.9 keV	6.1%	31.4%
Pu-238	16.3 keV	98.7%	99.1%
I-129	31.5 keV	84.9%	91.5%
Am-241	58.8 keV	117%	117.3%
Co-57	120 keV	82.7%	83.0%
Cs-137	662 keV	17.0%	18.3%
Co-60	1200 keV	11.4%	12.4%

SS500 PROBE

END-WINDOW GAMMA SCINTILLATION PROBE

A very sensitive end window scintillation probe designed to provide a cost effective gamma monitor for energies of 50 keV upwards.

Uses a 25.4 x 25.4 mm (1" x 1") NaI(Tl) crystal.

SS500

SS 500	
OPERATING VOLTAGE	650 V DC
DETECTOR CRYSTAL	Uses a 25.4 x 25.4 mm NaI (Tl) (1" x 1") Crystal
WINDOW WEIGHT	35 mg/cm^2
GAMMA SENSITIVITY	300 cps/microSv/hr (^{137}Cs)
ENERGY RESPONSE	50 keV - 2.0 MeV
HOUSING CONNECTOR	MHV
DIMENSIONS	Ø44.5 x 205 mm
WEIGHT	300g
TEMPERATURE	-10°C - +50°C
HUMIDITY	Up to 95% RH non-condensing

EASILY REPLACEABLE FOILS AVAILABLE

ALPHA/BETA CONTAMINATION PROBES

SS600 PROBES

LARGE AREA WINDOW RANGE

A series of three large area (100 cm² window) probes.

There are three versions:

- SS600 A – Alpha only with zinc sulphide layer
- SS600 B – Beta only with plastic scintillator
- SS600 AB – Alpha/Beta with zinc sulphide bonded to a plastic scintillator

The use of a plastic scintillator avoids the traditional use of anthracene in this application, with a comparable response.

EFFICIENCIES SS600 AB, α background 1.9 CPS, β background 7.5 CPS. Listed as percentage of 2π emission rate.

NUCLIDE	Am-241	Pu-238	Nat U	Sr-90 / Y-90	C-14	Pm-147	Pu-238	Co-60	Cs-137
EMISSION	α	α	α	β	β	β	β	β	β
EFFICIENCY	39.3%	42.0%	43.1%	38.4%	1.5%	36.9%	4.7%	14.0%	28.8%

SS700 PROBES

SQUARE WINDOW RANGE

A series of three ergonomically balanced probes with a square window of 50 cm² and a 64° angled handle.

There are three versions:

- SS600 A – Alpha only with zinc sulphide layer
- SS600 B – Beta only with plastic scintillator
- SS600 AB – Alpha/Beta with zinc sulphide bonded to a plastic scintillator

The use of a plastic scintillator avoids the traditional use of anthracene in this application, with a comparable response.

EFFICIENCIES SS700 AB, α background 0.7 CPS, β background 3.4 CPS. Listed as percentage of 2π emission rate.

NUCLIDE	Am-241	Pu-238	Nat U	Sr-90 / Y-90	Cl-36	Co-60	Cs-137
EMISSION	α	α	α	β	β	β	β
EFFICIENCY	33.0%	32.1%	34.8%	33.9%	30.6%	13.2%	23.1%

SS440 B PROBE

BETA SCINTILLATION

A beta scintillation probe designed to be an equivalent to the NE BP4.

The probe uses a Ø57 x 1.5 mm scintillator, with an active area of 19.6 cm², and provides comparable sensitivity for beta radiation to anthracene.

A choice of grill spacing is available:

- SS440 B-A – 3 mm
- SS440 B-B – 6 mm
- SS440 B-C – 9 mm

EFFICIENCIES SS440 B-C, β background 2.9 CPS. Listed as percentage of 2π emission rate.

NUCLIDE	Sr-90 / Y-90	C-14	Cl-36	Pm-147	Co-60	Cs-137
EMISSION	β	β	β	β	β	β
EFFICIENCY	34.8%	14.1%	36.1%	15.0%	23.6%	32.3%

SECONDARY STANDARD/NPL FIDELIS

HIGHLY TRUSTED RADIONUCLIDE CALIBRATOR

The FIDELIS is the ideal tool for calibrating all dose calibrators used in nuclear medicine departments, saving money on new calibrators and expensive reference sources.

It provides unsurpassed accuracy and is traceable to the primary standards of NPL (National Physical Laboratory - the UK national measurement institute). It was developed in conjunction with NPL and is a direct replica of, and tested against, their primary standard chamber.

The FIDELIS is used by large nuclear medicine centres and calibration services throughout the UK and all over the world, with some countries using it as their primary national standard.

FEATURES

- Provided with a well liner and removable sample holders.
- Calibrated for more than 60 radionuclides (option to add user defined factors and holders).
- Future proof - Calibration factors for new types of vial or new isotopes can be added using published data.
- Fully automatic self testing and daily checks.

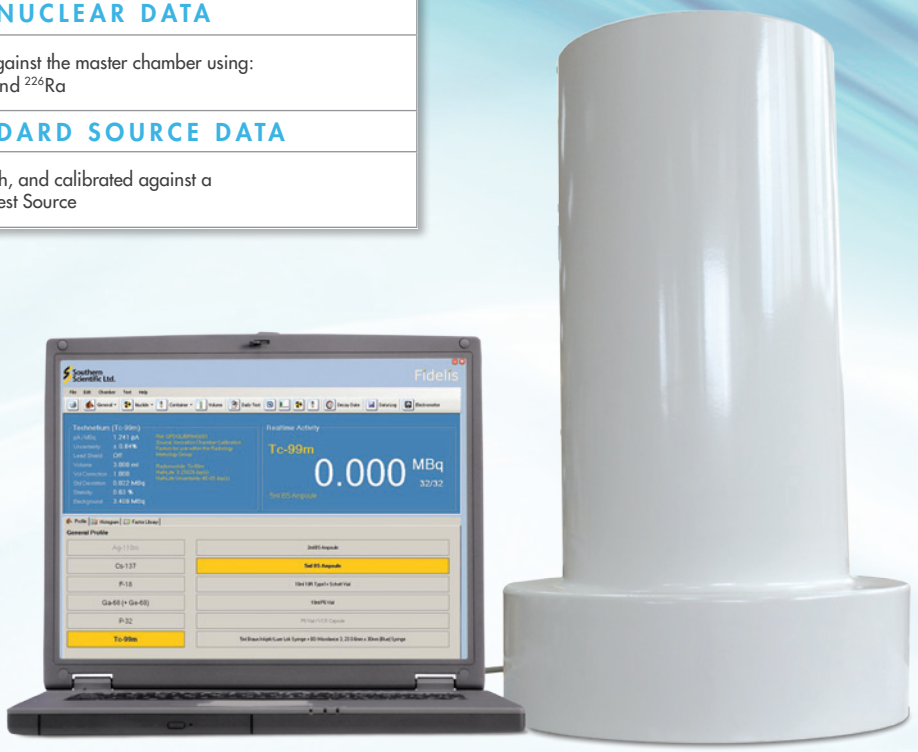
SOFTWARE

- Compatible with nuclear medicine management systems (export to Excel etc).
- Software is included (for use on Windows XP or Windows 7), providing a simple to use, unparalleled set of measurement tools.

IONISATION CHAMBER	
TYPE	Aluminium alloy, thin wall, deep well, high pressure
WELL DIMENSIONS	370 mm (H) x 65 mm (Dia.)
CABLING	1.8 m (6 ft) USB cable
POWER SUPPLY	Mains adaptor (110V - 240V)
GAS	Argon @ IMPa (~10 atmospheres)

MEASUREMENT RANGE	
TYPE	Autoranging high precision PAM module
ACTIVITY	Typ. 0.001 MBq to 75 GBq (0.03 µCi - 2 Ci) for ^{99m}Tc)
RESOLUTION	0.001 MBq (0.03 µCi)
ENERGY RANGE	25 keV to 3 MeV
LINEARITY	+/- 1%. Typical output for ^{99m}Tc 1.25 pA/MBq

NUCLEAR DATA
NPL test each chamber against the master chamber using: ^{241}Am, ^{57}Co, ^{137}Cs, ^{125}I and ^{226}Ra
STANDARD SOURCE DATA
Every unit is provided with, and calibrated against a 10 MBq ^{137}Cs Standard Test Source



HANDHOUND

HANDS-FREE HAND MONITOR

Designed mainly for use in isotope handling areas where hands could be contaminated.

The voice activated Handhound has been designed to help with HSE compliance, by keeping a record of hand contamination measurements for each user.

CONTAMINATION FREE

Hand sensor and voice activation means the Handhound can be operated entirely without touch

SENSITIVE DETECTION

A lead-collimated scintillation probe provides an excellent response to gamma emitters

CLINICAL HOUSING

Stainless steel, easy-clean enclosure

COST EFFECTIVE

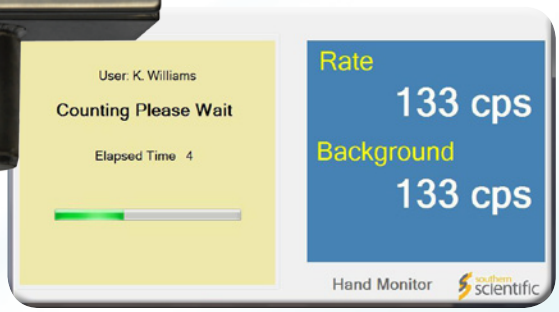
Based on the Radhound, the Handhound is a low-cost but effective hand monitoring solution

LOW FALSE ALARM RATE

A rolling background subtraction automatically adapts to changing environment

ACCOUNTABLE

All measurements are logged against a programmed user and can be easily downloaded onto USB



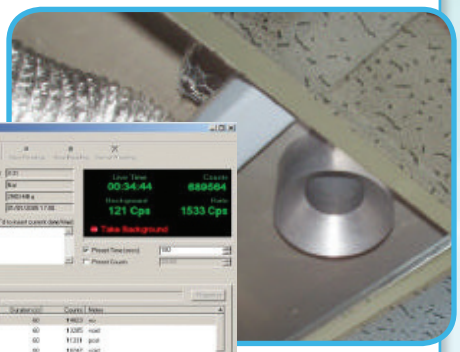
COUNTING PROGRESS SCREEN

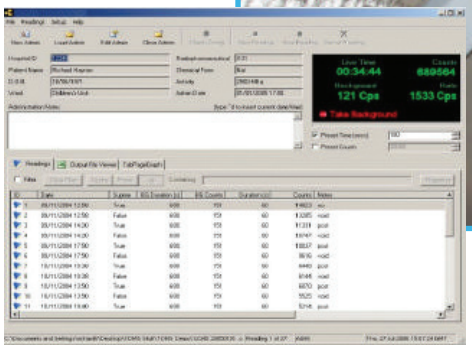
CEILING MONITOR

FOR DISCRETE ACTIVITY MONITORING OF NUCLEAR THERAPY PATIENTS

The Ceiling monitor has been designed to allow staff to monitor the radiation levels of nuclear therapy patients without disturbing them and without exposing the medical staff to unnecessary radiation dose.

A Radhound radiation monitor is installed behind the ceiling tiles above a patient's bed. This is connected to either a Geiger probe or a sodium iodide probe, depending on required sensitivity and whether spectroscopy is required. Custom made lead shielding is used for collimation, which provides a more directional response, removing the background from other patients. The monitor is remotely connected to a PC control station, outside the room.





The system has three key advantages:

1. To closely monitor and define when a patient is ready for safe discharge.
2. To follow ALARA regarding unnecessary exposure to staff.
3. Improve security and safety – with assurance that the patient is resident in the therapy ward.

ISOTOPE LIST

ISOTOPE	MEDICAL DIAGNOSTIC	MEDICAL THEARAPY	RESEARCH	NUCLEAR	INDUSTRIAL	NUCLEAR INCIDENT	EMISSION ENERGY (keV)		
							ALPHA	BETA Average (Max)	GAMMA
C-11	X								511*
C-14		X	X	X				49 (157)	
O-15	X								511*
F-18	X								511*
Na-22	X								511*/1275
P-32		X	X					695 (1710)	
P-33			X					76 (249)	
S-35		X	X	X				49 (167)	
Cl-36			X	X				49 (709)	
Ca-45			X					77 (257)	
Cr-51	X			X					5 / 320
Mn-54				X					5 / 834
Fe-55				X					6
Co-57	X								120
Co-58	X								511* / 810
Fe-59	X		X					150 (466)	1290
Co-60			X	X	X			96 (317)	1170 / 1330
Ni-63			X	X	X			17 (67)	
Ga-67	X								185
Se-75	X				X				260
Kr-85	X				X			250 (687)	
Sr-89		X						585 (1490)	
Sr-90/Y-90		X	X	X	X	X		200 (560) / 927 (2270)	
Tc(M)-90	X			X					140
Cd-109			X						88
In-111	X								245
In-113m	X								392
Te-123m			X						159
I-123	X								160
I-125	X		X						30
I-131	X		X					192 (606)	360
I-133		X		X		X		440 (1230)	
Ba-133						X			356
Xe-133	X				X			100 (346)	81
Cs-134	X							210 (660)	604
Cs-137					X	X		175 (514)	661
Pm-147	X	X	X	X	X	X		62 (225)	
Sm-151			X		X			77	
Eu-152			X					220 (690)	120 / 345 / 780
Tm-170			X					323 (968)	
Ir-192		X			X			210 (675)	316
Au-195		X							66 / 99
Tl-201	X								168
Tl-204	X							244 (760)	
Pb-210			X		X			4 (17) / 16 (964)	45
Bi-210					X			390 (1160)	
Po-210					X		5300		
Ra-226					X		4770		185
Th-232			X		X		4000		
U-235					X		4400		
U-238				X			4200		
Pu-238				X	X		5500		15
Pu-239				X			5160		51
Am-241			X	X	X	X	5480		60

* 511 keV Gamma emission resulting from Positron annihilation.

Emission energies taken from www.nuclide.org, which provides published sources for isotope specific data.

Only the strongest (most probable) detectable emission energies have been included and many weaker and very low energy lines have not been listed. In cases where there are two notable emissions of significant strength, these have both been listed and separated by a /.

Please note: this is intended to be a quick look-up table and not an accurate reference.

Distributed by:

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