



# RMS BODY SCAN

FULL-BODY CONTAMINATION MONITOR

» The **RMS BODY SCAN** sets a new benchmark for economical, reliable operation of full-body monitors.

» The latest detector technology combined with proven measurement electronics and software make the **RMS BODY SCAN** a high-performance monitor.

» Designed for performance in nuclear environments

» Confirmed IEC 61098



## FEATURES »



equipped with 24 pcs. structurally identical SZ 860 plastic scintillation detectors, or 24 pcs. PDK 860 flow proportional detectors»

- » suitable for alpha/beta/gamma contamination measurements
- » automatically adjustable overhead detector, from 160 cm to 210 cm
- » QuickScan technology to reduce count times
- » measurement time calculation per DIN ISO 11929:2010
- » optimized surface sensitivity (homogenous measurement properties)
- » negligible dead zones between the individual detectors
- » Coverage area with 20640cm<sup>2</sup> detection area
- » robust stainless steel housing, easily decontaminated, easy maintenance » uses the latest electronics with self-monitoring CAN bus\_function » low operation and maintenance cost
- » User screens and voice prompts in user-selectable language
- » optimized program structure for simple monitor operation and maintenance
- » easy and fast calibration using automatic source detection
- » easy firmware update or data download to USB stick
- » Linux-based operating software
- » USB and Ethernet connectivity
- » Central monitoring through (MaRCoS\_BodyScan) (optional)

## MEASUREMENT TASK »



**RMS BODY SCAN** is used where human surface contamination is to be monitored for a certain limit. This is at the exit from controlled operational areas, such as in nuclear plants. The human contamination monitor's measuring task is to tell with high statistical accuracy whether a person's surface contamination has exceeded the limit. For uncontaminated persons, on the other hand, a contamination alarm should be prevented with high statistical accuracy. Contamination should be measured in the shortest possible time to allow a faster flow of people. The **RMS BODY SCAN** has been modified based on experience with existing models, and in regard to measurement geometry, user friendliness and ease of service. Using the latest electronic components, the monitor constantly checks itself for malfunctions and user errors. With an additional program for networking several monitors, the user can query measuring statuses and results, and system statuses, from multiple locations. Remote monitoring and error analysis are also possible from any location. Through the use of 24 model SZ 860 or 24 model PDK 860 plastic scintillation detectors, the entire measurement surface is captured with the same homogeneity. These detectors are easy to maintain, with foil that trained personnel can change easily. The simplified detector arrangement makes defective detectors faster to replace. Optional gamma plastic detectors can be introduced for monitoring incorporations and small parts (file compartment). All electronic components are easy to access behind a service door, which makes maintenance and replacement easier.



## MEASUREMENT OPERATION »

The measurement principle is based on two steps for each person (front and back measurement). The optimized detector arrangement makes it possible to capture almost the entire surface of the person on whom measurement is performed. The person's size is irrelevant. The head detector is automatically positioned and is secured by a light curtain. During measurement, the positions of the hands, feet, head and body are monitored constantly to prevent positioning errors. For easy handling, the touchscreen and detailed

instructions over a speaker guide the user into the correct position. If no person or contamination is being measured, the background is automatically and continuously monitored. During measurement, the loudspeaker indicates the remaining measurement time and all measurement values are displayed at the same time. For alarms, various threshold values can be set, for which the measurement results can be shown in cps, Bq, and Bq/cm<sup>2</sup>, as desired.

## MEASUREMENT MODE »

### BACKGROUND MEASUREMENT »

- » Automatic background subtraction
- » Background updates for all detectors every second
- » Fast recognition of background variations

### MEASURING TIME »

- » automatic measuring time calculation
- » presets for specific measuring times
- » measuring time optimization for time reduction up to 40% for uncontaminated people.

### PERSONAL MEASUREMENT »

- » Automatic calculation of the shortest measuring time (depending on the detection limit)
- » Calculated or user-defined measuring time
- » User guidance through speech output
- » Display of contaminated areas
- » Measurements saved to an SQL database
- » Results indicated with speech output and graphic display

## SERVICE MODE »

The service mode can be password protected and activated through the user software. The service mode is for setting parameters, displaying detector status for individual channels, and for access to the internal SQL database. In addition to the user program, there is also the "cyclic test" program for recurring monitor tests.

### MAINTENANCE »

- » password access to parameters and functions
- » user-friendly service tools
- » detailed information on detector/measurement status
- » inspection of input and output

### SELF-DIAGNOSIS »

- » Display of background values
- » Independent monitoring of measurement tolerances and functionality.
- » Fast malfunction reports through self-monitoring

### TESTING & CALIBRATION »

- » Menu guided individual and multiple calibration
- » Database for saved test sources with automatic calculation of current activity
- » Calibration results are compared to reference values
- » Measurement results can be saved to a USB drive or network

### LAST MEASUREMENT / CONTAMINATION »

- » This function can be called up with a button on the display or with an external switch on the outside of the monitor. The screen shows the results of the last measurement with exceeded limits.



## ELECTRONICS »

» The control display unit is an embedded system (HMI) equipped with a chip card, CAN, USB, LAN and a 10,4 inch touchscreen for displaying measurement values. The settings and operation procedures are selected from the touchscreen. (A second display can optionally be integrated.)

» The operating system is Linux, which is used in all mab solutions contamination monitors and activity monitors. With **RMS BODY SCAN**, however, the whole user interface has been revamped and now supports a 10,4 inch touchscreen for easy user operation. Off-line media can be connected from USB ports.

## GAMMA SCINTILLATION DETECTOR SZG (OPTIONAL) »

The large-surface gamma detectors from mab (SZG 1500), used in **RMS BODY SCAN** are based on plastic scintillators 5.1 cm thick. Each detector measures about 100 cm by 15 cm and is equipped with a photomultiplier tube (PMT), preamplifier assembly with its own high voltage. The surface is 1500 cm<sup>2</sup>. The small gamma scintillator detectors (SZG 450 for the head position, for example)

are 30 cm by 15 cm. Every scintillator has a photomultiplier tube (PMT) with accompanying electronics. The surface is 450cm<sup>2</sup>. The large torso detectors are surrounded on five sides by 10 mm lead sheathing. The head scintillators are also sheathed with 10 mm thick lead. A lead-filled metal curtain on the front of the device provides additional protection.

## TYPICAL EFFICIENCY »

Nuclide	Emitter	Background (lps)		Efficiency (%)		MDA (Bq)	
		SZG 450	SZG 1500	SZG 450	SZG 1500	SZG 450	SZG 1500
<sup>137</sup> Cs	Gamma	75	300	24	24	45.6	91.3
<sup>60</sup> Co	Gamma	75	300	38	38	28.8	57.6



## DETECTORS »

### SZ 860 PLASTIC SCINTILLATION DETECTOR »

The large-surface mab **SZ 860** plastic scintillation detectors are used in various contamination monitoring devices. Notable features include a large 860 cm<sup>2</sup> active area with a unique structure for uniform reaction in all active areas, with no dead points. The multi-layer aluminized Mylar surface ensures long service life, and the surface density makes for efficient beta recognition. The large-surface scintillation detectors offer high efficiency with alpha and beta radiation and excellent long-term stability. The active area is divided into two independent sectors, each of which has its own high voltage, its own amplifier and counter. The window is protected by its pane and a stainless-steel grate. The individually adjustable design is made for easy maintenance and allows optional modifications for various uses — for example, an optional thicker Mylar layer, window protection with a fine or dense grate. These detectors are used in devices for monitoring undergarments, hands, feet and the entire body. It is fast and easy to replace a detector. No special tools are needed, and detector positioning is assisted by a user-friendly plug-in system.

### PDK 860 GAS FLOW PROPORTIONAL DETECTOR »

The large-surface mab **PDK 860** low-flow gas detectors are used in various contamination monitoring devices. Notable features include a large 860 cm<sup>2</sup> active area with a unique structure for uniform reaction in all active areas, with no dead points. The Mylar surface ensures long life. Due to the low flow rate of **2-4 L/min**, operation is very economical. The window is protected by Mylar foil and a stainless-steel grate. The individually adjustable design is made for easy maintenance and allows optional modifications for various uses — for example, an optional thicker Mylar layer, window protection with a fine or dense grate, as well as various types of gas. The large-surface gas flow proportional detectors offer high efficiency with alpha and beta radiation and excellent long-term stability. The active area is divided into two independent sectors, its own amplifier, HV and counter. These detectors are used in devices for monitoring undergarments, hands, feet and the entire body. It is fast and easy to replace a detector. No special tools are needed, and detector positioning is assisted by a user-friendly plug-in system.

## PROPERTIES »

- »robust detector technology
- »plug & play function
- »negligible dead zones between the individual detectors
- »homogenous response behavior
- »high efficiency
- »easy detector repair by user
- »compatible with other products in the RMS family

- »robust detector technology
- »plug & play function
- »negligible dead zones between the individual detectors
- »lower gas consumption
- »Filling gas options: P-10, or Ar/CO<sub>2</sub> (90%/10%)
- »homogenous response behavior, high efficiency
- »easy detector repair by user
- »compatible with other products in the RMS family

## HOUSING » DETECTOR ASSEMBLY »

robust plastic housing

thin-layer 2-zone plastic scintillation detector with ZnS coating and integrated photo-multiplier, high voltage generation, impulse processing, Mylar foil and protective grate

83%

480 mm x 180 mm

Mylar/PE

860 cm<sup>2</sup>

$\alpha < 0.1$  lps,  $\beta < 13$  lps

< 20 % ( $\alpha$  in  $\beta/\gamma$  channel with Am241)

< 1 % ( $\beta/\gamma$  in  $\alpha$  channel with Cs 137)

500 mm x 180 mm x 60 mm (L x W x H)

approx. 1.2 kg

robust aluminum housing

Aluminum housing consisting of 2 zones each with integrated high voltage generation, impulse processing, Mylar foil and protective grate

83%

480 mm x 180 mm

Mylar/PE

860 cm<sup>2</sup>

$\alpha < 0.1$  lps,  $\beta < 10$  lps

< 20 % ( $\alpha$  in  $\beta/\gamma$  channel with Am241)

< 1 % ( $\beta/\gamma$  in  $\alpha$  channel with Cs 137)

500mm x 180mm x 45mm (L x W x H)

approx. 1.4kg

- TRANSMISSION RATE »
- ENTRY WINDOW DIMENSIONS »
- ENTRY WINDOW MATERIAL »
- ACTIVE SURFACE »
- BACKGROUND »
- SPILOVER »
- DIMENSIONS »
- WEIGHT »

## TYPICAL EFFICIENCY »

- » GAMMA BACKGROUND : 0.1  $\mu$ S/h
- » MEASURING TIME : 10s
- » PARAMETER : sigma (1.65 + 1.65)
- » averaging surface 100cm<sup>2</sup>

Nuclide	Emitter	Background (lps)		Efficiency (%)		MDA (Bq /cm <sup>2</sup> )	
		SZ 860	PDK 860	SZ 860	PDK 860	SZ 860	PDK 860
<sup>36</sup> Cl	Beta	13	10	32	38	0,14	0,1
<sup>137</sup> Cs	Beta + Gamma	13	10	38	42	0,12	0,095
<sup>60</sup> Co	Beta + Gamma	13	10	18	24	0,25	0,16
<sup>99</sup> Tc	low energy Beta	13	10	11	21	0,41	0,19
<sup>14</sup> C	low energy Beta	13	10	8	9	0,57	0,44
<sup>90</sup> Sr/ <sup>90</sup> Y	high energy Beta	13	10	38	40	0,12	0,10
<sup>129</sup> I	Beta	13	10	17	21	0,26	0,19
<sup>238</sup> U	Alpha	0.1	0.1	27	24	0,015	0,017
<sup>241</sup> Am	Alpha	0.1	0.1	28	30	0,014	0,013

## OPTIONAL ADD-ONS »

- »automatic sliding doors or cabinets for entry or exit, or entry and exit, with safety function
- »Additional display at exit
- »small parts compartment with one SZG 450 or one SZ 860
- »file compartment with one SZG 450 or two SZ 860 / PDK860 detectors
- »gamma detector SZG for body, head and feet
- »Lead sheathing, 10 mm or 25 mm

- »Foot area monitoring to prevent illicit removal of objects from the control area
- »uninterruptible power supply
- »user language selection additional
- »supervision of networked monitors with (MaRCoS\_BodyScan) » integrated card, barcode or dosimeter reader
- »camera for human supervision



## TECHNICAL SPECIFICATIONS »

HOUSING »	robust stainless steel housing with adjustable feet
NUMBER OF DETECTORS »	24 structurally identical PDK 860 or SZ 860
ELECTRONICS »	industrial embedded system, USB device, CAN bus for internal control system (self-diagnostics)
SENSORS »	1 occupied/PIM, 1 body, 2 foot, 1 toe and 2 hand sensors
SOFTWARE »	user-friendly software with measuring time optimization and recurring monitor test module
OPERATING SYSTEM »	Linux embedded
SCREEN / DISPLAY »	10,4-inch screen
DATA STORAGE »	via SQL database, permanent data memory for >2000 measuring data
ALARM OUTPUT »	visual and acoustic
INTERFACES »	1 USB, 1 CAN, 1 LAN / Ethernet
STANDARD RELAY OUTPUT »	malfunction, ready to measure, contamination, no contamination
POWER SUPPLY »	89-265 VAC, 50-60Hz, 400VA max.
TEMPERATURE RANGE »	operating temperature (per IEC61098): 0-40°C, -10°C - 50°C (storage)
HUMIDITY »	operation (per IEC61098): ≤ 85 % non-condensing at max. 35°C. storage temperature: ≤ 95 % non-condensing.
DIMENSIONS »	2300H x 0750W x 1000D mm / open cabinet / Internal Access: 50cm wide, 200cm high 2300H x 1000W x 1300D mm / with doors, closed cabinet/ Internal Access: 50cm wide, 200cm high 2300H x 1000W x 1300D mm / with doors and gamma detectors including lead, closed cabinet / Internal Access: 50cm wide, 200cm high
WEIGHT »	300, 500, 1500 kg

## TYPICAL VARIANTS »

- »RMS BODY SCAN\_S Open cabinet style fitted with 24 pcs. PDK/SZ detectors. This is the smallest footprint variant.
- »RMS BOSY SCAN\_M Closed cabinet style fitted with 24 pcs. PDK/SZ detectors. Can be optionally fitted with inlet/outlet barriers or electrically controlled full height inlet/outlet sliding doors.
- »RMS BODY SCAN\_L Closed cabinet style fitted with 24 pcs. PDK/SZ detectors, plus high sensitivity gamma scintillators within a lead shadow shield. Can be optionally fitted with barriers or sliding doors.

## ACCESSORIES OPTIONAL »

- »Head detector automatically adapting to body height, Ident. No.: 10000172
- »automatically adjustable GAMMA Head detector SZG kit with 10mm lead shield Ident. No.: 10000101
- »GAMMA scintillation detector SZG with 2 cm lead shadow shielding for incorporation measurement Ident. No.: 10000156
- »Spare detector PDK860 / GAS FLOW detector Ident. No.: 10000103
- »Spare detector SZ860 / GAS FREE detector Ident. No.: 10000104
- »Enclosed booth controlled barrier kit - for inlet and/or outlet Ident. No.: 10000008
- »Enclosed cabinet DOOR\_entrance Ident. No.: 10000151
- »Enclosed cabinet DOOR\_exit Ident. No.: 10000107
- »GAMMA Toolbox for small items measurement Ident. No.: 10000173
- »Toolbox for small items measurement with 2 pcs. SZ860 Ident. No.: 10000173
- »Calibration sources Co<sup>60</sup>, approx. 1 kBq Ident. No.: 20000038
- »Calibration sources Am<sup>241</sup>, approx. 1 kBq Ident. No.: 20000033
- »uninterruptible power supply Ident.No.: 10000152
- »supervision of networked monitors with MaRCoS\_Body Scan Ident.No.: 13000002
- »Transponder or card reader for person identification Ident.No.: 20000004
- »Camera kit Ident. No.: 20000005



24 pcs. structurally identical SZ 860 plastic scintillation detectors, or 24 pcs. PDK 860 flow proportional detectors

2 x Gamma body detector (SZG 1500)

Gamma small part detector (SZG450)

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