HAND FOOT MONITORING

Sirius™-5

Hand, Cuff and Foot Surface Contamination Monitors

Sirius-5AB monitor with four hand /cuff detectors, two foot detectors and optional frisker.

The Mirion Sirius-5 provides thorough and reliable detection of external contamination on the hands and feet of personnel working in nuclear environments. Depending on your monitoring needs, Sirius monitors are designed to use either plastic scintillator (TPS) gasless detectors or patented* gas flow proportional detectors (LFP-579).

With Mirion WebRemote® software, an easy-to-use touch screen graphical user interface for industrial PC-based operation results in improved health physics programs, better tracking of contamination and faster, more thorough personnel throughput at boundary points.

Excellent detector protection, modularity of components, and extensive diagnostics result in direct reductions in maintenance, repair, and operation costs.

Sirius monitors use a sophisticated "fast following" background trending and release-limit algorithm to provide the best performance in a stable or varying radiation field.

*Patent US 7,470,913 B1 High Efficiency and High Homogeneity Large-Area Gas-Filled Detectors

FEATURES

✔ Rugged and reliable for high traffic areas

✔ Optimized counting geometry to measure both sides of the hands /cuffs and bottom of feet in one step operation

✔ Easy access for maintenance from the top, front and sides. No access to the rear of the unit is required

✔ All positioning sensors are solid state devices for increased reliability

✔ Superior detector protection, modularity, and diagnostics result in direct reductions in maintenance, repair and operation costs

✔ WebRemote enabled: ergonomic and easy-to-use touch screen graphical user interface; accessible locally or via PC / tablet web browser

✔ Windows 10 IoT operating system with LAN capability and USB ports

✔ Same "industry-best" software and serial bus electronics across Mirion Argos™-3/-5, GEM™-5 and Cronos® -1/- 4 /-11 monitor families; no re-training needed

✔ Compliant with IEC61098 Standard requirements

✔ Algorithm based on Gaussian or Bayesian statistics (compliant with the ISO 11929:2010 Standard requirements)

SIRIUS™-5 HAND, CUFF AND FOOT SURFACE CONTAMINATION MONITORS

Sirius-5 monitors cuffs tool

Sirius-5 monitors provide the optimum balance between cost and coverage, monitoring the palms, backs of the hands, cuffs and feet in a single step, with a very close counting geometry for the best sensitivity. The detectors are vertically oriented to minimize the possibility of detector contamination.

The Sirius-5 is available with either six gas flow proportional detectors optimized for alpha and beta detection or six gasless thin plastic scintillator detectors optimized for beta, alpha/beta or beta/gamma capability. Gasless and gas flow proportional detectors are identical in form factor. As a result, changing between gasless and gas flow proportional operations on the monitor is as simple as changing between TPS and LFP-579 style detectors and pre-amplifiers. Additionally, both detector styles are interchangeable between Sirius-5 hand , cuff and foot monitors and the Mirion Argos-3 /-5 whole body monitors, minimizing management of spares and reducing maintenance costs for facilities where both hand, cuff and foot and whole body monitors are required.

ELECTRONICS

The High Voltage (HV), preamplification, amplification, discrimination, counting, test pulse generation and other processing electronics are mounted right on the detectors. The cables between the detectors and computer are all direct current and low voltage.

SETTING PARAMETERS

Parameter settings, testing, calibration and maintenance is accomplished locally or from a remote location using Mirion WebRemote software. The WebRemote platform enables Tablet or PC connection to the Siirius-5 unit wvia LAN or direct link.

Alternatively, the operator can use the standard Monitor Software, pre-installed on all Sirius-5 Contamination Monitors, to provide local monitor access and functionality.

The following types of parameters are available for adjustment:

- Sensitivity of detector by zone
- Alpha, beta, and/or gamma alarm activity levels set in units of Bq, Bq/cm^2, dpm, dpm/cm^2, nCi, nCi/cm^2, pCi, pCi/cm^2, μCi or μCi/cm^2
- False alarm and alarm confidence probability
- HV Optimization using Figure-of-Merit (FOM) calculations
- Fixed or variable count times (calculated and optimized as a function of the alarm level setpoint, local background levels and desired accuracy of measurement)

Table 1. Model-specific information

RADIOLOGICAL (TYPICAL)

Model	Sirius-5AB	Sirius-5PB/PAB/PBG
Detector Type and Quantity	LFP-579 x6	TPS x6
Two Moveable Hand Detectors	Yes	
Frisker Option Available	Mirion Gas Flow Proportional Detector (LFP-100DHP)	Mirion CSP™ SMART probes (SB/SAB/SABG-100)*
Detector Type (Hands, Cuff & Foot)	Gas Flow Proportional	Plastic Scintillator
Radiation Monitored	Alpha/Beta	Beta (PB), Alpha/Beta (PAB) or Beta/Gamma (PBG)
Window Area Per Detector	~ 579 cm²	
Window	0.8 (±12%) mg/cm2 (Mylar); window assembly is field replaceable	1.2 mg/cm² (Multilayer Aluminum coated Mylar); window assembly is field replaceable
Typical Gas Flow Rate	10 cm³/min	Not applicable as external gas is not required
Possible Gas Mixtures	P5, P7.5, P-10 (Argon-Methane), or Argon/CO_2 (90/10)%	

Table 2. Typical 4π efficiencies, measured with 10 cm x 10 cm plate source placed in the center of the detector.
For comparison with instruments specifying 2π efficiency or % of emission surface rate, multiply these figures by 2.
§ No Alpha/Beta discrimination for TPS-B-579 and no Alpha/Beta separation for TPS-BG-579.

Typical efficiencies:	LFP-579 detectors, on contact, with 0.5 mm fine mesh	LFP-579 detectors, on contact, with foot grill on 0.25 mm fine mesh	TPS-B-579 detectors, on contact, with 0.5 mm fine mesh	TPS-B-579 detectors, on contact, with foot grill on 0.25 mm fine mesh	TPS-AB-579 detectors, on contact, with 0.5 mm fine mesh	TPS-AB-579 detectors, on contact, with foot grill on 0.25 mm fine mesh	TPS-BG-579 detectors, on contact, with 0.5 mm fine mesh	TPS-BG-579 detectors, on contact, with foot grill on 0.25 mm fine mesh
^{14}C (beta)	8%	6%	4%	3%	2%	1%	2%	2%
^{99}Tc (beta)	16%	14%	13%	10%	9%	6%	9%	7%
^{60}Co (beta)	14%	14%	15%	11%	10%	8%	7%	6%
^{137}Cs (beta)	25%	22%	21%	18%	18%	13%	15%	12%
^{60}Co (gamma)	—	—	—	—	—	—	16%	17%
^{137}Cs (gamma)	—	—	—	—	—	—	7%	7%
^{36}Cl (beta)	25%	23%	23%	20%	20%	16%	14%	13%
^{90}Sr/^{90}Y (beta)	32%	26%	29%	23%	25%	18%	17%	14%
^{241}Am (alpha)§	17%	13%	15%	9%	13%	7%	12%	7%
^{235}U (alpha)§	16%	11%	11%	4%	10%	4%	7%	2%
^{239}Pu (alpha)§	16%	12%	12%	7%	11%	6%	10%	5%

*See separate specification sheets for the **CSP** *Family* smart probes.

MONITORING ASSISTANCE VIA USER INTERFACE

Indicator lights at the entry show the monitor is ready to use. While the occupant is being monitored, messages and a countdown are given both on the LCD screen and audibly (multiple languages are available). Verification of proper occupant positioning is ensured with the help of infrared sensors. All hand and foot positioning sensors are non-mechanical solid state types for enhanced reliability. Visible and audible alarms are given if contamination is detected. The display shows the type (alpha or beta), the quantity and the location (alarming detector flashing on a figure). The system records data and date /time stamped logs showing the number of times the unit was used, parameters used, calibration settings, fault messages etc.

A relay closure is available for remote signaling of the monitor's status (e.g. "In Operation", "Contaminated", "Clean", "Fault", etc.

MAINTENANCE

The Sirius-5 monitors simplify maintenance with easy access from the front and center of the unit; as well as easy replacement and repair of the detectors. A separate LED on each detector shows which detector is alarming and/or being addressed on the LCD screen.

For ease of diagnostics, numerous test screens are available to enable precision monitoring, and changing of parameters including high voltage and discrimination thresholds for each detector. To provide further assistance rate meters show counts seen by each detector in real-time.

Calibration of all detectors and alarm testing can each be done in less than ten minutes.

REMOTE STATUS MONITORING

A user-friendly dashboard enables the status monitoring (in service, contaminated, out of service, maintenance) of multiple Contamination Monitors over the LAN. The dashboard is accessible from a Tablet or PC web browser and requires no proprietary software installation.

SPECIFICATIONS

PARAMETER ENTRY

- Parameters may be entered with the touch of a finger using the capability of the built-in touch screen and WebRemote software. Additionally, a USB connected keyboard/mouse may be used to enter parameters

MECHANICAL
Cabinet:

- Steel with rugged powder coat finish for column and top, stainless steel base and foot pan cover provide for ease of decontamination and minimum maintenance

- Dimensions for any of the Sirius-5 models is approximately (W x H x D): 78.0 x 179.3 x 91.9 cm (33.5 x 70.6 x 36.2 in.)

- Approximate weights are (with no options installed):

Model	Weight
Sirius-5AB	125.0 kg (275.0 lb)
Sirius-5PB /PAB /PBG	135.8 kg (298.8 lb)

ELECTRONICS
Computer:

- The Sirius-5 computer operates on Windows 10 IoT operating system with LAN capability and USB ports for transferring data. Data may be retrieved either via USB or a LAN

- High-quality digitized sound for prompts, with dual speakers

Display Screen:

- ~23.4 cm (10.4 in.) touch screen LCD display, integrated onto top of unit

Easy access Input/Output and Power Entry Ports panel at foot of pedestal in rear:

- Six USB ports and one Ethernet port (RJ-45)

- IEC standard AC receptacle

- Sirius-5AB also includes a gas connector

Environmental:

- Temperature Range:
  - Operating (meets IEC 61098) – 0-40 °C (32-104 °F)
  - Storage – 0-50 °C (32-122 °F)

- Relative Humidity:
  - Operating (per IEC 61098) – ≤ 85% non-condensing at 35 °C (95 °F) maximum
  - Storage – ≤ 95% non-condensing

Power Requirements:

- 220 V ac/50 Hz /1.0 A or 110 V ac /60 Hz/2.0 A mains 3 m (~10 ft). IEC standard cable (supplied; other cables are available; specify special cable requirements; contact local Mirion affiliate) for further information

Power Consumption:

- 110 VA

Certifications:

- IEC 61098 compliant
- ISO 11929:2010 compliant

OPTIONS

Gas Flow Hand-Held Tool/Body Frisker (Sirius5-FSKAB)

The Sirius-5AB unit can be fitted with the optional Model LFP-100DHP frisker (100 cm^2, 0.8 (±12%)mg/cm^2) that has excellent response to alpha/beta radiation. It comes with a retractable cable (incorporating the gas flow in the same cable) which provide up to 3 m (10 ft) of frisking range. An integral flow proportional frisker is available to enhance the monitoring capabilities. The frisker body incorporates an amber LED to indicate count rate, a beeper for audible indication and a red LED for alarm. The LCD displays the digital/analog rate meter results plus the current background level, alarm point and highest count rate achieved during current frisk. When not in use, the frisker continuously monitors background.

Gasless Hand-Held Tool/Body Friskers (Sirius5-FSKPAB, Sirius5-FSKPB and Sirius5-FSKPBG)

The Sirius-5 gasless units can be fitted with the Mirion SB/SAB/SABG-100 CSP 100 cm^2 plastic scintillation probe to provide beta/ alpha-beta/or alpha, beta-gamma capabilities.

Horizon 2.0 Compatibility

The Mirion contamination monitors can be integrated with Horizon® Supervisory Software to provide an integrated solution with Mirion instruments. Horizon software complements the functionality of the WebRemote Contamination Monitor Interface.

Local Database Support Option (SOFT-LDB)

The Local Database Option facilitates quick monitoring of the effectiveness of your contamination control programs. See separate specification sheet for full details.

SIRIUS™-5 HAND, CUFF AND FOOT SURFACE CONTAMINATION MONITORS

Model	Description	Number if Detector Positions
Sirius-5AB	1-STEP HAND/CUFF/FOOT MON.; ALPHA/BETA	6
Sirius-5PB	1-STEP HAND/CUFF/FOOT MON.; PLAS. BETA	6
Sirius-5PAB	1-STEP HAND/CUFF/FOOT MON.; PLAS. ALPHA/BETA	6
Sirius-5PBG	1 STEP HAND/CUFF/FOOT MONITOR PLAS. BETA/GAMMA	6
Sirius-5 SIM	1-STEP HAND/CUFF/FOOT MON.; SIMULATOR	6 (no actual detectors; blank-off plates)

Option	Description
WebRemote-Kit#Y	WebRemote Software and Rugged / Pro / Basic Hardware. FOR Rugged Y=1; FOR Pro Y=2; FOR Basic Y=3.
Sirius5-FSKAB	FRISKER OPT.; SIRIUS-5AB
Sirius5-FSKPB	FRISKER OPTION; SIRIUS-5PB
Sirius5-FSKPAB	FRISKER OPTION; SIRIUS-5PAB
Sirius5-FSKPBG	FRISKER OPTION; SIRIUS-5PBG
Sirius5-MAG	MAGNETIC CARD READER FOR SIRIUS
Sirius5-BAR	BARCODE CARD READER FOR SIRIUS
Sirius5-PROX	PROXIMITY CARD RDR FOR SIRIUS
SOFT-LDB	Loc.Database Support;Factory Installed. Provides local database support for a new Mirion Contamination monitor: • Factory Installed. • Includes latest Mirion SOFT-MON-SERIAL application software (Version 8.01 or above).
Sirius-5 Casters Kit	Casters with Integrated Leveling Feet to facilitate installation at final location. Includes: • Four 50 mm swivel casters. • Associated hardware to mount to Sirius-5.
Sirius-5 Wood Shipping Crate, Reusable	• For use with Sirius-5 only. • Field installable (contact local Mirion Service affiliate for assistance). • Includes custom foil vacuum bag to reduce moisture effects during shipping.

MIRION TECHNOLOGIES

CE — ISO 9001 SYSTEM CERTIFIED — MERIDEN CT / ATLANTA GA / OAK RIDGE TN / CONCORD ON

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