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## HF-4

# HAND-FOOT CONTAMINATION MONITOR

## MAIN ADVANTAGES

- Gas-less smart scintillation detectors
- Optimized number of detectors (two hands, two feet)
- Two-step measurement of hands (palms and backs)
- A detachable hand detector for frisking
- A variety of detectors available for optimum measurement of various radiation types
- Dynamic processing algorithms to give shortest measurement times depending on background
- User friendly graphic interface
- Quick change of measurement parameters (for example alarm levels, nuclides, units) by selection from stored presets using the touchscreen display
- Voice messages available in different languages
- Easy transport thanks to wheels and a handle
- Ethernet LAN connection as standard
- Web interface for the remote display of status

## PURPOSE

The HF series hand-foot contamination monitors are intended for the measurement of surface contamination by alpha, beta and gamma emitting radionuclides on hands, feet, and clothing.

Types HF-4A, HF-4B, and HF-4C have **suppressed sensitivity to gamma radiation** and thus low response to gamma background. This allows setting of lower alarm levels comparing to the HF-4D and HF-4E types.

- **A** measures only alpha contamination and is therefore designed especially for plants for the production and / or processing of nuclear fuel, uranium mining and / or processing.
- **B** measure alpha and beta contamination but cannot discriminate them. It has the highest sensitivity to beta contamination, especially low energies.
- **C** is a two-channel monitor, which can distinguish between alpha and beta contamination.

Types HF-4B and HF-4C are suitable for nuclear power plants, where the gamma background may be increased or variable.

Types HF-4D and HF-4E have **increased sensitivity to gamma radiation** and thus higher response to gamma background. This prevents them from setting as low alarm levels as can be set for the HF-4B and HF-4C types.

- **D** measures all types of radiation (alpha, beta, gamma) in one channel. It is suitable for nuclear medicine workplaces where Tc-99m radionuclide and possibly others pure gamma emitters are used.
- **E** measures all types of contamination and can discriminate alpha. It is suitable for training or experimental workplaces.

The HF-4 monitors use two hand and two feet scintillation detectors. For proper contamination check from both sides, hands must be measured in two steps, palms and backs separately.

Optionally, the right hand detector can be equipped with a handle and used as a frisking probe.

The monitor measures the background radiation when not being used, and removes this from the user measurements to allow operation in higher background areas. As soon as any sensor detects that a person is present, the background measurement is interrupted. Once the user has achieved the correct measurement position, the measuring process begins. Visual indicators and voice prompts help to achieve the correct position.

The monitor guides the workers during the measurement sequence and informs them of the results by voice and visual display.

Measurement results and events are stored and can be exported to a PC for records and analysis via Ethernet (Modbus, TCP/IP).

Using the touchscreen, a predefined set of parameters can be selected, language changed and the monitor can be switched to the service mode (basic diagnostics and settings). A PC with service software is used for full diagnostics and settings.

# HAND-FOOT CONTAMINATION MONITOR

## SPECIFICATIONS

Detector type	scintillation
Active hand area	2 × 286 cm <sup>2</sup>
Active foot area	2 × 525 cm <sup>2</sup>
Dimensions (W × H × D)	(640 x 1434 x 798) mm
Weight	50 kg
Power supply	85 to 264 VAC
Units	cps, cpm, dpm, Bq, Bq.cm <sup>-2</sup> , Ci, Ci.cm <sup>-2</sup> , 1.cm <sup>-2</sup> .min <sup>-1</sup>
Operational temperature	0 to +45 °C

## OPTIONAL EQUIPMENT

50-A-0015848	Removable right hand detector for frisking of clothing
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## OPTIONAL ACCESSORIES

59-A-0010115	Fixture for calibration checks (for 120 x 200 mm sources)
50-A-0011369	Additional protective foil frame for foot detectors (suitable for alpha and alpha/beta monitors)

## TYPES

Name	1. channel	2. channel
HF-4A	alpha	-
HF-4B	alpha + beta	-
HF-4C	beta	alpha
HF-4D	alpha + beta + gamma	-
HF-4E	beta + gamma	alpha

## RELATED PRODUCTS

HM-4	Hand Contamination Monitor
HF series	Hand and foot Contamination Monitor with 6 detectors
SFP-100	Smart Frisking Probes
FCM-11	Frisking Contamination Monitor
ExitScan-2	Personnel Exit Monitor

## TYPICAL RADIOMETRIC PARAMETERS

Model	Channel	Radionuclide	Hand detector		Foot detector	
			Efficiency [%]	MDA [Bq/cm <sup>2</sup> ]	Efficiency [%]	MDA [Bq/cm <sup>2</sup> ]
HF-4A	α	<sup>241</sup> Am	47	0.02	40	0.01
HF-4B	α	<sup>241</sup> Am	49	0.05	40	0.05
	β	<sup>36</sup> Cl	48	0.04	40	0.04
HF-4C	α	<sup>241</sup> Am	47	0.02	38	0.01
	β	<sup>36</sup> Cl	33	0.06	33	0.04
HF-4D	α	<sup>241</sup> Am	49	0.11	40	0.12
	β	<sup>36</sup> Cl	48	0.09	43	0.08
	γ	<sup>137</sup> Cs	46	0.08	44	0.07
HF-4E	α	<sup>241</sup> Am	47	0.02	38	0.01
	β	<sup>36</sup> Cl	42	0.10	38	0.09
	γ	<sup>137</sup> Cs	40	0.09	38	0.08

