"WasteScan" series
Waste Assay Monitors WAM

Purpose
The "WasteScan" series monitors are the latest generation of segmented waste assay monitors. It is primarily intended for quantitative and qualitative characterization of gamma emitting radionuclides in waste stored in drums of different height, shape and weight. Analysis of non-cylindrical objects is also a possible option. Typical applications are assay of low or intermediate level waste to be stored in the repository or the checking of the waste potentially suitable for free release. Integrated sophisticated software enables the total and radionuclide specific activities evaluation and their distribution in drum volume.

Main Advantages
- Design enables optimization for specific customer’s requirement
- Different detectors can be used for optimal performance and throughput at specific applications
- Fast-scan feature and automatic collimator of the main detector allowing a greater range of measurable activities
- Full analysis and post-analysis of all acquired spectral data from each volume element with acquisition parameters
- Fully integrated software for total spectrum analysis
- Peak attenuation correction
- Automatic weighing of the drum as a standard

Description
Mechanical parts contained within a unit, amongst others:
- Fixed or wheel mounted platform
- Fixed or mobile part with spectrometric detector shielding, collimator and optional shutter
- Drum rotator with weight sensors
- Fast-scan feature and background MDG dose rate detectors.
- Spectrometric gamma detector (HPGe as standard, model depending on the application).
- Electronics including MCA for the processing of data from the detector.
- Control and power supply switchboards which allow local manual control of the system, remote control and display PC with the application software and the database.
- Basic calibration kit (custom designed phantom with reference source). Optionally, manual or automatic loading and/or feeding system.

"WasteScan" series monitors are used for spectrometric characterization of radioactive waste. It can be used in nuclear power plants, waste repositories, science facilities, reprocessing plants etc. for typically LLW/ILW measurements or free release.

www.vf.eu
Models Available

WAM-200 monitor

WAM-201 monitor

WAM-202 monitor

WAM-300 monitor

Common Specification

Platform and detection part
Monitor platform can be optionally mounted on wheels and thus can serve as a mobile monitor. Each drum is weighed automatically before the measurement starts. The detection part of the system is provided with background shielding, collimator and optionally with a shutter.

Measurement
The drum measurement zone is divided into 9 main sectors. Each of main sectors is divided to another 9 sub-sectors making a total 81 measuring sectors. The operator can recall any of 81 measured spectrums and recalculate any desired analysis.

Software
The data obtained and processed from the detector electronics are evaluated by sophisticated software. Spectra processing includes complete calibration with MCNP efficiency calibration module, peaks parameters determination, nuclides identification with whole decay chain, activities calculation including corrections to waste nature etc.

Remote control system*
The system is operated remotely from the PC (both manually and automatically). From this PC the spectrometric, device control and special waste assaying evaluation software modules are run. Maintenance operations can be manually controlled locally from the control and power supply switchboards. *(Not available for WAM-200 – see below)

Fast-scan
After the auto-weighing procedure is done, the monitor proceeds to the Fast-scan measurement. This quick measurement provides data for the automatic collimator setting of the HPGe detector. *(Not applicable for WAM-200)

Detection part specification
Detector type
HPGe, standard efficiency 30 %

Typical Energy Range
60 keV ~ 10 MeV

Typical Resolution at 122 keV
< 850 eV

Typical Resolution at 1330 keV
< 1850 eV

Typical Peak to Compton ratio
60:1

Multichannel analyser
up to 64k channels

Operating conditions
Temperature
5 ~ 55 °C (41 ~ 131 °F)

Relative humidity
up to 80 % non-cond.

Pressure
86 ~ 106 kPa (654 ~ 765 mmHg)

Power supply
220 ~ 240 VAC / 3 A

Models Specification

WAM-200
WAM-200 is the most compact and easy-to-operate WAM monitor. During the measurement, the detector-collimator assembly moves in a vertical direction. The system is controlled by an integrated notebook placed in a lockable case. On this notebook the spectrometric, device control and special waste assaying evaluation software are run.

WAM-201
WAM-201 advanced design provides sophisticated detector part which can move closer for measurements and further away for the safe loading and unloading of the drum.

WAM-202
WAM-202 drum monitor is provided with a retraction trolley on steel rails which ensures the best loading and unloading conditions.

WAM-300
WAM-300 is the high-end drum monitor with 152Eu transmission source and fixed detector-collimator part. Each of 9 main sectors can be measured with the transmission source to obtain precise density. The Whole procedure can follow one of the pre-programmed procedures.
## Model Specification

<table>
<thead>
<tr>
<th>Feature</th>
<th>WAM-200</th>
<th>WAM-201</th>
<th>WAM-202</th>
<th>WAM-300</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile platform – monitor mounted on wheels</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Vertical detector motion¹</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>N/A</td>
</tr>
<tr>
<td>Horizontal detector motion</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Vertical drum motion</td>
<td>N/A</td>
<td>N/A</td>
<td>□</td>
<td>N/A</td>
</tr>
<tr>
<td>Horizontal drum motion</td>
<td>N/A</td>
<td>N/A</td>
<td>□</td>
<td>N/A</td>
</tr>
<tr>
<td>Adjustable drum rotator speed</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Fast-Scan</td>
<td>N/A</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Shutter</td>
<td>N/A</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Typical HPGe detector measuring range</td>
<td>3 kBq ~ 100 MBq (81 nCi ~ 27 mCi)</td>
<td>3 kBq ~ 1 TBq (81 nCi ~ 27 Ci)</td>
<td>3 kBq ~ 1 TBq (81 nCi ~ 27 Ci)</td>
<td>3 kBq ~ 1 TBq (81 nCi ~ 27 Ci)</td>
</tr>
<tr>
<td>Measuring range with optional shutter up to</td>
<td>N/A</td>
<td>3 TBq (81 Ci)</td>
<td>3 TBq (81 Ci)</td>
<td>3 TBq (81 Ci)</td>
</tr>
<tr>
<td>Electrical cooling</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Liquid Nitrogen cooling²</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>Maximum drum diameter</td>
<td>610 mm (24.1 in)</td>
<td>610 mm (24.1 in)</td>
<td>650 mm (25.6 in)</td>
<td>610 mm (24.1 in)</td>
</tr>
<tr>
<td>Maximum drum weight</td>
<td>1500 kg (3300 lb)</td>
<td>1500 kg (3300 lb)</td>
<td>1500 kg (3300 lb)</td>
<td>1000 kg (2200 lb)</td>
</tr>
<tr>
<td>Typical weight of the monitor (approximation)</td>
<td>700 kg (1550 lb)</td>
<td>1700 kg (3750 lb)</td>
<td>1700 kg (3750 lb)</td>
<td>1800 kg (4000 lb)</td>
</tr>
<tr>
<td>Typical dimension of the monitor (W x H x D)</td>
<td>200 x 200 x 70 cm (79 x 79 x 28 in)</td>
<td>175 x 220 x 70 cm (69 x 87 x 28 in)</td>
<td>215 x 256 x 167 cm (101 x 85 x 66 in)</td>
<td>265 x 226 x 120 cm (105 x 90 x 48 in)</td>
</tr>
</tbody>
</table>

### Optional accessories:

- **Drum surface dose rate measurement (count of probes)**: 1-4, 1-4, 1-5, 1-4
- **Transmission source (132Eu as a standard)**: N/A, N/A, N/A, □
- **Wipe system – sweep tests**: N/A, □, □, N/A
- **Manually operated mechanical equipment for drum loading**: □, □, □, □
- **Different types of automatic and semi-automatic drum conveyers**: □, □, □, □

¹ When equipped, the vertical movement motor is fitted with an electromagnetic brake which stops the assembly automatically in case of power failure.

² Liquid Nitrogen cooling option removes the standard electrical cooling system.

*Optional accessories may change monitors weight and/or dimensions.*
Standards and Certificates
Waste-Scan Waste Assay Monitors are designed according to these standards and regulations:

- **ISO 14850-1:2004** - Nuclear energy – Waste-packages activity measurement; High resolution gamma spectrometry in integral mode with open geometry.
- **ISO 11929** – Determination of the detection limit and decision threshold for ionising radiation measurements, Parts 1, 3 and 8.
- **96/29/EURATOM** – EU directive outlining basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation.
- **GOST 26874-86** – Spectrometry of ionizing radiation – Methods for measurement of principal parameters.
- **GOST 27451-87** – Instruments for measurement of ionizing radiation – General technical conditions.
- **GOST 29074-91** – Equipment for monitoring of radiation situation – General requirements.

Models and Accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>K1390</td>
<td>WAM-200 basic option including phantom barrel with reference source</td>
</tr>
<tr>
<td>K1391</td>
<td>WAM-201 basic option including phantom barrel with reference source</td>
</tr>
<tr>
<td>K1392</td>
<td>WAM-202 basic option including phantom barrel with reference source</td>
</tr>
<tr>
<td>K1393</td>
<td>WAM-300 basic option including phantom barrel with reference source</td>
</tr>
</tbody>
</table>

Optional Accessories

- Drum surface dose rate measurement
- Manual or automatic bar code reader for identification and tracking of the waste package
- A printer connected to the PC for protocol printing
- Remote camera surveillance system
- Manually operated mechanical equipment for drum loading
- Different types of automatic and semi-automatic drum conveyers
- Set of recommended spare parts for five-year operation
- Liquid Nitrogen cooling assembly with automatic volume monitoring system instead of electrical cooling
- Custom safety system (emergency stop, PIR sensors, door switches, etc.)

Related Products

<table>
<thead>
<tr>
<th>K1039</th>
<th>MK-30P Measuring Chamber</th>
</tr>
</thead>
<tbody>
<tr>
<td>K0120</td>
<td>Swab tests (pods)</td>
</tr>
<tr>
<td>K13XX</td>
<td>Radcount-2 with Dose Rate probe</td>
</tr>
</tbody>
</table>

Contact address

**Czech Republic**
VF, a.s., Svitavská 588
CZ 679 21 Černá Hora
tel. +420 516 428 611ax +420 516 428 610
info@vf.eu

**Slovak Republic**
VF, s.r.o., M. R. Štefánika 9
SK 010 02 Žilina
tel. +421 415 072 411
fax +421 415 072 410
info@vf.eu