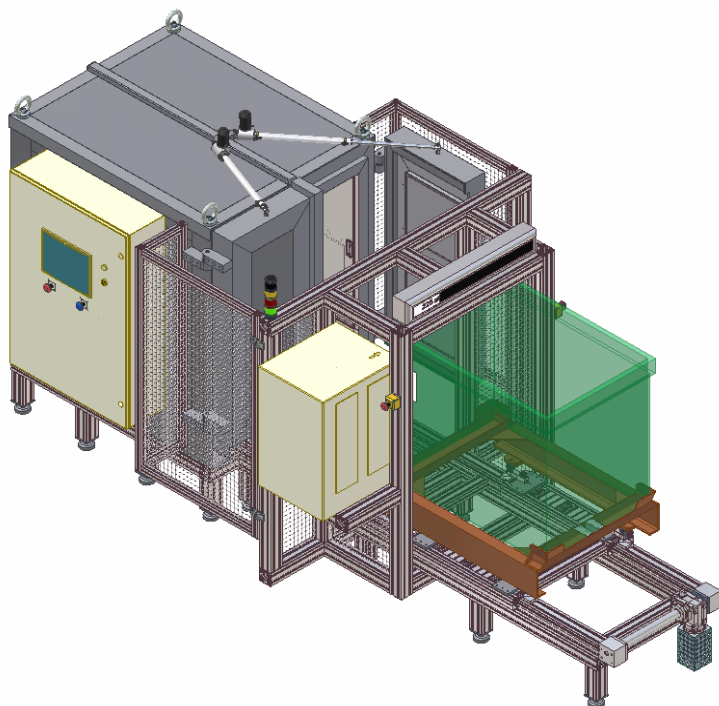


Free Release Monitor

FRM-02 series



The FRM-02 monitors are intended for measuring and analyzing the integral activity of gamma-emitting radionuclides in waste.

Based on the measurement results, it is possible to make a decision whether the material is to be free released or not.

Purpose

Free Release Monitors, FRM-02 series, are intended for measuring and analyzing the integral activity of gamma-emitting radionuclides in crates, pallets, drums and other similar packages with waste material. It is used mainly as free release monitor though it can be used as a low level waste monitor as well. Based on the measurement results, it is possible to make a decision whether the material is to be released into the environment, decontaminated or classified and disposed as radioactive waste.

The monitor can be calibrated for a variety of radionuclides or optionally the so called radionuclide vectors (fingerprints) can be implemented.

Description

The basic parts of the monitor are as follows:

- Measuring chamber with plastic scintillation detectors, processing electronics and the lead shielding
- Embedded tensometric scale sensors for the weighing of the material
- Conveyor with a movable cart for the transport of the pallets/drums with the material being measured from/to the measuring chamber
- Drives for the doors and the movable cart
- Control panel with a technological PC with touch screen and other control buttons and switches
- Large information display panel and a visual-acoustic signalling unit
- Safety closures and interlocks to maximize the occupational safety

As standard, 32 detection units are used which are located in the door, back panel, top and bottom panels, and side panels to ensure an excellent detection area coverage and high sensitivity. The amount of detectors allows good determination of the activity space distribution. The detectors used are large plastic scintillators integrated with photomultipliers and MCAs. Each detection unit also contains a temperature sensor.

The closed measuring chamber is outfitted with an inner stainless-steel lining and narrow drain space at the bottom for easy decontamination. As standard, lead shielding is 50 mm (2 in) thick; though other shielding thickness and material can be used on request.

Main Advantages

- Excellent throughput of the system enabled by the high sensitivity and short measurement time
- 32 detection units, each with integrated MCA and temperature sensor
- Ability to operate even when one of the detectors has malfunctioned or is in failure
- Automatic operation, low operational costs
- User-friendly interface (optionally using touch screen), selectable preset materials and nuclides from the database
- Automatic background subtraction
- Graphic image of the activity distribution enabling the location of hot spots and potentially removing the sources from the package

Standards and regulation used

96/29/EURATOM - EU directive laying down basic safety standards for the protection of the health of workers and the general public against the dangers arising from ionizing radiation.

EC RP-122, Part I – Practical Use of the Concepts of Clearance and Exemption

IAEA RS-G-1.7 - Application of the Concepts of Exclusion, Exemption and Clearance

ISO 11932 - Activity measurements of solid materials considered for recycling, re-use or disposal as non-radioactive waste;

ISO 11929 - Determination of the detection limit and decision threshold for ionising radiation measurements, Parts 1, 3 and 8;

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Description

The control system consists of an internal PLC along with an industrial panel PC for evaluation, storage, display and administration of the measured data. Operation of the unit is user-friendly thanks to the LCD-TFT colour (touch screen) monitor. This panel PC with the touch screen is installed on the side wall of the monitor.

Operation

The material measured is placed in the waste package (pallets and/or the drums). The packages are transported by means of a fork-lift truck from the storage area to the movable cart which is integral part of the FRM-02 feeding conveyor. After loading, it is possible to start the measurement either from the local control panel or from some remote controller. The process runs fully automatically. The material on the cart is weighed. In case that its weight exceeds the limit, the measurement will not start. In case that the weight is lower than the limit, the package loaded on the cart will move into the measuring chamber.

The waste material is then automatically measured according to the last settings chosen by the user. The operator is free to change the type of material, measurement geometry (for example ratio of the filling of the package) and critical radionuclide (or optionally radionuclide vector) by simple selection from preset values in the database. Integral gamma activity (Bq) and volumetric gamma activity (Bq/kg) are calculated and spatial activity distribution is evaluated. Measurement results can also be shown in Bq/cm² after a specific conversion factor has been set into the PC control unit.

A sophisticated algorithm is used to shorten the measurement time. The preset required statistical uncertainty is taken into account and the background subtraction is done automatically. Background is measured continuously during idle time. Calculation and setting of the lowest possible measuring time is automatic though it is possible to set the minimum and maximum measuring times if required.

After completing the measurement, the results are stored in the database and displayed on both the local monitor and a large local information display. An embedded signalization unit ensures strong visual and acoustical signalling in the event that the preset alarm levels are exceeded. Finally the cart moves to the unloading position.

Optional accessories

- Free release procedures based on radionuclide vectors (fingerprints)
- PC used for the evaluation, storage, display and administration of the measured data installed in a separate rack rather than on the side wall of the on the monitor
- The integrated panel PC can be connected via Ethernet interface to the remote PC from which the local database is also accessible, results can be shown, parameters can be changed and the measurement process can be controlled
- Bar code reader for identification of the waste packages and/or operators allows automatic link of the waste package identification with the measurement results and potentially also with the operator's identification in the database. Any other types of personnel ID cards readers can be used upon request



Flexible solutions

- Printer for the printing of the protocols and/or labels. Protocols printed verified by the operator can be stored and the labels can be stick on the package with the waste. Such labels can contain noticeable final decision (YES/NO) and other information as per the request. Also the bar code can be used to have complete information about the package and measurement available from the label
- Accessories for automatic printing and sticking of the labels on the pallets measured.
- Set of calibration tools and sources – to be specified for specific application
- Configurable binary I/O module
- Accessories for remote wireless start/stop of the measurement process (e.g. from fork-lift truck by the driver after the loading etc.)
- Spectroscopic version with HPGe-detectors

Specification

Detection limits; sources in the middle of the chamber:

Co-60	less than 300 Bq
Cs-137	less than 700 Bq
Ba-133	less than 1 000 Bq
Gamma energy range	150 – 1500 keV
Processing capacity	less than 15 t / 8 hrs
Measurement time	less than 3 min
Total cycle time	less than 15 min
Pallet/crate dimensions (l x w x h)	1.2 x 0.8 x 1.0 m (3.94x2.62x3.28 ft)
Drum dimensions (ϕ x v)	0.6 x 0.8 m (1.97 x 2.62 ft)
Maximum package weight	1000 kg (2 204 lbs)
Number of the detectors	32
Shielding	50 mm (2 in) lead
Geometry	4 PI
Mains power supply	110-230 VAC
Monitor dimensions (l x w x h)	2.80 x 1.25 x 1.80 m (9.19 x 4.10 x 5.91 ft)
Total weight	about 6 tons (13 000 lbs)

Ordering data

For ordering, please contact your assigned VF representative. The system parameters and the range of delivery will be specified and agreed according to the application and customer's requirements.

It is possible to customize the control of the system, package size and weight, signalling units and information displays, interconnections, etc.

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