

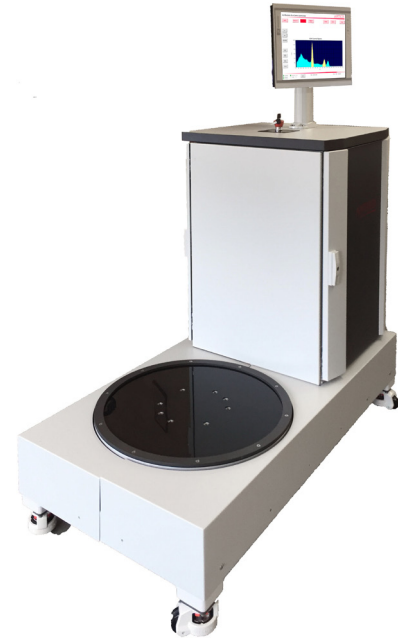
Low Resolution Drum Gamma Scanner

G3410-200

Introduction

The ANTECH Model G3410-200 LRDGS is a transportable Low Resolution Gamma Scanner for the characterisation and measurement of 200 L drums of waste. It is capable of characterising waste as Low Level Waste (LLW), Exempt or suitable for 'free release'. The G3410-200 consists of a turntable with a built in weigh scale and an instrumentation enclosure, which houses the system electronics and workstation (Panel PC) mounted on a common chassis.

Next to the turntable a half height 19" rack mount instrumentation enclosure houses three shielded sodium iodide detectors with associated counting electronics, turntable motor drive, power distribution and safety circuitry. A LCD touchscreen is mounted on an adjustable arm attached to the instrument enclosure.



Chassis and Drum Turntable

All equipment is mounted on a sturdy chassis. The chassis is fitted with castors and jacking feet which enable the system to be easily transported and fixed into position to prevent it moving during drum loading and unloading operations.

The turntable is designed to accept a 200 L (nominally 600 mm diameter) drum of waste. The turntable mounting plate has locating ring to assist with centralising the drum when it is loaded and to ensure that it stays in position during rotation. The turntable is mounted on a load cell arrangement that has the capability to weigh drums of up to 300 kg. The turntable is fitted with a servo motor and can rotate at a speed of up to 6 rpm to ensure a homogenous scan of the drum.

Instrumentation Enclosure and Detectors

An 1300 mm x 1400 mm x 710 mm (H x W x D) screened instrumentation enclosure providing EMC protection is mounted on the chassis next to the turntable. The instrumentation enclosure contains all of the power distribution electronics. It also houses three sodium iodide (NaI) detectors, each fitted with a photo-multiplier that connects to the system computer. Each detector is shielded with 1" of lead to reduce the area background and to provide collimation. The three detectors are positioned vertically above each other at variable heights on a robust frame to provide a scan area that covers the entire drum.

The turntable servo motor drive and associated motor safety circuitry is housed within the enclosure. The power reset button and indicator light are mounted on the side of the enclosure with a key resettable emergency stop button on the top. Power to the system is provided from a single phase, 110 or 230 Vac, 50/60 Hz supply and is capable of being isolated and locked from the outside of the enclosure.

A lockable data take off and server connection port is mounted near the base of the enclosure. All doors for the enclosure can be locked for system security.

Computer and Software

The embedded computer and touchscreen functions as the Operator Interface. The screen is mounted on an adjustable arm attached to the top of the instrument enclosure. The computer runs a software application called MasterLRDGS, which accepts and analyses spectroscopic and activity data from each of the detectors to determine the drum activity. MasterLRDGS carries out analysis of data, displays information about individual detectors, background and measurement counts in both numerical and graphical format. MasterLRDGS measures drum weight and enables the user to set up a number of different calibration curves (or fingerprints) each corresponding to a different waste stream or different waste matrix and activity type or radionuclide type.

The software uses the reported drum weight to apply a density correction to the results using the Antech ISOcorr software. It also has the option to accept fingerprints to enable activity per nuclide to be reported. It enables the user to:

- Configure pass/fail threshold levels
- Sentence on total activity, specific activity or the number of standard deviations above background.
- Monitor the system to confirm correct operation
- Set configurable password protected parameters.

The software is configurable to enable a Bar Code Reader to be used to input drums information, where appropriate. All software runs on Windows operating System.

Performance

The LRDGS is sufficiently sensitive that it can sentence radioactive waste as ILW, LLW, LALLW, VLLW and most important, where appropriate, as Out-of-Scope, greatly reducing disposal costs. The Minimum Detectable Activity (MDA) or the detection limit activity has been determined based on realistic background measurements using the conventions of the ISO 11929-1 standard. The table below compares the derived Specific MDA values for radionuclides of interest and compares them with the In-Scope / Out-of-Scope Threshold in units (Bq/g).

Radionuclide	Co-60	Cs-137	Eu-152	Ra-226 (NORM)	U-235+	U-238+ (Pa-234m)	Am-241
Gamma Ray Energy (keV)	1173.2	661.66	344.3	186.2	182.3	1001	59.5
Measurement Time (s)	300	300	300	300	300	300	300
Detector Efficiency	5.73E-04	7.35E-04	1.04E-03	1.23E-03	1.24E-03	6.13E-04	2.91E-05
MDA (Bq)	5.25E+02	4.55E+02	9.89E+02	7.72E+03	4.83E+02	6.33E+04	2.64E+04
Specific MDA (Bq/g)	7.13E-03	6.18E-03	1.34E-02	1.05E-01	6.55E-03	8.59E-01	3.58E-01
In-Scope / Out-of-Scope Threshold (Bq/g)	0.1	1.0	0.1	0.5	1.0	1.0	0.1

Features

- Employs three shielded sodium iodide detectors, 3" x 3" standard
- Gamma ray spectroscopic analysis of the contents of 200 L drums or objects of equivalent volume envelope
- Assay can be configured with customer adjustable pass/fail threshold
- High measurement throughput due to high efficiency sodium iodide detectors
- Built in weigh scale for automatic average density correction

Benefits

- Low cost spectroscopic drum assay system
- Transportable system on wheels
- Easy access to electronics and detectors for maintenance

Specification

Dimensions (H x W x D)	1300 mm x 1400 mm x 710 mm (approx.)
Weight	340 kg (approx.)
Operation temperature range	0-40 °C
Operation humidity range	< 80% non-condensing
Detectors	Three 3" x 3" NaI detectors
Compliance	93/68/EEC: CE Marking Directive
	2004/108/EEC: EMC Directive
	EN2006/95/EC: European Low Voltage Directive

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