

CHARMS - Characterisation Assay & Radiation Monitoring Station – G3650

Introduction

CHARMS - Characterisation and Assay Radioactivity Monitoring Station is a mobile assay and measuring system for making laboratory quality measurements of drums, waste bags and other waste objects in the field. It consists of a trailer with a laboratory/office and a heavy-duty turntable. The detection system employs a high-resolution, high purity Germanium (HPGe) detector with a large crystal diameter to enhance gamma ray detection. The HPGe detector is collimated and shielded to reduce the effect of the radiation background and radioactivity from other objects. The shielded detector system is mounted within the laboratory/office with a direct view of objects placed on the turntable for measurement. The motorised turntable, with an integral load cell for weight measurement, has a capacity of 2 metric tonnes.

CHARMS employs the Far Field measurement method, viewing the entire waste object (drum, waste bag) being measured. Using the weight measured by the load cells in the turntable (rotation platform) an average density attenuation correction is performed. During each measurement the waste object (for example drum or waste bag) is rotated at a constant rotation speed to reduce the effect if inhomogeneity in the waste matrix.

The high efficiency (>50%) shielded and collimated HPGe detector with a large diameter crystal provides spectroscopic measurements with both excellent gamma ray energy resolution and sensitivity. Detection limits (MDA) have been determined based on field measurements with a realistic background dose-rate. Using a 5-minute measurement time, MDAs of 0.0035 Bq/g for Cs-137 and 0.0021 Bq/g for Co-60 have been determined. For measurements of Cs-137 and Co-60, and most other radionuclides of interest, CHARMS is able to sentence the waste into the various categories of Out-of-Scope, Very Low Level Waste (VLLW), Low Activity LLW (LALLW) and LLW.



CHARMS is designed to operate on 110 VAC, which may be supplied from 110 VAC mains or 240 VAC mains



(through an isolation step-down transformer) or by on-board portable generator. Battery backup is provided as the CHARMS trailer is equipped with a 70 Wh backup battery (UPS) sufficient to keep the HPGe detector cooled down to operating temperature during non-operational times (power-cuts, nights, and weekends). A safety circuit is provided incorporating emergency stop buttons to stop rotation of the turntable.

Features

- In-field laboratory quality gamma spectroscopy measurements of drums, waste bags, loaded pallets and large volume objects weighing up to 2 metric tonnes.
- High efficiency (>50%) shielded and collimated HPGe detector with large diameter crystal.
- Integrated weigh scale for automatic average density correction.
- Detection limits for 5 min. measurement of 0.0035 Bq/g for Cs-137 and 0.0021 Bq/g for Co-60.
- Assay can be configured with customer adjustable measurement criteria.
- 110 VAC operation from 110 or 240 VAC mains or on-board portable generator.
- Rechargeable 24 VDC battery operation during quiet hours to maintain detector cooling.

Benefits

- High measurement throughput due to high efficiency large diameter HPGe detector.
- Short measurement times (typically 5 minutes) with low minimum detectable activity (MDA).
- Able to sentence waste into categories of Out-of-Scope, VLLW, LALLW and LLW
- Trailer mounted system for transportable laboratory quality in-field measurements.
- High efficiency HPGe detector for high quality spectroscopic measurements with low MDA.
- Electro-mechanically cooled HPGe detector with no requirement for liquid nitrogen.
- Measurement protocol and detector calibration compliant with ISO 17025.
- Detector System may be dismounted and deployed for measurements without the trailer.

Specification

Dimensions (H x W x L)	2740 mm x 2250 mm x 6140 mm (approx.)
Maximum load on turntable	> 2 metric tonnes, turntable diameter 1700 mm
Operation temperature range	0-40°C
Operation humidity range	<80% non-condensing
Detector	High efficiency >50% HPGe detector with large diameter crystal
Compliance	93/68/EEC: CE Marking Directive
	2014/30/EU: EMC Directive
	2014/35/EU: European Low Voltage Directive
	2006/42/EC: Machinery Directive
	2011/65/EU RoHS Directive
	BS EN 61010: 2001 Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1: General requirements
	BS EN60204-1: Safety of Machinery Electrical Equipment
	BS EN60529: Degrees of Protection (IP Ratings)