

ORTEC[®]

ISO-CART-II

Mobile Assay System



“An optimized transport system for in-situ waste measurements.”

AMETEK[®]
ADVANCED MEASUREMENT TECHNOLOGY

ISO-CART-II

Key Customer Benefits

ISO-CART-II represents a generational advancement over previous models, with improvements in several areas:

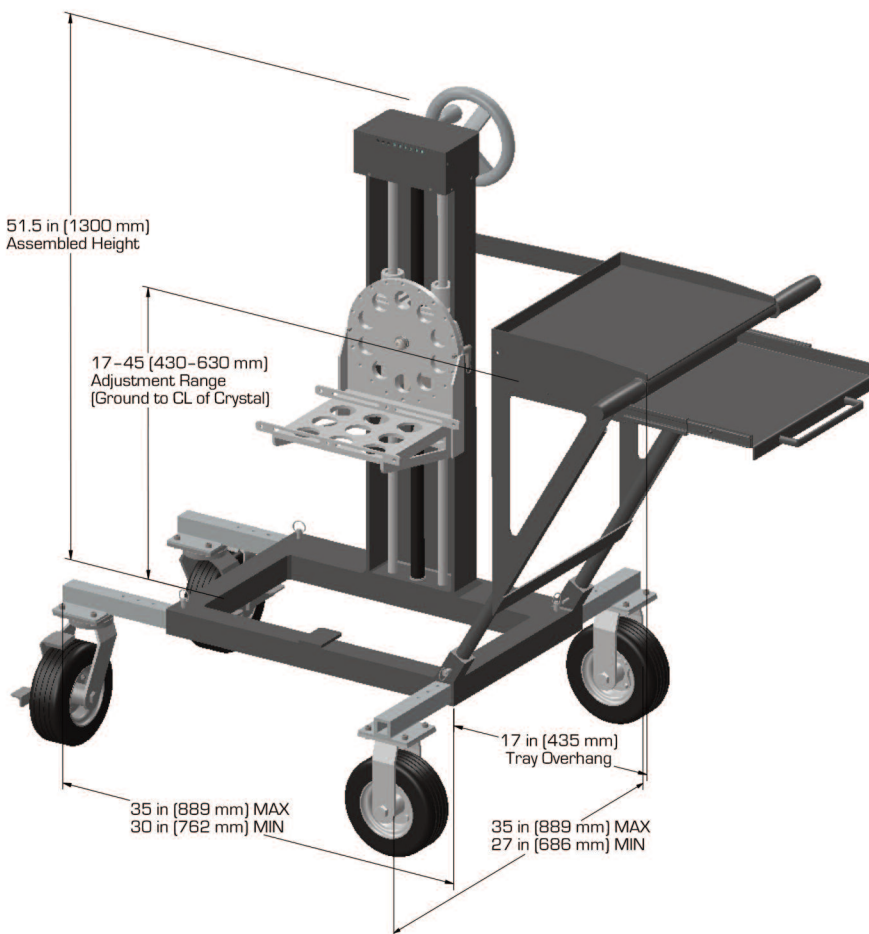
- Supports new and “legacy” spectrometry hardware
- Lightweight materials used wherever feasible in the interests of maneuverability.
- Adjustable front and rear track for extra stability even in tight spaces.
- Easy assembled and disassembled for transportation.
- Continuously and easily adjustable detector height and variable tilt adjustment.
- Unrestricted direct detector view of ground for soil assays.
- New modular collimator system allows minimum weight configuration (ISO-CART-85).
- Bottle counting option (ISO-CART-85)

System Overview

ISO-CART-II Mobile NDA Systems are ideal solutions for a wide variety of in-situ gamma-ray measurement requirements. The specially designed cart hardware transport system carries all the components: HPGe detector, shield and collimator, multichannel analyzer system, and laptop computer. The ISO-CART-II is entirely compatible with the latest generation of ORTEC integrated spectroscopy hardware and with spectrometry hardware which has been used with previous generations of ISO-CART.

An ISO-CART-II system can provide everything necessary to produce quantitative results quickly and easily “right out of the box.” The ORTEC ISOTOPIC software can control and process spectra from multiple ISO-CART systems assaying a single item, or can process results from multiple sequential views of the same item. The system can be supplied pre-calibrated at the ORTEC factory, 100% ready for use.

With ISO-CART-II, the entire assay system is easily transported to any measurement location. The large wheels permit easy movement over rough surfaces. The detector support can be positioned at heights from 0.38 m [15 in.] to 1.2 m [48 in.]. The pivot mechanism orients the detector at different angles from 0 to 180°. A sturdy adjustable shelf provides space for the notebook computer for convenient on cart operation. If the spectrometry system must be moved to a location where it is impractical to move the cart itself, it can be easily removed and carried. The collimator may be easily removed for infinite-plane soil measurements.



ISO-CART-II

Basic Cart Specifications and Options

ISO-CART-II: Large wheels permit easy movement over rough surfaces. Detector support positioning: 0.38 m (15 in.) to 1.2 m (48 in.) H. Pivot mechanism orientation: 0 to 180°. Overall maximum dimensions: 1324 mm (52 in.) L x 889 mm (35 in.) W x 1300 mm (51.5 in.) H. Weight: 63.5 kg (140 lbs).

SHD-1 Shield/Collimator: The standard collimator is 1.6 cm (0.625 in.) thick and 20.3 cm (8 in.) long. It is composed of lead with a 2 mm (0.08 in.) copper liner. Complete shield dimensions: 26.42 cm (10.4 in.) H x 20 cm (8 in.) W x 77.5 cm (30.5 in.) D. Weight: 16.82 kg (37 lbs).

SHD-2 Shield/Collimator: The medium-duty collimator is 1.3 cm (0.5 in.) thick and 20.3 cm (8 in.) long. It is composed of a tungsten-copper alloy for better shielding characteristics while maintaining a small volume assembly. Complete shield dimensions: 26.68 cm (10.5 in.) H x 2 cm (8 in.) W x 77.5 cm (30.5 in.) D. Weight: 27.27 kg (60 lbs).

SHD-3 Shield/Collimator: The heavy-duty collimator is 4.6 cm (1.8 in.) thick and 20.3 cm (8 in.) long. It is composed of heavy duty lead for high radiation areas. Complete shield dimensions: 25 cm (9.75 in.) H x 20 cm (8 in.) W x 77.5 cm (30.5 in.) D. Shield is split in two sections for assembly purposes. Weight: 68 kg (150 lbs).

Laser Meter: The Laser Meter accurately determines the distance from the detector endcap to the measurement point. A sighting laser mounted on the collimator is used to center the detector on the measurement point. The range finder can be set to display the distance in meters or feet. 18.8 x 7.0 x 4.7 cm (7.4 x 2.8 x 1.9 in.). Accuracy: 3 mm.

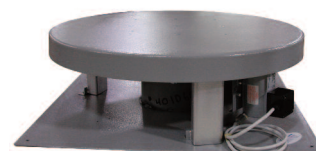
Turntable: Diameter: 30 in.; Rotation Speed: 1 rev/min; Capacity: 1000 lbs.; Height: 9.5 in.

Cart and Options Ordering Information

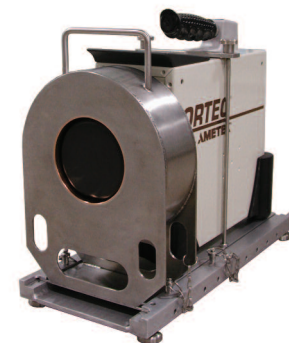
Model	Description
ISO-CART-II	ISO-CART-II. Requires a Detector-Collimator Carrier (DCC).
ISO-DCC	Detector-Collimator Carrier slide and plate
IDM-200-V-ISO-2-DCC	Detector-Collimator Carrier for IDM-200-V
TSP-ISO-DCC	Detector-Collimator Carrier slide, plate and mounting adapter screws and bar for trans-SPEC-DX-100T and TSP-ISO-SHLD
SHD-1	5/8-inch Lead Shield/Collimator, copper lined. For use with HPGe detector.
SHD-2	Tungsten Shield/Collimator. For use with HPGe detector.
SHD-3	Heavy Duty Lead Shield (1.8" thick) for high backgrounds. For use with HPGe detector.
TSP-ISO-SHLD-3	Lead Shield, 3" long x 2" thick. Provides 0.5" collimation. For use with Detective-DX-100T or trans-SPEC-DX-100T.
TSP-ISO-SHLD-2	Lead Shield, 2" long x 2" thick. For additional collimation with TSP-ISO-SHLD-3.
ISO-LASERMETER	Laser Range Finder
ISO-LSRMTR-ADAPT-1	Lasermeter adapter for SHD-1 shield
ISO-LSRMTR-ADAPT-2	Lasermeter adapter for SHD-2 shield
ISO-LSRMTR-ADAPT-3	Lasermeter adapter for SHD-3 shield
ISO-SCALE	Platform scale with indicator floor stand
ISO-TURNTABLE-110	Turntable for drum rotation. Capacity = 445 kg (1000 lb). 110 V, 50 Hz.
ISO-TURNTABLE-240	Turntable for drum rotation. Capacity = 445 kg (1000 lb). 240 V, 60 Hz.
ISO-TURNTABLE-OPT1-2	Increase in turntable RPM from 1 RPM to 2 RPM
ISO-TURNTABLE-OPT1-3	Increase in turntable RPM from 1 RPM to 3 RPM



ISO-LASERMETER mounted on SHD-1.



ISO-TURNTABLE.



trans-SPEC mounted on TSP-ISO-DCC with TSP-ISO-SHLD.

ISO-CART-II

ISO-CART-II System Configurations

ISO-CART™-85

ISO-CART-85 is a new mobile system for radioactive waste assay by high-resolution gamma spectroscopy. Through the use of a single very large-area high purity germanium (HPGe) detector, and a modular collimation system, ISO-CART-85 achieves, in many cases, free release levels in reasonable count times, for in-field measurements.

The HPGe detector is provided in the form of the ORTEC IDM-200-V, the revolutionary all-in-one integrated Gamma Spectrometer, cooled by a miniature Stirling cycle cryo-cooler. An internal battery powers the cooler and the highly stable digital signal processing electronics for up to 3 hours or longer with battery life extending options or battery hot swap.

The system is built around the ISO-CART-II system transport and also options the useful bottle-counting shield which allows it to be used as an "in-field counting room" to count bulk assay samples on the face of the HPGe detector. The tried-and-tested ISOPLUS software, in its latest version now offers 64-bit compatibility with the latest Windows operating systems. [A separate ISOPLUS brochure is available.]

ISO-CART-85 systems are provided "ready to go", traceably calibrated at our factory. The standard configuration comprises:

- ISO-CART-II.
- IDM-200-V large area, fully integrated HPGe spectrometer.
- ISO-2-IDM-SHD Modular Collimator Kit. Includes three field of view collimators (2", 4", and 6") and three 2" FOV collimator shields.
- Mounting hardware.
- ISOPLUS waste assay software.
- Laptop computer with software installed.
- Factory calibration.
- All necessary cables and connectors.

Separate brochures are available for the ISO-CART-85 system and ISOPLUS software from www.ortec-online.com.

Ordering Information for ISO-CART-85

Model	Description
ISO-CART-85-PC	Complete ISO-CART-85 System, Factory Calibrated. Includes ISO-CART-II, IDM-200-V-ISO-2-DCC Detector/Collimator carrier for IDM-200-V, ISO-2-IDM-SHD modular collimator, IDM-200-V Integrated HPGe spectrometer, ISOPLUS (ISOTOPIIC) software, ISO-CAL point source factory calibration, and Laptop computer with software loaded (printer not included).
ISO-CART-85-NOPC	ISO-CART-85 System Without PC or Factory Calibration. Includes ISO-CART-II, IDM-200-V-ISO-2-DCC Detector/Collimator carrier for IDM-200-V, ISO-2-IDM-SHD modular collimator, IDM-200-V Integrated HPGe spectrometer, and ISOPLUS (ISOTOPIIC) software.
ISO-2-IDM-SHD-EXT	Optional Bottle Counting Extension for ISO-2-IDM-SHD. Includes 6 each 1-liter bottles.

Individual Components

ISO-2-IDM-SHD	Modular collimator kit for use with IDM-200-V, includes 1 each ISO-2-IDM-FOV-2 2" Steel Field of View Collimator, 1 each ISO-2-IDM-FOV-4 4" Steel Field of View Collimator, 1 each ISO-2-IDM-FOV-6 6" Steel Field of View Collimator, 3 each ISO-2-IDM-SHD-2 2" deep lead sectional shield for FOV collimator.
ISO-CAL	Point source calibration at the factory (if PC not ordered, files will be supplied separately).
ISO-CART-II	Cart only (no Detector/Collimator carrier (DCC) or collimator).
IDM-200-V-ISO-2-DCC	Detector/Collimator Carrier for IDM-200-V.
ISO-2-IDM-FOV-2	2" Steel Field of View Collimator for use with IDM-200-V, Sn/Cu lined.



ISO-CART-II

ISO-2-IDM-FOV-4	4" Steel Field of View Collimator for use with IDM-200-V, Sn/Cu lined.
ISO-2-IDM-FOV-6	6" Steel Field of View Collimator for use with IDM-200-V, Sn/Cu lined.
ISO-2-IDM-SHD-2	2" deep lead sectional shield for FOV collimator. 1" wall thickness.
IDM-200-V	Integrated HPGe spectrometer.
ISOPLUS-BW	ISOTOPIIC Waste Assay analysis software.

ISO-CART-II Systems Based on Liquid Nitrogen Cooled HPGe Detectors and the digiDART MCA

ORTEC HPGe detectors are the industry standard in terms of quality and performance. ISO-CART-II systems may be configured with a wide variety of ORTEC HPGe detectors from which relative efficiencies of over 200% are available. The portable HPGe detector is mounted, along with the chosen collimator on the detector/collimator carrier or "DCC" which is easily removable from the cart as a unit

If the detector must be moved to a location where it is impractical to move the cart, the detector/collimator unit can be removed and carried.

Dewar Options

A portable, all-attitude HPGe detector is available with a 3.0-liter Gamma Gage dewar. A 7.0-liter multi-orientation dewar (MOD) is also available. The MOD dewar allows near all attitude use while offering reduced size compared to the equivalent holding time Gamma Gage model. Typically, the HPGe detector chosen would be a large volume GEM (P-type) or GMX (N-type); however, a wide variety of detector choices are available. Standard systems may be ordered by model number located on the back of this brochure. Contact us to suggest a configuration according to your detection limit and count-time requirements.

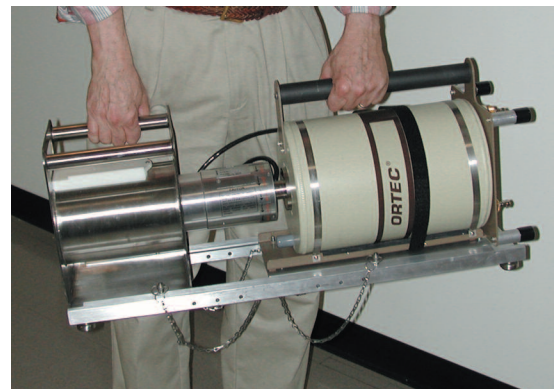
For more information on ORTEC LN₂-cooled HPGe detectors, visit www.ortec-online.com.

digiDART™ Data Acquisition Hardware

The digiDART is an ideal MCA for use with an in-situ assay system. It can acquire preliminary data in the field as a stand alone unit or perform a complete analysis on the spot with the use of a notebook computer.

- High-performance rugged HPGe grade spectrometer, 16k channels
- Digitally stable: consistent answers for long counts, changing count rates and temperatures
- Operates with or without an attached PC
- Built-in backlit LCD display and control keypad — live display of acquiring data
- Energy calibration using keypad
- Nuclide ID and activity calculation for nine Regions of Interest (ROI)
- High throughput — over 100,000 processed pulses per second
- Fits in the palm of your hand or attaches to your belt
- Holds 23 16k spectra in internal memory (614 at 512 resolution)
- ~9 hour battery life, recharge internally
- Only 860 grams, including batteries
- Fast USB communications
- SMART-1 detector technology ensures spectral data acquired is of the highest quality, via an internal state of health function which monitors the detectors performance parameters.
- Provides authentication of spectral data

For more information on the digiDART, visit www.ortec-online.com



ISO-CART-II

Ordering Information for ISO-CART-II Systems based on Liquid Nitrogen cooled HPGe Detectors and the digiDART MCA

To fully specify your choice of ISO-CART system, select the model number below for the size of detector needed and replace the letters DDD in the model number with the desired choice of dewar, as follows:

3.0 = 3.0-liter Gamma Gage dewar or M7L = 7.0-liter MOD dewar

Other configurations may be supplied on request. Your existing detectors may be used. Contact your ORTEC representative or e-mail ortec.info@ametek.com with your requirements.

System Description: Complete ISO-CART system includes: pneumatic-tired CART, fitted with 5/8-inch copper-lined lead collimator, carrier and mounting plate, storage shelf, HPGe Detector with SMART-1 technology, bayonet pressure fill adapter, digiDART, ISOPLUS software and Laptop computer. System is integrated and tested and supplied with factory calibration.

Model	Description
ISOCART-GEM25-DDD	ISO-CART Mobile Assay System incorporating GEM25 detector
ISOCART-GEM40-DDD	ISO-CART Mobile Assay System incorporating GEM40 detector
ISOCART-GEM60-DDD	ISO-CART Mobile Assay System incorporating GEM60 detector
ISOCART-GEM80-DDD	ISO-CART Mobile Assay System incorporating GEM80 detector
ISOCART-GEM100-DDD	ISO-CART Mobile Assay System incorporating GEM100 detector
ISOCART-GEM120-DDD	ISO-CART Mobile Assay System incorporating GEM120 detector
ISOCART-GMX25-DDD	ISO-CART Mobile Assay System incorporating GMX25 detector
ISOCART-GMX40-DDD	ISO-CART Mobile Assay System incorporating GMX40 detector
ISOCART-GMX60-DDD	ISO-CART Mobile Assay System incorporating GMX60 detector
ISOCART-GMX80-DDD	ISO-CART Mobile Assay System incorporating GMX80 detector
SHD-2-SUB	Substitute SHD-2 for SHD-1 in system
SHD-3-SUB	Substitute SHD-3 for SHD-1 in system

System Options

ISO-BACKSHIELD	Removable backshield for PopTop detectors
ISO-CART	Cart with Detector/Collimator Carrier only (collimator not included)
ISO-DCC	Carrier for detector/collimator
ISO-DCC-X	Carrier for X-COOLER detector (Caution: ISO-CART should not be moved while X-COOLER is in use.)
ISO-CAL	Point-source calibration at the factory
ISO-LASERMETER	Laser Range Finder
ISO-LSRMTR-ADAPT-1	Lasermeter adapter for SHD-1 shield
ISO-LSRMTR-ADAPT-2	Lasermeter adapter for SHD-2 shield
ISO-LSRMTR-ADAPT-3	Lasermeter adapter for SHD-3 shield
ISO-WIRELESS	Complete set add-ons to replace PC-to-digiDART wiring by wireless networking. Includes remote computer.
ISO-DEWAR	STD50L dewar, WD/50 withdrawal device, and TL-6 6-ft. transfer line
ISO-SCALE	Platform scale with indicator floor stand
ISO-TURNTABLE-110	Turntable for drum rotation. Capacity = 445 kg (1000 lb). 110 V, 50 Hz.
ISO-TURNTABLE-240	Turntable for drum rotation. Capacity = 445 kg (1000 lb). 240 V, 60 Hz.
ISO-TURNTABLE-OPT1-2	Increase in turntable RPM from 1 RPM to 2 RPM
ISO-TURNTABLE-OPT1-3	Increase in turntable RPM from 1 RPM to 3 RPM
ISO-TURNTABLE-OPT2	Wireless On/Off via hand-held remote
ISO-TURNTABLE-OPT3	Power Cord Extension from standard 6 ft. to a maximum of 75 ft.
ISO-TURNTABLE-OPT4	Hardwired Switch Cable Extension up to 75 ft.
ISO-CASE	Transportation case for digiDART, laser meter, and laptop.

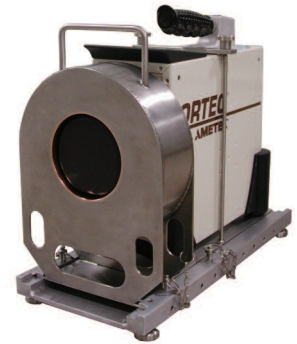
ISO-CART-II

ISO-BOX	Airworthy "roll-in" system transportation box for complete ISO-CART (detector ships in its own crate), includes space for ISO-CASE.
SHD-1 5/8-inch	Lead Shield/Collimator, copper lined
SHD-2	Tungsten Shield/Collimator
SHD-3	Heavy Duty Lead Shield (1.8" thick) for high backgrounds

ISO-CART-II Systems Based on the ORTEC Detectable and Micro-Detectable Family Portable Integrated Spectrometers

The Detectable and trans-SPEC families of hand-held integrated HPGe spectrometers have given the in-situ spectrometrists new options. The Detectable line of high resolution hand-held identifiers or RIIDs can also be deployed in assay applications. These fully portable, battery powered, instruments may be hand-carried or mounted on an ISO-CART-II to provide a fully integrated solution for in-situ measurements, along with the ISOPLUS analysis software.

Specific mounting hardware allows the Detectable or trans-SPEC model to be simply attached to the detector/collimator carrier (DCC).



Ordering Information for Mounting of Detectable and trans-SPEC Instruments to ISO-CART-II (Mounts to DCC)

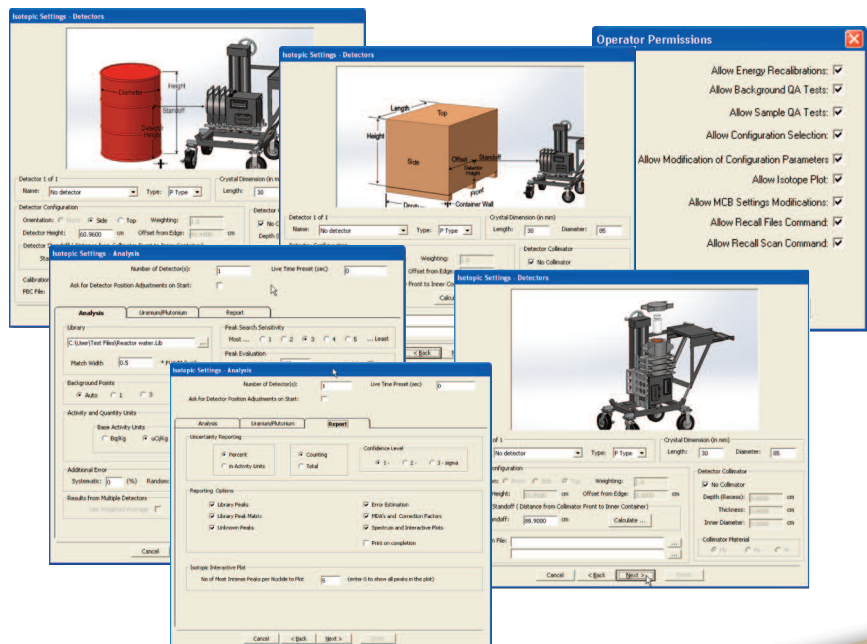
Model	Description
SO-ADAPT	Mounting Adapter screws and bar for Detectable-EX or Detectable-DX
ISO-ADAPT100	Mounting Adapter screws and bar for Detectable-EX-100T, Detectable-DX-100T, or trans-SPEC-DX-100T
ISO-ADAPT-MICRO	Mounting Adapter screws and bar for Micro-Detectable or Micro-trans-SPEC
TSP-ISO-SHLD-3	Lead Shield, 3" long x 2" thick. Provides 0.5" collimation. For use with trans-SPEC-DX-100T.
TSP-ISO-SHLD-2	Lead Shield, 2" long x 2" thick. For additional collimation with TSP-ISO-SHLD-3.
TSP-ISO-DCC	Carrier slide/plate and mounting adapter screws and bar for trans-SPEC-DX-100T and TSP-ISO-SHLD.

ISOTOPIK Software, the Analysis Heart of the ISO-CART-II System, Regardless of Hardware Configuration! (download the full brochure at www.ortec-online.com)

A Practical, Flexible, and Defendable Solution for Gamma Spectrometry Waste Assay Measurements

Applications

- γ Boxes, Drums, Pipes or Surfaces (collimated detector)
- γ Close Geometry small containers (e.g. bottles on-endcap)
- γ Wide Area Assay of Soils and Surface (uncollimated detector: M-1 methodology)



ISO-CART-II

Why ISOTOPIC?

Practical

- Practical, easy-to-use solution to quantitative assay of gamma-emitting waste samples in a variety of configurations.
- Ideal for applications using existing ORTEC ISO-CART-II, especially in combination with ORTEC IDM-200-V integrated HPGe detectors (ISO-CART-85 assay systems).
- Supports additional HPGe detectors and electronics or as part of an integrated measurement system.
- Calibrate ANY detector on site, TRACEABLY, in minutes.
- Easy system expansion.

Flexible

- Analyzes all types of gamma-emitting waste, fissile and non-fissile.
- Measures various container shapes and sizes, surfaces and even soils using independently verified analysis methods.
- CLOSE geometry measurements for “on-endcap” applications such as bottle counting.
- Easily combine multiple measurements on a single object.
- Expanded Report Writer with MS Access Data Storage and Crystal Reports for Custom Reports.
- Supports software integration into large, automated measurement systems.

Defendable

- Robust algorithms developed and refined by multiple US DOE sites as well as the US Energy Measurements Laboratory.
- Third party “round-robin” testing to validate results accuracy.
- Results traceability guaranteed via simple user- or factory-calibration with traceable source.

Ordering Information for ISOTOPIC

Model	Description
ISOPLUS-BW	ISOTOPIC Advanced Gamma-Ray Waste Assay Analysis Software
ISOPLUS-GW	Documentation for ISOTOPIC
ISOPLUS-NW	ISOTOPIC Network Copies
ISOPLUS-UW	Update to ISOTOPIC
ISOPLUS-2YW	2 year update subscription for ISOTOPIC
ISOPLUS-3YW	3 year update subscription for ISOTOPIC
ISOPLUS-4YW	4 year update subscription for ISOTOPIC
ISOPLUS-5YW	5 year update subscription for ISOTOPIC

Isotopic Averaged Report					
General Information					
Measurement group: Isotopic-Average MDA, NBS 446-TopView 12 inches					
Sample Description: NBS 446-TopView 12 inches					
Report file1: C:\User\NBS 446-TopView 12 inches Buf00085-uTSP 7390.html					
Report file2: C:\User\NBS 446-TopView 12 inches Buf00086-MT7390.html					
Data acquisition:				Data analysis: 4/18/2014 4:48:55PM	
Library: C:\User\AAIsotopicTest\U-Np.lib				Tolerance (FWHM): 0.50	
Configuration					
Container:					
Container Type: Cylinder	Material ID: Al	Thickness (entered): 0.20 cm			
Height: 1.98 cm	Fill Height: 1.58 cm	Length: N/A			
Diameter: 8.00 cm	Depth: 0.00				
Tare weight: 0.000 kg	Container Density: 2.70 g/cc				
Material:					
Material: U3O8	Density(initial): 3.400 g/cc	Thickness: 1.58 cm			
U Init. Fraction: 0.0000	Pu Init. Fraction: 0.0000	Net Wt: 2.067E-001 kg			
Volume: 6.08E+001 cc	Gross Wt: 2.067E-001 kg				
Density (measured): 3.399 g/cc	Density(adjusted): 3.399 g/cc				
Isotopic Results					
Nuclide	Mass(g)	Activity (uCi)	Uncertainty (%)	MDA (g)	MDA (uCi)
U-235	3.750E+000	8.11E+000	10.94	1.55E-002	3.36E-002
U-238	8.553E+001	2.85E+001	8.19	5.34E-001	1.78E-001
U-234	0.000E+000	0.00E+000	35.87	1.51E-002	9.48E+001
Np-237	0.000E+000	0.00E+000	27.94	1.81E-005	1.28E-002
Total Activity: 3.659E+001 uCi			Total Alpha Activity: 3.66E+001 uCi		
Uranium Analysis					
Total grams of Uranium: 8.929E+001					
U-235 enrichment in % (186 to 1001-kev region): 2.475 +/- 0.080					
Ratio U-238/U-235: 137.37					
Averaged MDA for the Measured Geometry					
Nuclide	Gamma Ray (keV)	MDA (grams)	MDA (uCi)		
U-235	185.85	1.55E-002	3.36E-002		
U-238	1,001.45	5.34E-001	1.78E-001		
U-234	120.91	1.51E-002	9.48E+001		
Np-237	312.10	1.81E-005	1.28E-002		
Analyzed By: _____					
Approved By: _____					

Specifications subject to change
102314

ORTEC[®]

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