

- Portable HPGe Gamma-Ray Spectrometer with Integral LN₂ Dewar
- Standard holding times in the range of 1–5 days¹
- Available in all-attitude and compact multi-orientation dewar types
- Lightweight: <11 lbs for 24-hour holding time version
- Available for all GEM, GMX, SLP or GLP detectors
- Automatic high-voltage shutdown and high count-rate indicator
- SMART-1 detector option provides temperature monitoring when used in conjunction with digiDART²
- PopTop and non-PopTop versions
- 16 engineering design improvements over previous models³

Gamma Gage II represents a series of engineering improvements over the highly successful Gamma Gage of which many thousands are deployed daily in portable high resolution spectroscopy applications. These improvements have been implemented specifically in response to requests from users of the original Gamma Gage.



Gamma Gage II is intended for most any situation in which it is necessary to "take the instrument to the sample." Examples of such measurements are found in many waste assay and site characterization measurements, as well as nuclear materials holdup, and portable safeguards isotopic ratio measurements. In some cases, a Gamma Gage dewar is an excellent solution when space/weight is at a premium, for example, in Whole Body Counting applications or in some multi-detector research applications, although increasingly, electrical cooling is a viable alternative in these.⁴

The integral LN₂ dewar is available in a variety of hold times to suit the measurement constraints on size/weight and holding time.

A Tale of Two Dewars

Two dewar type options on Gamma Gage II allow a choice between complete all-attitude no-spill operation and no-spill operation in a slightly restricted range of attitudes from a more compact dewar, the MOD dewar.

The definition of an all-attitude dewar is, apart from the inevitable venting of boil-off liquid nitrogen during use, the liquid refrigerant cannot escape from the dewar while the detector is in use, regardless of the orientation ("attitude") of the dewar. This is achieved by the relatively simple expedient of making the single fill-vent tube extend to the geometrical center of the LN₂ reservoir. Thus whatever the orientation of the dewar, the fill/vent tubes are above the level of the liquid. The dewar is never more than 50% full.

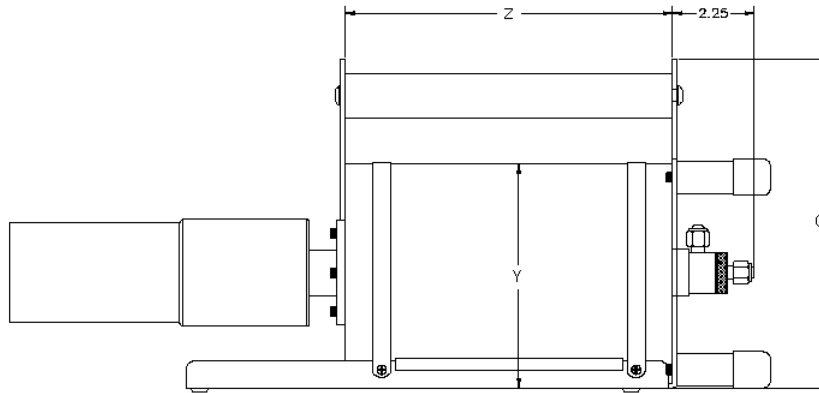
In some situations, the constraint on size is more important, and a dewar which may be filled completely is required, even at the expense of having to restrict the range of movement allowed without some venting of refrigerant. The MOD (multi-orientation dewar) option allows this. It may be operated pointing vertically upward, downward or horizontally. Table 1 gives the choice criteria between all-attitude and MOD dewar types; the basic tradeoff is between minimum size/weight for a given holding time and avoidance of loss of liquid refrigerant.

Table 1. Multi-Orientation Dewar vs. All-Attitude Dewar

	MOD	All-Attitude
Ease of filling with a funnel	More difficult and slower than all-attitude	Fills Easily
Ease of filling with a pressurized source	Equal	
Storage/Fill Dewar	Not compatible	Easily used with S/F dewar
Size	Smaller (all of the volume is utilized for LN)	Larger (only half the dewar volume is utilized for LN)
Dry Weight (Same LN ₂ Capacity)	Smaller dewar equals lighter weight	Larger dewar equals heavier weight (~4 lbs.)
Spill Possibilities	LN is Easily Spilled by moving dewar	Very Difficult to make LN spill out of ports
Rotation About Center Axis	Causes pressurization of dewar and consequent leakage of refrigerant	No LN is spilled
Rotation on Longitudinal Axis (Tilting Up or Down)	Only 180° operation in one plane	No LN is spilled

Gamma Gage II

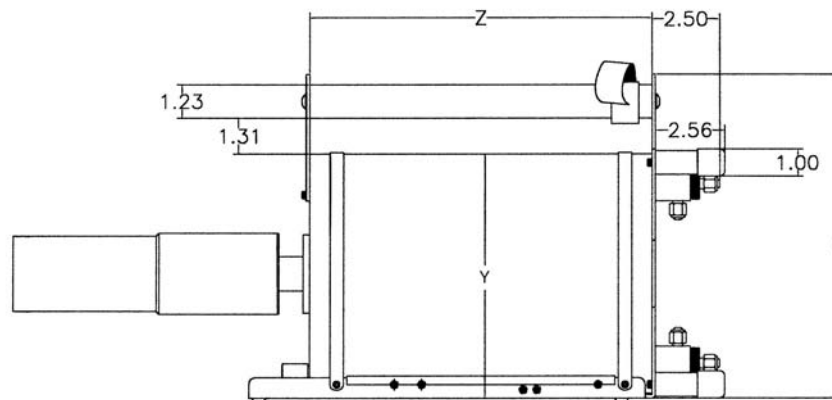
Portable HPGe Gamma Ray Spectrometer



All-Attitude Dewar

DESIGNATION			DEWAR TYPE				
			ALL ATTITUDE			MULTI-ORIENTATION (MOD)	
LN ₂ VOLUME >			1.2L	3L	5L	3L	7L
HOLD TIME ¹ >			1 day ¹	2 days ¹	4 days ¹	2 days ¹	5 days ¹
UNIT	TOL						
Q	mm	±13	229	302	302	229	302
	(in.)	±0.5	(9.0)	(11.9)	(11.9)	(9.0)	(11.9)
Y	mm	±5	157	229	229	157	229
	(in.)	±0.2	(6.2)	(9.0)	(9.0)	(6.2)	(9.0)
Z	mm	±5	229	267	419	292	320
	(in.)	±0.2	(9.0)	(10.5)	(16.5)	(11.5)	(12.6)

¹Hold times are approximate for standard non-PopTop cryostats in 2.75" diameter size endcap only. Hold time for PopTop cryostats and special cryostats may vary. Actual hold times may vary depending on specific dewar, cryostat, and detector.



Multi-Orientation (MOD) Dewar

Gamma Gage II Portable HPGe Gamma Ray Spectrometer

The SMART-1 Detector Option

ORTEC's new SMART-1 detector technology is a great advance in HPGe detectors and their operation. (Currently the SMART-1 option is only available in conjunction with the DigiDart portable MCA.) SMART-1 technology is a major enhancement to data and chain of custody integrity. It is a dramatic improvement in detector management practice and data control.

A SMART-1 detector is intelligent. The built-in controller monitors and reports on all vital system functions. The individual vital signs are available as well as the overall "state of health." The controller, which includes the high voltage supply, is built into a module which is firmly attached to the detector itself. Used in conjunction with the DigiDART, the following attributes may be monitored to ensure correct operation:

- Preamplifier ± 12 , ± 24 Volt values (read only)
- Detector element temperature (read only)
- Detector high voltage value (read only)
- Detector high voltage state (on/off) (read/write)
- Detector overload state
- Detector high voltage shutdown state
- Detector serial number (read only)
- Detector authentication code (read/write)

Gamma Gage II Fill Options

Both the all-attitude and MOD versions of the Gamma Gage II are supplied with fill funnels to allow manual filling in a HORIZONTAL orientation. (The MOD dewar cannot be filled in vertical orientation.) Both dewar types are compatible with the ORTEC manual and automatic LN₂ fill systems.

The all-attitude version may be filled in a vertical orientation or kept "at the ready" by attachment to the DWR S/F "mother cow" long term storage dewar.

Ordering Information

PopTop

Model	Description
CFG-PG4-x	Gamma Gage II with x liter all attitude dewar for use with PopTop capsule x = 1.2, 3 or 5
CFG-PMOD4-3	Gamma Gage II with 3L MOD dewar for use with PopTop capsule
CFG-PMOD4-7	Gamma Gage II with 7L MOD dewar for use with PopTop capsule

Non PopTop

Model	Description
CFG-GG, DWR-1.2G	Non-PopTop Gamma Gage II with 1.2L all-attitude Dewar
CFG-GG, DWR-3.0G	Non-PopTop Gamma Gage II with 3.0L all-attitude Dewar
CFG-GG, DWR-5.0G	Non-PopTop Gamma Gage II with 5.0L all-attitude Dewar
CFG-GG, DWR-MOD3L	Non-PopTop Gamma Gage II with 3.0L MOD Dewar
CFG-GG, DWR-MOD7L	Non-PopTop Gamma Gage II with 7.0L MOD Dewar

¹Hold times are approximate for standard non-PopTop cryostats in 2.75" diameter size endcap. Hold time for larger sizes, PopTop cryostats and special cryostats may vary.

²Details of the exciting digiDART and SMART-1 detector option available on request.

³Improved balance, operate vertically "on end" for in-field grab sample counting, improved cabling, "on-board" storage of fill adapter, SMART-1 intelligent detector option, etc.

⁴Ask for details on the revolutionary X-COOLER!

