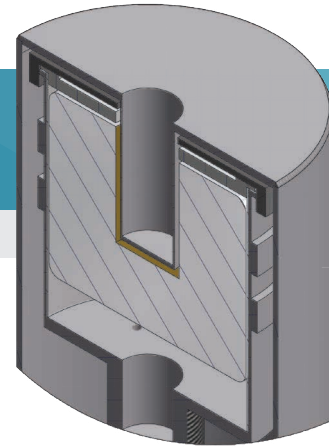




WELL™

Germanium Well Detector



Ge Well Detector

FEATURES & BENEFITS

- Blind well approaches 4π counting geometry yielding high absolute efficiency
- Large variety of models available allowing to select the optimum Well detector for your application
- Thin, ion-implanted contact inside Well allows spectroscopy from 20 keV up to 10 MeV
- Equipped with Intelligent Preamplifier
- USB 2.0 Serial Interface

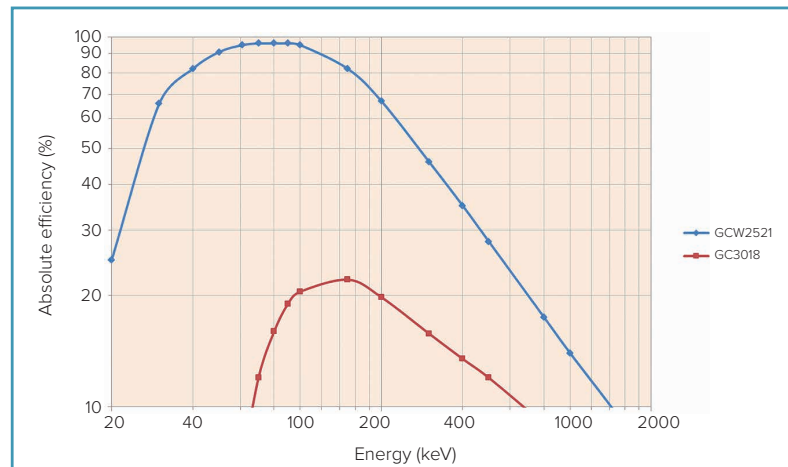
APPLICATIONS

- Environmental samples
- Geology
- Oceanography
- Life sciences

DESCRIPTION

The Mirion High-Purity Germanium (HPGe) Well Detector provides maximum efficiency for small samples because the sample is virtually surrounded by active detector material. The Mirion Well detector is fabricated with a blind hole rather than a through hole, leaving at least 15 mm of active detector thickness at the bottom of the well. The counting geometry therefore approaches 4π .

The Well insert in the endcap is made of aluminum with a side-wall thickness of 0.5 mm and a 1 mm thick bottom. The ion implanted contact on the detector element is negligibly thin compared to 0.5 mm of aluminum so these detectors have intrinsically good low energy response, allowing spectroscopy down to 20 keV.



Measured efficiency of a Model GCW2521 with a mixed point source located at the bottom of the 10 mm diameter Well, compared to a Model GC3018 with a source to endcap distance of 1 cm.

ADVANTAGES OF WELL DETECTORS

The advantages of well type detectors are based on the near 4π counting geometry for a source placed inside the well.

This geometry assures a **high counting efficiency** as the full energy peak efficiency may be written as:

$$\epsilon = \eta \cdot \epsilon_i$$

Where η represents the geometrical efficiency given by $\eta = \theta/4\pi$. θ is the solid angle under which the detector “sees” the source and ϵ_i is the intrinsic efficiency. For a well type detector, $\eta \sim 1$ as θ approaches 4π . The absolute efficiency is thus mainly governed by the intrinsic efficiency. The figure on the previous page illustrates the substantial efficiency improvements achieved by well detectors for small or point sources. The chart compares the efficiency of a GCW2521 well detector with a point source inside well with a comparable size GC3018 coax detector with the source at 1 cm from the front face.

For applications where small, low-activity samples must be measured, this high counting efficiency results into **lower detection limits** or **shorter counting times** to achieve a given detection limit.

Also, Well Detectors have the advantage that **sample positioning is easy** and not very critical. Sample vials can easily be placed inside the well. The effect on the absolute efficiency of moving the sample inside the well is about an order of magnitude less than positioning a source inaccurately above a coaxial detector.

In making the choice for a Well type detector for a certain application, the above advantages have to be weighed against some potential disadvantages. The Well geometry only accommodates a small sample volume. If more sample material is available another measurement geometry using a coaxial or planar detector may yield a lower MDA per gram of sample. Secondly, due to the higher capacitance of the detector and the consequently higher electronic noise, the resolution performance of Well type detectors is worse than coaxial detectors, particularly at low energies. And thirdly, because the sample is very close to the detector and completely surrounded by it, a Well detector is more prone to summing effects, especially when isotopes with many coincident gammas are measured.

MODELS AND OPTIONS

A variety of detector sizes and well diameters are available. The standard well depth is 40 mm for all detectors. Consult the accompanying table for information on standard units. These models are available in most of the Mirion cryostat configurations. Consult the ‘Cryostat and Cryostat Options’ section in our product literature for more information.

HPGe Well Detectors are used to measure small samples, often with very low activity, sometimes leading to very long counting times. This type of detectors can therefore significantly benefit from adding the ULB™ Ultra-Low Background option. In this option Mirion uses a cryostat construction and select materials to reduce the background radiation on the detector, resulting in a shorter counting time to achieve a required detection limit. See the ULB section under ‘Cryostats and Cryostat Options’ for more details.

Well Detectors are equipped with an iPA™ Intelligent Preamplifier resistive feedback preamplifier. The Intelligent Preamplifier (iPA unit) included with this style of HPGe detector has an improved, low power analog front stage providing excellent resolution and count rate performance.

An integrated digital back-end makes use of the detector sensors to continuously monitor and store all relevant parameters and status information. This data, which may be trended over time, allows the user to take preventative measures if a key parameter starts to shift and ultimately improves equipment availability and productivity.

It also enables setup and tuning of the preamplifier through digital controls rather than potentiometers.

The preamplifier status information, on board log file and digital controls are accessible through a USB 2.0 serial connection and software application which is provided with the iPA unit.

See the “Intelligent Preamplifier” specification sheet for more details.

WELL Germanium Well Detector

GERMANIUM WELL DETECTOR

General Specifications and Information

Model Number	Rel. Eff. (%)	Well Dia.* (mm)	Active Volume (cc)**	Resolution	
				FWHM (1332 keV)	FWHM (122 keV)**
GCW1521	15	10	90	2.1	1.1
GCW1522	15	16	100	2.2	1.3
GCW2021	20	10	110	2.1	1.1
GCW2022	20	16	120	2.2	1.3
GCW2521	25	10	130	2.1	1.2
GCW2523	25	16	140	2.3	1.4
GCW3021	30	10	150	2.1	1.2
GCW3023	30	16	160	2.3	1.4
GCW3521	35	10	170	2.1	1.2
GCW3523	35	16	180	2.3	1.4
GCW4021	40	10	190	2.1	1.2
GCW4023	40	16	200	2.3	1.4
GCW5021	50	10	260	2.1	1.2
GCW5023	50	16	260	2.3	1.4
GCW6021	60	10	300	2.1	1.3
GCW6023	60	16	300	2.3	1.5
GCW7021	70	10	320	2.1	1.3
GCW7023	70	16	320	2.3	1.5
GCW8022	80	10	350	2.2	1.3
GCW8023	80	16	350	2.3	1.5
GCW9022	90	10	380	2.2	1.3
GCW9023	90	16	380	2.3	1.5
GCW10022	100	10	400	2.2	1.3
GCW10023	100	16	400	2.3	1.5

* Consult factory for other Well dimensions.

** FWHM at 122 keV and Active Volume are nominal values listed for comparison purposes only. These are not specification limits.



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