

WIZARD Automatic Gamma Counters



Superior performance

for every gamma counting need

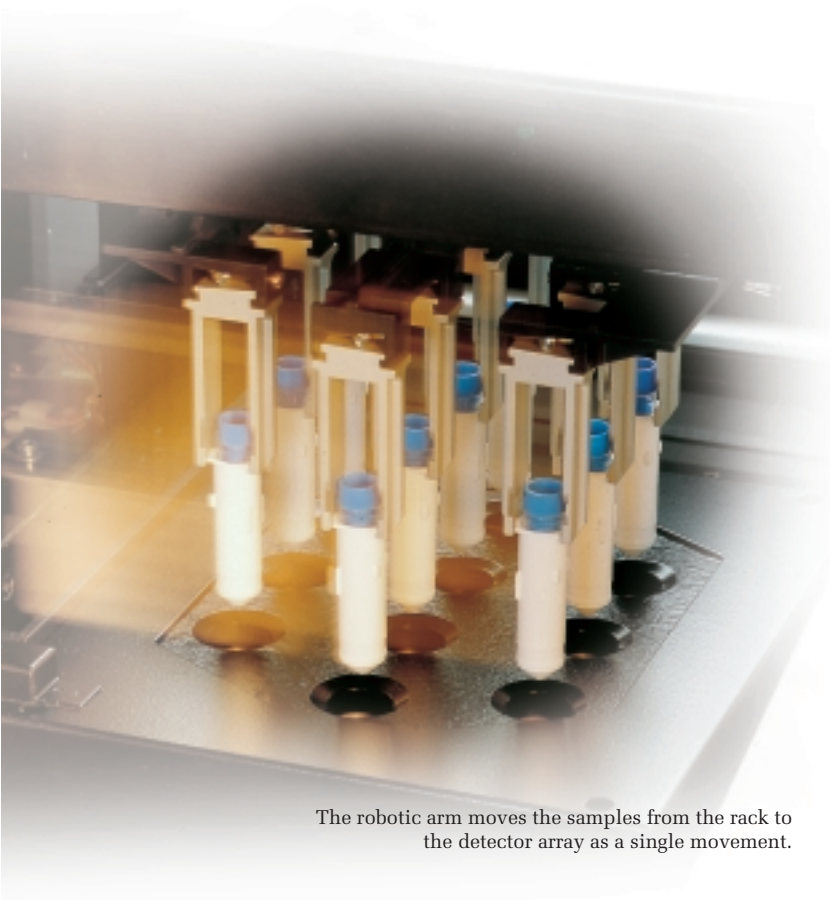
The WIZARD difference is in the design

WIZARD® Automatic Gamma Counters are designed for superior counting performance with all types of samples and for every gamma counting application. Unique well-type detectors and sample changer system, advanced robotics, and highly effective lead shielding result in high counting efficiency, constant background and minimal crosstalk.

In short, WIZARD delivers counting performance unachievable by any other gamma counters.

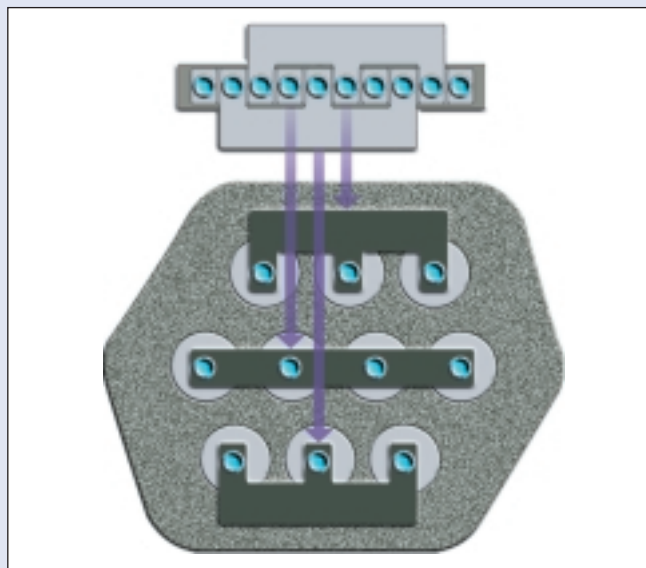
Well-type detectors and advanced robotics deliver superior counting performance.

1470 WIZARD counters are designed with a unique sample changer system that enables lift of samples to well-type detectors from a conveyor, which remains hidden behind the detector lead shielding. The result is no crosstalk from samples on the conveyor—the key to superior counting performance. Well-type NaI (Tl) crystals collect signal from all around the sample, rather than just from the sides, providing the best counting efficiency possible.

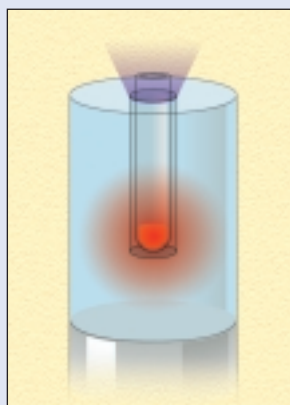


The robotic arm moves the samples from the rack to the detector array as a single movement.

1470 WIZARD Robotic Sample Changer System



The robotic arm consists of three solid elements which move the sample holders from a rack to the detectors and simultaneously change the single-row alignment to the 3 x 4 arrangement of the detectors.



The WIZARD's well-type detector with 4π detector geometry means that pulses are not lost through the bottoms of the tubes.

Effective lead shielding means constant background and minimal crosstalk.

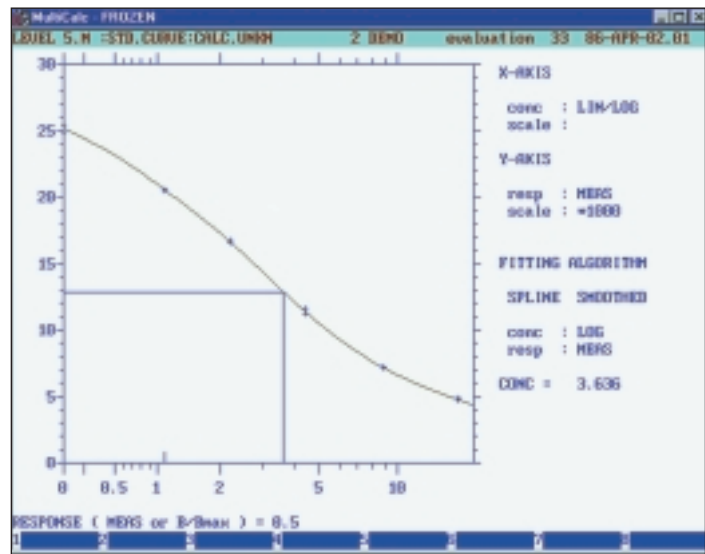
In a universal gamma counter, the lead shielding around the detector is another important factor in determining the performance of the instrument. WIZARD counters have no open elevator passages through which interfering radiation can pass to the detector. 1480 WIZARD has 75 mm and each detector in 1470 WIZARD has 30 mm of solid lead against the samples in the conveyor. As a result, WIZARD counters surpass all others in background and crosstalk reduction.

WIZARD counters feature tools and technology to optimize your gamma counting.

- **Multichannel analyzer (MCA) technology**—WIZARD incorporates a high resolution 1024-channel multichannel analyzer dedicated to each detector.
- **Flexible counting volumes**—WIZARD's 10-position racks accept a wide range of RIA tubes up to 13 mm in diameter. Additionally, the 1480 WIZARD allows vials up to 28 mm diameter in its 5-position rack. A wide range of centrifuge tubes is also applicable.
- **Built-in RIACalc WIZ data reduction and quality assurance program**—makes WIZARD a complete, stand alone RIA counter.
- **Compatibility with MultiCalc® data management program**—with this system WIZARD forms part of the laboratory data system.
- **Easy GLP compliance**—WIZARD monitors nine detector parameters and provides their documentation automatically.
- **EASY 'STAT' counting**—process STAT samples without touching the racks in the conveyor.
- **No volume adjustments**—the long well-type detector construction eliminates the need for separate volume adjustment procedures.
- **Samples in separate carriers**—the easy to replace carriers are the only parts of the instrument which come into contact with samples. This eliminates a common source of detector contamination in other counters, sample spillage.
- **No contamination hazard**—counterweights, a feature of older counters with through-hole detectors, are not needed, moving another important source of potential contamination.



WIZARD's racks accept all RIA tubes and vials.



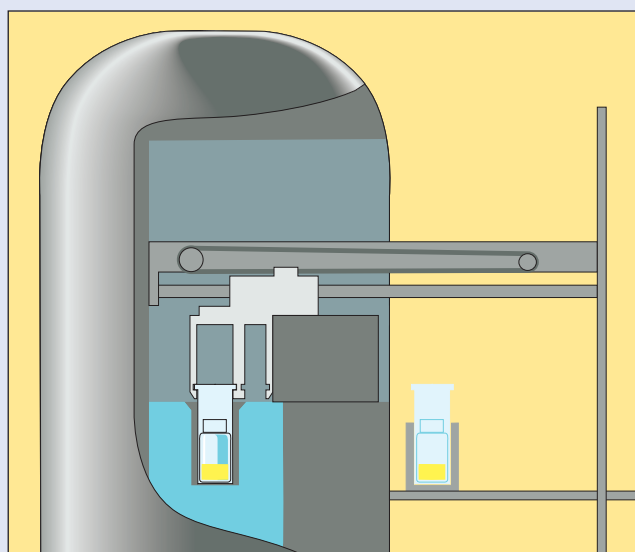
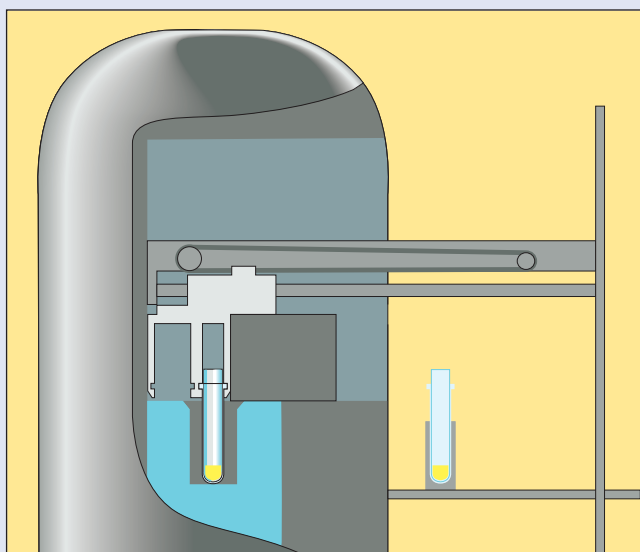
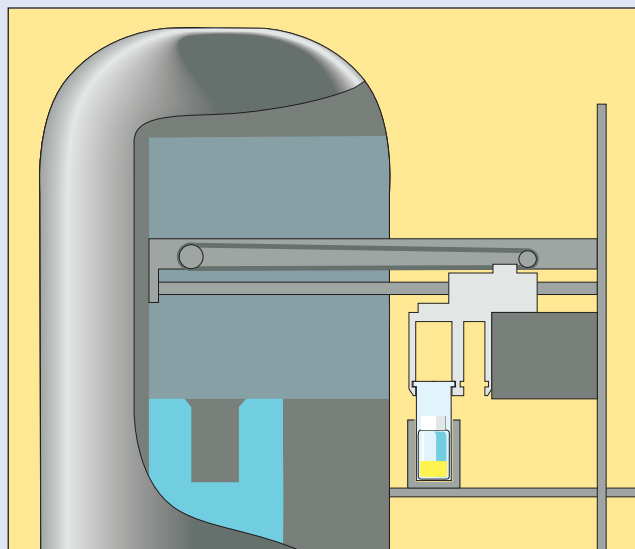
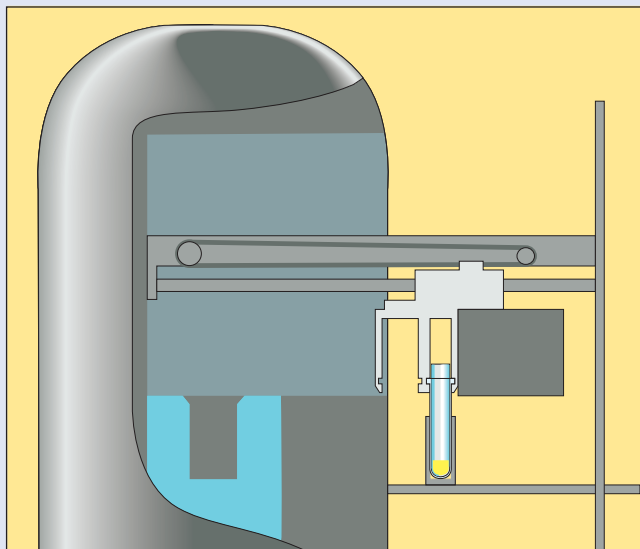
MultiCalc is the definitive immunoassay software package. It not only supports gamma counting, but all other technologies too.



- **Not susceptible to vial quality problems** — with WIZARD, all vials can be counted with the same high reliability. Unlike ordinary counters, uneven bases and other small irregularities in vial shape will not cause a jam in the elevator system, making a service call necessary.

- **Bar codes for protocols, multi-function and positive rack ID** — WIZARD uses a bar code system for both counter control and sample ID. The ID clip has two labels, one for protocol call-up; the other for rack ID number or to call up special functions.

1480 WIZARD Robotic Sample Changer System



The patented robotic sample changer system handles all types of racks which may be in any order on the conveyor. Whether you need high capacity (the two images at left) or large volume (the two images at right), WIZARD best meets your needs.

A WIZARD counter for every gamma

There is a WIZARD model to fit every gamma counting application. Choose the WIZARD counter that best meets your needs.



1470 WIZARD is available in 1,000 and 550 sample (right) versions.

1470 WIZARD — for basic research and routine counting applications

- **Choice of models**— available with 1, 2, 5 or 10 detectors and capacities of 550 or 1,000 samples.
- **Upgradeable**— 1, 2 and 5 detectors models can be easily updated to add additional detectors for higher throughput. Software upgrades can be made simply by changing a 3.5" disk.
- **Compact footprint**— the 550-sample WIZARD is the smallest automatic 10-detector gamma counter available. Its 65 x 77 cm² footprint will help you make the most of your lab space.
- **Counts manually too**— WIZARD can be converted into a manual multidetector counter with a single command. In manual mode, sample volumes up to 5 mL, such as LSC minivials, can be measured or flow cell determinations made.
- **For all laboratory gamma work**— with an energy range up to 900 keV and a powerful set of software, WIZARD gives you error-free results from a wide range of applications, including all RIA and IRMA tests, screening assays, etc.
- **Ideal for chromium release studies**— no crosstalk from samples on the conveyor means that the WIZARD is ideal for working with higher energy isotopes such as Chromium-51. With WIZARD, the crosstalk figures for chromium are two orders of magnitude better than in conventional multidetector counters employing through-hole detectors. The 1470 WIZARD, with its unprecedented low crosstalk figures and 10 detectors makes an ideal counter for chromium release studies.

In 5- and 10-detector models, a special tray for manual loading of samples is supplied.



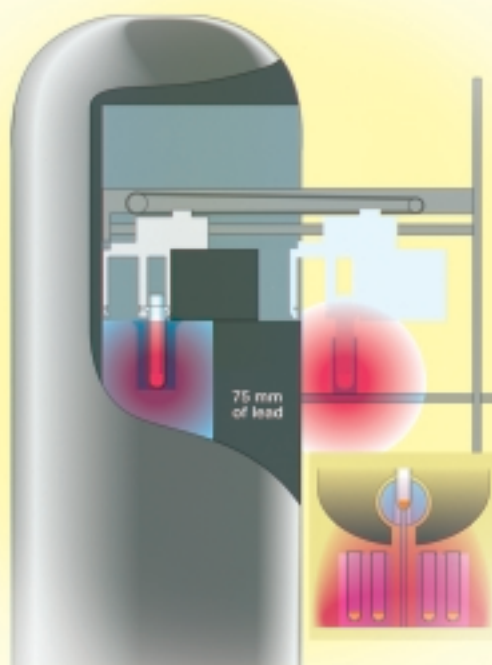
counting need



1480 WIZARD 3"

1480 WIZARD 3"— for more sophisticated research applications

- **One model for all special application needs**— 1,000- and 270-sample capacity of 13 mm and 28 mm vial diameters, respectively.
- **Excellent background reduction**— specially configured lead shielding together with the unique sample changer design leads to virtual elimination of crosstalk from samples on the conveyor. The 1480 WIZARD 3" is the leading gamma counter in terms of background and crosstalk reduction.
- **High efficiency, 3" well-type detector**— even more efficient counting, higher energies, and multilabel counting capabilities.
- **Ideal for high energy or low activity samples**— with its high efficiency, detector, and the ability to count sample volumes up to 20 mL, the 1480 WIZARD 3" is particularly suitable for high energy gamma emitters, low activity samples, environmental samples, or Shilling testing, etc.
- **No limits in microsphere studies**— count results are provided in multiple windows and the spectra are broken down to obtain the true activities. Counts in the multiple windows are "unfolded" using a matrix method. Data are corrected for background, dead time and half life as well. Superior shielding allows the use of high energy labels, such as ^{46}Sc , without interference from samples on the conveyor.



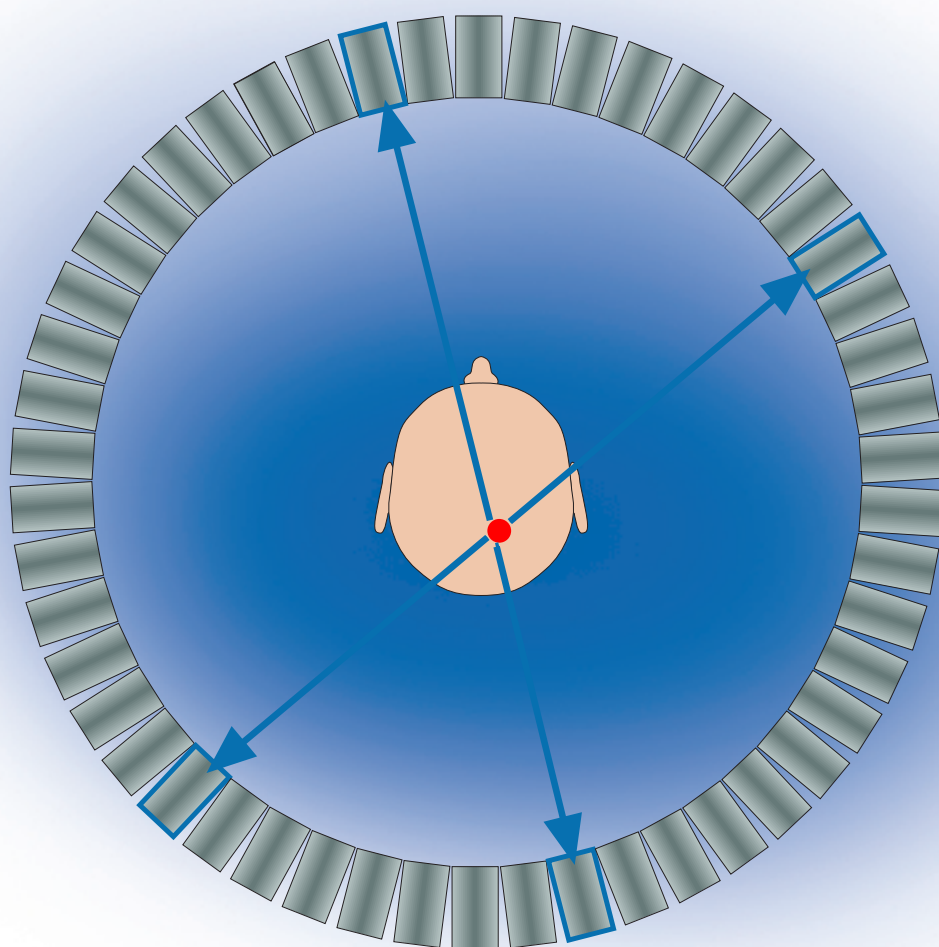
The ideal solution

for automatic monitoring of arterial samples in PET

In Nuclear Medicine, gamma-emitting radiopharmaceuticals are used for diagnostic studies and therapy. Careful quantification of the dose is vital to balance the minimum possible exposure to the patient with the maximum possible therapeutic dose to the target organ. However, a subject may still be exposed to an activity up to a billion Becquerel. In such a situation, minimizing crosstalk is essential in order to obtain useful results. (Even crosstalk as low as one to one million (0.0001%), can result in an additional background of 60,000 DPM, making the data useless.)

The 1480 WIZARD 3" is the optimal counter for evaluating PET studies. The WIZARD's excellent shielding is essential to assure the integrity of results. (75 mm thick lead shielding is a minimum requirement for the necessary attenuation of external radiation.) While the lead thickness itself is important, the shape of the shielding is even more important.

Openings in the shielding easily break the protection, resulting in crosstalk hundreds of times larger than is acceptable. In the 1480 WIZARD the shield is molded under as well as all around the sample to provide even, reliable crosstalk elimination.



Emitted positron soon collides with an electron in tissue and two 511 keV gamma photons are emitted in opposite directions. The decay site is then calculated from several photon tracks. Axial movement of the subject allows its "slicing" and 3D imaging of its metabolic activity. More PET instruments are being employed after introduction of planar SPECT (single-photon emission computed tomography) and curved plate (CPET) scanners.

Direct real gamma counting power onto your most demanding applications

High resolution MCA technology

Each individual detector has its own 1024-channel multi-channel analyzer. Compare this with the 256-channel MCA normally used in multi-detector gamma counters and you've got four times the resolution! This makes results more accurate, especially in dual label counting.

Automatic normalization

All corrections (such as spillover, background, and efficiency) are calculated and accomplished automatically by a normalization cassette for each defined isotope. Results

are automatically corrected for decay either to any date and time or to the start of the assay. Whether a nuclide is used as a single or a dual label, you only have to normalize once. In dual label counting different zero-times can be supplied for different isotopes.

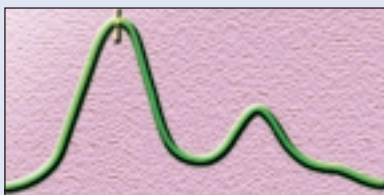
Library-directed Dynamic Normalization

WIZARD counters employ Dynamic Normalization to eliminate the effects of detector imbalance. This also takes care of drift in the performance of detectors, which may be caused by aging or environmental instability.

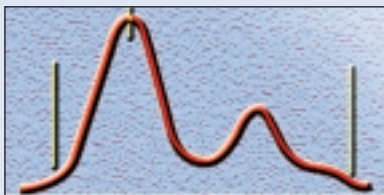
Dynamic normalization adjusts windows each time it measures a sample.

Select your nuclide and press one button

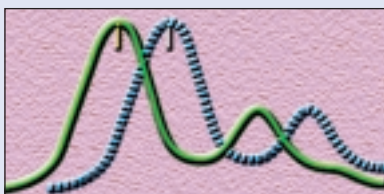
	⁶⁸ Ge	²⁰³ Pb	
¹²⁵ I	⁴⁷ Ca	²⁰³ Hg	⁸⁶ Rb
¹¹ C	¹⁰⁹ Cd	¹²³ I	¹⁰³ Ru
⁵⁷ Co	¹⁴¹ Ce	¹²⁵ I	¹²⁵ Sb
⁵¹ Cr	⁵⁸ Co	¹¹¹ In	⁴⁸ Sc
¹³⁷ I	¹³⁴ Cs	^{114m} In	⁴⁷ Sc
⁷⁶ As	¹³⁷ Cs	⁴² K	⁷⁶ Se
¹⁹⁹ Au	¹⁷⁷ Er	⁴³ K	¹⁵³ Sm
¹⁹⁸ Au	¹⁸ F	²² Na	¹¹³ Sn
¹³⁷ Ba	⁵⁹ Fe	⁸⁹ Nb	⁸⁵ Sr
¹³⁹ Ba	⁶⁷ Ga	¹⁵ O	^{87m} Sr
⁷⁷ Br	¹⁰³ Gd	Open	^{99m} Tc



Smoothing and peak finding. Noise is removed by digital filtering and the peak position is determined.



The initial peak position, optimum window coverage etc. are stored in an isotope library. They are "fine tuned" during normalization.



Peak comparison. The peak position is compared with that determined during normalization and the window position is adjusted by the deviation factor.



Counts for calculation. All pulses falling within the adjusted window are used for further calculations.

Controls and settings —

always accessible and ready when you need them

Instrument control with clear built-in LCD display

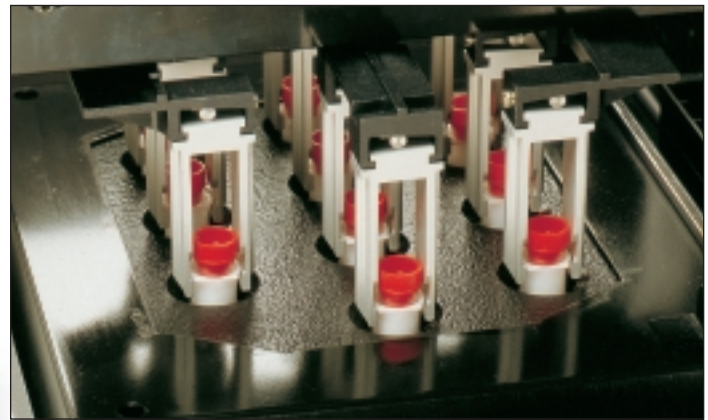
Instrument control is via an interactive video display unit situated ergonomically immediately above the keyboard. There are no loose screens attached. For set up there is an IBM AT-type keyboard, located in a separate compartment.

Built-in isotope library

With the built in isotope library, you don't have to worry about window settings and half-lives. Simply call the isotope by name and WIZARD makes all necessary settings, automatically and in such a way that optimum counting conditions are achieved.

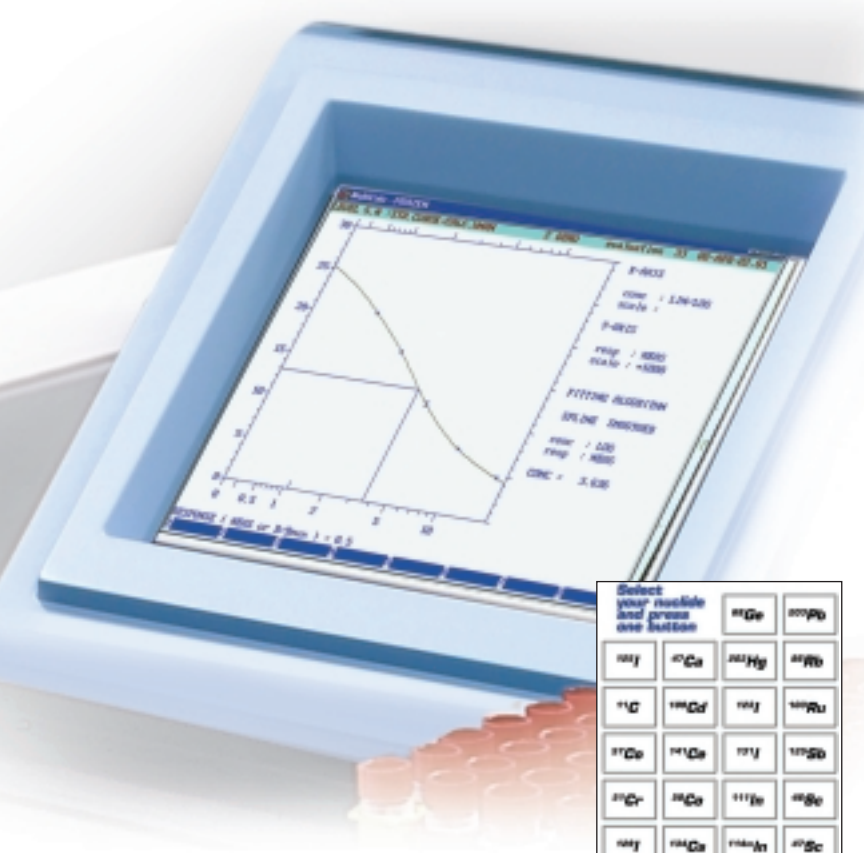
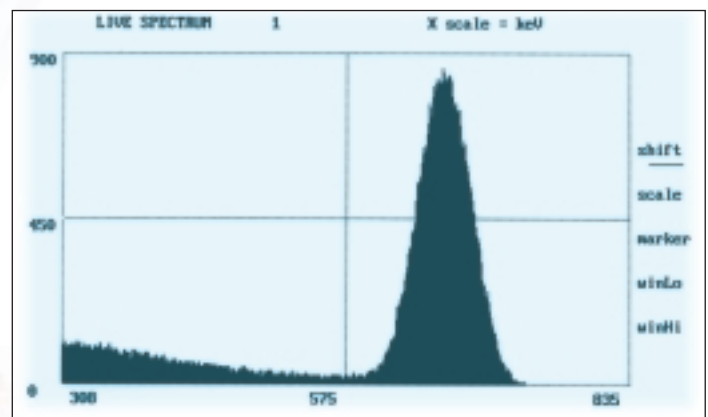
Samples always visible to user

With WIZARD, samples are never out of your sight, not even during counting. All parts of the counter are very easy to access and cleaning couldn't be easier.



Live spectrum display

Select and view the counting spectrum of any detector on the VDU. Zooming is available to get an enlarged view of the whole 1024-channel MCA, calibrated as 1 keV/channel.



Select your isotope and press one button

⁶⁷ Ge	⁶⁷ Zn
¹⁰⁹ Ag	¹⁰⁹ Cd
¹³⁷ Cs	^{137m} Ba
¹⁵² Eu	¹⁵² Gd
¹⁵⁴ Eu	¹⁵⁴ Gd
¹⁵⁹ Gd	¹⁵⁹ Er
¹⁹² Ir	¹⁹² Pu
²⁰³ Pb	²⁰³ Bi
²¹⁰ Pb	²¹⁰ Bi
²¹⁴ Pb	²¹⁴ Bi
²²⁸ Ac	²²⁸ Ac
²³² Th	²³² Th
²³⁵ U	²³⁵ U
²³⁸ U	²³⁸ U
²⁴⁴ Pu	²⁴⁴ Pu
²⁵² Cf	²⁵² Cf
Open	²⁵² Cf

Built-in isotope library.

Instrument performance assessment helps in GLP

Our contribution to GLP

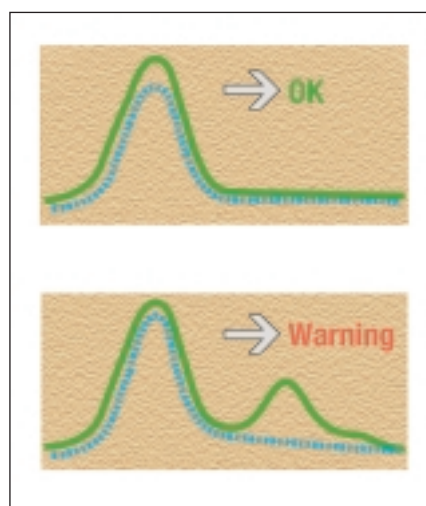
PerkinElmer offers some GLP features to help you in routine quality control tasks. WIZARD assures the reliability of results in several ways:

- WIZARD's auto-diagnosing feature inspects the isotope spectrum each time a sample is measured. It immediately warns of any condition changing the response from the expected.
- WIZARD's EASY GLP allows automatic monitoring of a number of parameters of each detector and provides documentation on the parameters relating to instrument performance.
- RIACalc WIZ provides a large variety of QC tools, such as control plots and precision profiles.

WIZARD picks up any error before you do in the following ways:

- 1. Detector energy resolution**, most reliable measurement of detector condition. Resolution for a given isotope depends essentially on the light production and collection efficiency. The more light photons produced, the less statistical variation there is and the better the energy resolution is. By monitoring this parameter detector failure can be predicted long before it actually happens.
- 2. Background.** GLP regulations require background to be recorded because an elevated value indicates that the instrument is contaminated. This is a common failing in other counters where the sample tube comes into direct contact with the sample changer mechanism or a detector. In WIZARD counters the risk of contamination is eliminated by the protective holder system.
- 3. Absolute detector efficiency**, determined for ^{125}I using the coincidence method. The method does not require calibrated sources (having a known DPM value).

- 4. Detector stability probability (Chi-squared test)**, which compares the observed standard deviation with the theoretical one and provides a probability index to show how well these compare.
- 5. Calibration**, which follows peak position of the isotope. Because counting windows are adjusted according to this, the calibration drift does not indicate error in itself; rather it indicates the wear of the PMT. If the calibration becomes excessive the PMT gain must be adjusted.
- 6. Relative detector efficiency, e.g. normalization.**
- 7. CPM values in a given window.**
- 8. CPM values in total energy range.**
- 9. Window settings if dynamic window setting is used.**



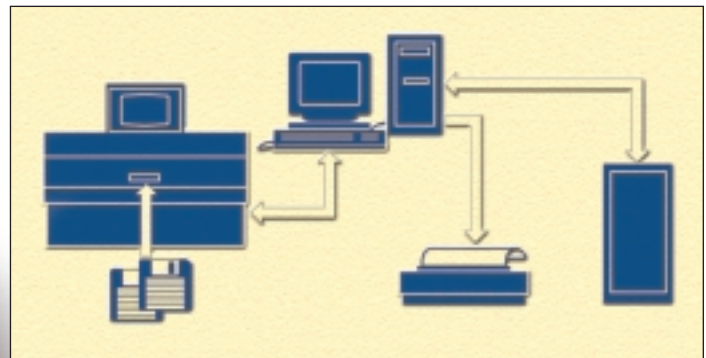
Auto diagnosing checks the spectrum of every sample measured.

Fast, single button RIACalc WIZ

speeds routine calculations and QC

WIZARD is designed to be simple to use in your daily operations. After your protocols are initially set up, all that's left to do is to load your samples onto the conveyor and press the START button. With RIACalc WIZ, results are calculated and QC files updated automatically.

- **Includes complete range of assays**—all normal RIA/IRMA assays and screening programs are included such as hepatitis screening, RAST, Renin, T_3 uptake, dual label Shilling test, bound/free calculations and chromium release studies.
- **Supports wide selection of response programs**—includes linear, quadratic or cubic regressions, and weighted or unweighted, manual or automatic spline functions.
- **Stores complete quality control information automatically**—used to compare the quality of each individual assay run. Up to 6 levels of controls in 50 assays and 12 parameters in 125 assays can be stored. You can follow these as graphical Shewart/Levy-Jennings or Cumulative Sum (CUSUM) charts.
- **Plot precision profile and RER (response error relationship) curves**—indicate assay precision (%CV of the concentration versus the concentration) in different concentration areas. Quality control rules can be used to detect out of control situations automatically.
- **Plot population histograms**—population plot of unknown samples helps to recognize the samples outside the normal population or to establish normal ranges in certain demographic areas.
- **Final results**—user-formatted results can be printed out or saved into a data logger. From the data logger they can be sent to another computer, automatically online.



- Printer for hard copy record of counting data
- Data logger for storage of counting data prior to further processing
- System PC for storage, further processing and application programs
- External PC or mainframe for storage, further processing and integration with laboratory data system



Advanced MultiCalc[®] software

meets special data management requirements

MultiCalc is a software package for external PC's, suitable for labs doing immunological and other labeled assays. MultiCalc works with gamma counters and other instrumentation as well, such as liquid scintillation analyzers, fluorometers, and luminometers.

Supports all evaluation programs.

MultiCalc supports all response programs and fitting techniques, including five parametric logistic fit, cubic regression and automatic spline. It can perform all RIA/IRMA and related gamma procedures, either single or dual label, as well as receptor assays, fraction plots or assays where each unknown has its own curve to be calculated.

MultiCalc PC network.

Form an independent network of two to five counters connected to one MultiCalc PC. Several workstations running MultiCalc can also be connected to a PC server to join a larger local area network. Dedicated data files, such as QC files, may reside in the server and be accessed by one or several workstations. A MultiCalc PC network provides a secure and easy method of working with data.

Automatically communicates with mainframe computers.

MultiCalc can, for example, receive worklists from another computer, add the results to the list and send them back, either directly or with manual acceptance. The communication can take place automatically after each completed assay batch.

MultiCalc features total programmability.

All program settings can be changed to fully comply with your needs.

- **Programmable output**— new output formats can be made and connected with a full set of arithmetical, logical, statistical or conditional operators.

- **Programmable transformations**— freely modify preset transformations to standard curves with a comprehensive set of commands.
- **Programmable input**— freely modify input data before further processing.
- **Programmable QC rules**— write your own quality rules to detect out of control situations using MultiCalc's special application language. Factory settings are Westgard Multi-Rule for concentrations.
- **Programmable population plot**— plots any result field, normal or user-specified, as a histogram. Dual plots are also possible. Factory settings are concentration values in patient samples.
- **Programmable worklist**— calculate each individual patient result according to patient-dependent data such as age, sex, weight or sample volume employing a unique worklist concept.
- **Precision profiles with overlays**— plot the response-error relationship to follow the dependence of measured response and its error, both counting and total error. Precision profiles follow dependence of %CV and concentration, both counting and total error. Overlaying and adding are possible.
- **Ready for integration into any laboratory data system**— WIZARD gives you total freedom in the selection, evaluation and transfer of data. The RIA evaluation can take place internally, or in the external PC. Data can be sent to a serial or parallel printer or PC or you can use the built-in data logger to accumulate data without needing any external device.

Ordering Information

Instruments (CPM models)

	Model	Detectors	Sample Capacity
1470 WIZARD	1470-001	1	550
	1470-002	2	550
	1470-005	5	550
	1470-010	10	550
	1470-011	1	1,000
	1470-012	2	1,000
	1470-015	5	1,000
	1470-020	10	1,000
1480 WIZARD 3"	1480-011	1	1,000

Options

1221-244	UltraTerm III Terminal Emulator Software for MS-DOS
1224-310	MultiCalc Advanced Data Management Software (Requires an external PC. See Order Guide.)
2011-0030	Laser Printer B/W 230 V
2011-0040	Laser Printer B/W 110 V
1409-208	Floor Stand

Get superior performance for every gamma counting need.

For more information about the WIZARD Automatic Gamma Counters, call (800) 762-4000. To locate your local sales office, visit www.perkinelmer.com/lasoffices.



**IBC w/ pocket &
business card slits**



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