

Drug Discovery

Research

Clinical Screening

Liquid Scintillation

Tri-Carb® 2100TR

Liquid Scintillation Counter

Description

The Tri-Carb® 2100TR liquid scintillation counter is computer-controlled, benchtop liquid scintillation analyzer for detecting small amounts of alpha, beta and gamma radioactivity.

Standard Instrument Features

- **Patented TR-LSC® (Time-Resolved Liquid Scintillation Counting)** using unique afterpulse rejection technology is featured for high sensitivity, low background counting of LS samples. TR-LSC increases sample throughput and reduces cocktail consumption.
- **Built-in IBM® compatible, Pentium® class single board computer** features 4 MB RAM; 3.5 inch, 1.44 MB floppy disk; video graphics adapter card; high resolution color SVGA CRT display; clock calendar with battery support; serial communications and parallel printer port; and IBM® PC DOS 2000 or higher operating system.
- **A cassette-loaded, bidirectional conveyor mechanism** is standard with fully accessible sample capacity of either 408 standard 20 mL vials or 720 small 4 or 7 mL vials, depending upon configuration purchased.
- **High resolution linear Spectralyzer™ memory**, calibrated in keV has three measuring regions with preset and user adjustable settings. The high resolution multichannel analyzer accumulates all sample counting information. Spectra can be interpolated to the nearest 1/10 keV over an energy range of 0-2,000 keV.
- **SNC (Self-Normalization and Calibration)** recalibrates the Spectralyzer and quench-indicating parameters via a ¹⁴C sealed reference for absolute activity calculations via the Direct DPM technique.
- **IPA™ (Instrument Performance Assessment) database** stores the results for each of eight IPA parameters into a built-in database for instant recall as tables, and as time vs. performance charts. IPA data may also be transmitted through RS-232 for storage. IPA shows trends of IPA parameters to identify impending problems.
- **Multitasking operating environment** with color SVGA CRT monitor is mounted on a maneuverable support arm, and full alphanumeric keyboard installed in a pull-out drawer. System simultaneously converses, analyzes data, counts, reports, plots, changes samples, and performs display functions.
- **Multi-user sample processing for 15 users**, includes automatic recall and summary printout of counting conditions and data reduction routines by Quick-Count protocol inserts (30 or 60 protocol options are available).
- **Direct DPM (Disintegrations Per Minute) for single label pure beta or beta/gamma nuclides** provides single key DPM for the full range of beta nuclides, even heavily quenched ³H. Does not require the user to store quench curves, and different nuclides may be counted in the same cassette.



Tri-Carb® 2100TR

SPECIFICATIONS SHEET



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- **¹³³Ba low energy external standard source and tSIE (transformed Spectral Index of External standard)** calculations eliminate the effects of vial glow, volume variations, plastic wall and cocktail changes on the DPM results. The use of integral spectrum counts eliminates the need for repeat counting of the external standard and negates the effect of isotope half-life on quench monitoring accuracy and precision. The ¹³³Ba external standard is centered under the sample vial which eliminates the affects of volume variations and assures reproducible quench monitoring for the life of the instrument. AEC (Automatic Efficiency Control) compensates region settings for the effects of chemical and color quenching.
- **AEC (Automatic Efficiency Control)** corrects for differential quenching effects in multi-label samples. The low energy spectrum of the external standard ensures accurate tracking of ³H, ¹⁴C and other low energy sample spectra over a very wide quench range.
- **SIS (Spectral Index of Sample)** quench-indicating parameter determines counting efficiency of sample spectrum.
- **Electrostatic controller** ionizing device helps neutralize static electricity on small and large vials.
- **Automatic data reduction** includes averaging of repeat sample counts, replicate sample counting with averaging, percent C.V., low count rejection, result normalization, and results calculated per user-defined equations.
- **Preset time and preset error termination** optimizes counting statistics.
- **Percent of standard calculations** is available for single or dual label samples.
- **Luminescence detection and reporting** with percent luminescence is flagged on printout to alert user of possible sample problems.
- **Background subtraction** for accurate counting of low activity samples, is based on counts of first vial or manually entered values.
- **Half-life correction** is made to any specified date and time; single or dual label decay correction is made for short half-life radionuclides.
- **Decay computations** automatically calculate of decay-corrected DPM values for commonly used radionuclide standards.
- **Date and time output selection for each sample** for printouts and data file storage ensures positive record of when samples are actually counted. Battery protected date and time clock also provides real time display of counting time and date.
- **Programmable single phototube counting** enables luminescence assay counting.
- **Live SpectraView™ display** provides high resolution color SVGA display and printer plot of sample spectra, with linear or log energy scale and expansion facilities.
- **Hard copy of CRT screen** documents data and counting conditions, and aids diagnosis of sample interferences.
- **Printer plot** of sample spectrum is available.
- **Automatic cycle control** of sample batches is included, using cycle-trip flag that resets the cycle count at the beginning of automatic counting.
- **Output can be formatted** with spreadsheet-type calculations for each of the user protocols.
- **Programmable RS-232 serial interface** is included, format and baud rate selectable.
- **Positive sample identification** gives protocol number, cassette number, and sample number.
- **Group PrioStat™** gives priority counting status to batch of samples counted according to any of the stored protocols with automatic restoration of interrupted protocol.
- **Computer-aided diagnostics** verify all system functions; includes manual high voltage adjustment for special counting conditions, and high voltage history printout.
- **Anti-jam recovery** of transport and elevator mechanism is standard.
- **Automatic power-fail recovery** automatically restarts counting when power is restored, beginning with the interrupted sample.
- **Dot matrix printer** 80-column high speed bidirectional printer with IBM compatible parallel interface is available.

Options

- **Varisette™ sample changer** enables intermixing and counting of both large and small sample vials without requiring special adapters. Option includes large vial (12-position) and small vial (18-position) cassettes.
- **30-user protocol option** upgrades the 2100TR to allow 30-user programming capability.
- **60-user protocol option** upgrades the 2100TR to allow 60-user programming capability (requires the 30 protocol option).
- **Ethernet adapter kit** includes an Ethernet card, internal cabling and connector panel. Provides simple connection to networks. Customer must supply and install network software driver.
- **Hard disk with Tandem Processing™ option** provides built-in data and spectrum storage, and enables automatic, data processing via the built-in computer.
- **Printed header indicates drive and path of stored data and spectrum files. GLP compliant documentation to track stored files.** (Included with hard disk option.)
- **Dynamic color-corrected single and dual label DPM** based on tSIE/AEC includes DPM based on SIS, constant quench DPM, and full spectrum DPM based on spectrum unfolding. Also includes factory stored quench curves for single and dual label ^3H and ^{14}C DPM calculations.
- **HSCM (High Sensitivity Count Mode)** increases system sensitivity by complementing high efficiency counting with further background reduction via TR-LSC.
- **Luminescence detection and correction** subtracts luminescence events from sample activity with spectral stripping and flags chemiluminescence or photo-luminescence as a percent of total detected counts.
- **Heterogeneity monitor** determines sample quality and flags non-homogeneous sample results.
- **Temperature-controlled refrigeration** establishes and maintains optimum counting conditions for a wide variety of sample types.
- **Sample PrioStat™** interrupt mode allows special function priority counting of individual samples with manual control over counting conditions.
- **DataStore built-in 3.5 inch, 1.44 MB floppy disk drive for data storage** stores data for subsequent off-line processing on an external computer. Provides completely automatic data and spectrum file storage by protocol and sample number. Unique data file extension naming prevents overwriting of previously recorded files.
- **RiaSmart™ radioimmunoassay software*** with Expert QC provides a complete RIA data processing package for counting bound or free fractions, replicate averaging, input screening for outliers, standards, controls and unknown samples.
- **DPM 1-2-3™* software** provides spill-up and spill-down corrections of up to three isotopes, for single, dual or triple label counting.
- **RadMan™* radioactive waste management software** with instrument usage logging, provides a data base for categorizing radioactive waste by user, instrument, radionuclide, data and waste container. Allows direct entry of data files from instrument, or by floppy disk or manual entry. User customized reports may be categorized as required, including detailed header and footnotes.
- **SpectraGraph™* spectrum analysis software** provides spectral overlay and spectrum comparison capabilities. Selection of up to six counting regions, plotting or postrun processing, mathematical spectrum manipulations, and auto-optimization of counting regions.
- **SpectraWorks™ Windows®-based spectrum analysis software** analyzes beta, alpha, and gamma spectra. Requires the Windows 3.0 or higher operating software on a stand alone computer. Provides simultaneous display for up to four spectra in stacked or overlaid mode. Features zooming to any part of the spectrum; six regions of interest; display of counts or CPM and linear or log spectra; provides automatic and manual scaling; calculates E^2/B , MDA, peak resolution; allows adding and subtracting of spectra and multiplication and division by constants. Fully compliant with normal Windows conventions.

**Requires hard disk with Tandem Processing.*

Accessories

- **Instrument utility cart** functionally designed general purpose laboratory cart. Supports any PerkinElmer benchtop system.
- **Cassette carrying basket** to accept ten large vial or 12 small vial cassettes. Designed for easy stacking.
- **See the Equipment, Chemicals & Supplies section** in PerkinElmer Life Sciences catalog.

Physical Data

Dimensions:

| | |
|---------|-------------------|
| Height: | 18.5 in. (47 cm) |
| Width: | 40.5 in. (103 cm) |
| Depth: | 32 in. (81 cm) |

Weight

| | |
|--|------------------------------|
| 477 lb | (217 kg) |
| [523 lb | (238 kg) with refrigeration] |
| Shipping weight: approximately 650 lb (295 kg) | |

Electrical Requirements:

117 Vac + 10%, 50/60 Hz, 20 amp protection
 220 Vac + 10%, 50/60 Hz, 10 amp protection
 3-prong grounded plug, 500 watts
 Power consumption: <900 VA; 1150 VA with temperature control option

Environmental:

Operating ambient temperature 15 to 35°C (59 to 90°F)
 Operating relative humidity 30% to 85%

Typical Performance Data

(As measured in factory at Downers Grove, Illinois)

Energy Range: 0-2,000 keV

Efficiency, Normal Count Mode:

| | | Minimum Acceptable |
|-----------------|------------|-----------------------|
| ³ H | 0-18.6 keV | 60% |
| ¹⁴ C | 0-156 keV | 95% |

Figure of Merit (E²/B), NCM (Normal Count Mode):

| | | |
|-----------------|------------|-----|
| ³ H | 1-18.6 keV | 180 |
| ¹⁴ C | 4-156 keV | 380 |

Figure of Merit (E²/B), High Sensitivity Count Mode (optional):

| | | |
|-----------------|---------------|-----|
| ³ H | 1-12.5 keV | 300 |
| ¹⁴ C | 14.5-97.5 keV | 950 |

Figure of Merit (E²/B), Ultra Low Level Count Mode:

| | | |
|-----------------|---------------|-------|
| ³ H | 1-12.5 keV | 500 |
| ¹⁴ C | 14.5-97.5 keV | 1,400 |

Observed Background, NCM:

| | | Average |
|-----------------|------------|----------|
| ³ H | 0-18.6 keV | 17.3 CPM |
| ¹⁴ C | 0-156 keV | 24.3 CPM |

Note: The efficiencies, backgrounds, and E²/B values for the Normal Count Mode are determined using NIST traceable PerkinElmer sealed large glass vial standards sets P.N. 6008400 and 6008500. High Sensitivity Count Mode values are determined using NIST traceable PerkinElmer low level sealed large glass vial standards set P.N. 6018914. No maximum is specified for background.

Safety, Radiated Emissions and Immunity:

The Tri-Carb 2100TR has been tested and approved for safety, radiated emissions and immunity according to the standards of CSA, TUV, IEC1010 and CE93.

In the U.S.A. the CSA approval satisfies the requirements of 29CFR 1910.399.



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