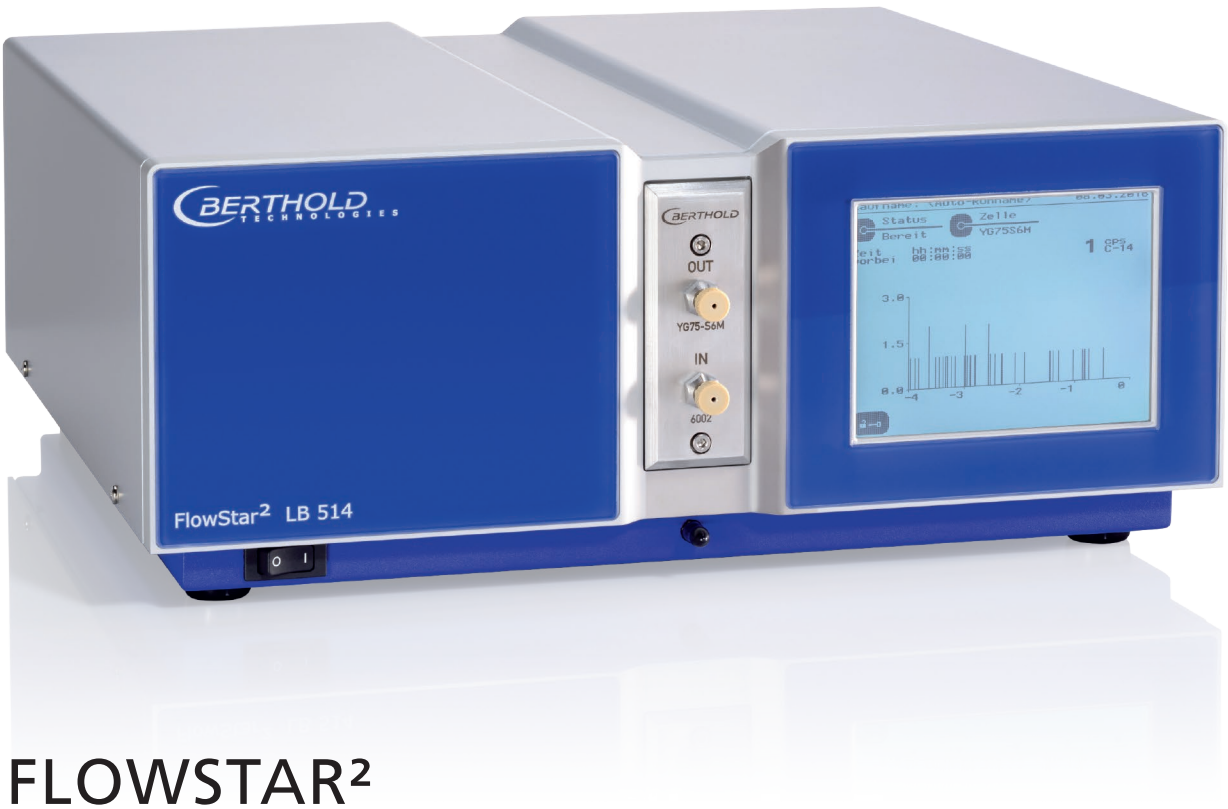
BERTHOLD TECHNOLOGIES

FLOWSTAR² LB 514

Radio Detector for HPLC

detect and identify



FLOWSTAR²

Maximum flexibility, outstanding sensitivity

With over 50 years of experience Berthold Technologies is taking radio-HPLC flow detection to the next level. Designed for maximum ease of use, safety and flexibility the FlowStar² LB 514 sets the new standard for what a radio-HPLC flow detector should be. A wide range of available cells ensures optimal performance and supports full compatibility with both, routine and challenging applications. The convenient dual mode capability enables simple installation in different configurations and makes integration into existing systems easy.

APPLICATIONS & TECHNOLOGIES

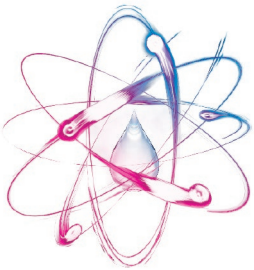
Superior performance for both routine and challenging applications

Pharmaceutical Analysis
Radio-HPLC is a key technology for the separation and quantitation of radiolabeled drugs and putative metabolites in drug development.

Environmental Analysis
A wide variety of contaminants from sources such as industrial waste, landfill sites, pesticides and pharmaceutical drugs can make their way into the environment. The challenging identification of these contaminants demands for highly-sensitive detectors to enable detection of lowest concentrations.

Development and QC of Radiochemicals
Radiochemicals are only as good as the care taken in each preparation step and strict regulations have to be met during production. Radiochemical purity analysis using the FlowStar² LB 514 can support you meeting your QC standards.

QC of Radiolabeled Antibodies and Proteins
Radiochemical identity and purity analyis of radiolabeled antibodies and proteins using the FlowStar² LB 514 is a simple and reliable method to ensure that only the radiolabeled antibody or protein is present in the quality control sample.



Support for UHPLC and other technologies

Berthold Technologies research and development scientists continue to develop new tools and accessories to meet the needs of the latest LC technologies. Most recently we have adopted the FlowStar to the following LC technologies:

■ ULTRA HIGH PERFORMANCE LIQUID CHROMATOGRAPHY (UHPLC)

UHPLC provides improved separation speed, throughput, and sensitivity. We have designed a new generation of flow cells optimised for superior resolution in UHPLC.

■ HPLC-MS

This powerful and highly sensitive technique combines the physical separation capabilities of liquid chromatography with the mass analysis capabilities of mass spectrometry. Preparative HPLC-MS is used for rapid mass-directed purification of target substances in pharmaceutical, food and agrochemical applications. Berthold Technologies provides specific flow cells to realise the sensitive detection of radio peaks in HPLC-MS.

■ HPLC-NMR

The combination of HPLC and NMR has also made its way into the analytical laboratory. The FlowStar solution supports this combination of technologies by offering specific measuring cells.

BERTHOLD TECHNOLOGIES

KEY BENEFITS

User-friendly

The FlowStar² LB 514 is designed to be intuitive and easy to use to get you up and running quickly.

- **INTUITIVE INTERFACE**
  The intuitive touch screen interface makes it easy to get started and keep going. Results are displayed in both, a graphical chromatogram and a numerical format so you can start interpreting your results in real time while the run is still in progress.

- **SMART CELL DESIGN**
  All measuring cells are equipped with a chip to automatically set the correct cell-specific system parameters.

- **PREDIFINED RUN PARAMETERS**
  Extensive isotope library with predefined energy windows and cell usage options (^{14}C, ^{3}H, ^{32}P, ^{33}P, ^{35}S, ^{128}I, ^{111}In, ^{99}mTc).

Flexible

The FlowStar² LB 514 makes integration easy so that everything works together to ensure consistent and reliable results.

- **INTEGRATED A/D CONVERTER**
  Records signals from external instruments (e.g. UV-detector) without requiring expensive additional hardware.
- **USB PORT**
  Enables external control using RadioStar or other HPLC control software (e.g. Chromeleon™).
- **TWO MEASURING CHANNELS**
  Fascilitates dual label measurements or analog output range extension.
- **DUAL ANALOG OUTPUT**
  Convenient integration into existing HPLC data systems

Safe & Secure

The FlowStar² LB 514 embodies our committment to providing everything you need for safe and easy integration into your lab environment.

SAFETY FEATURES:

- Automatic HV shutdown for system safety.
- Built-in leak detection to prevent the measuring system from damage caused by aggressive liquids. The system will shut down automatically in the event of cell leakage.
- Test cell-specific automated internal system validation tests with reminder function.

SECURITY FEATURES:

- On-board system performance tests with instrument based history function.
- Password-based multi user access control to protect instrument from unauthorised use.

Highly Sensitive

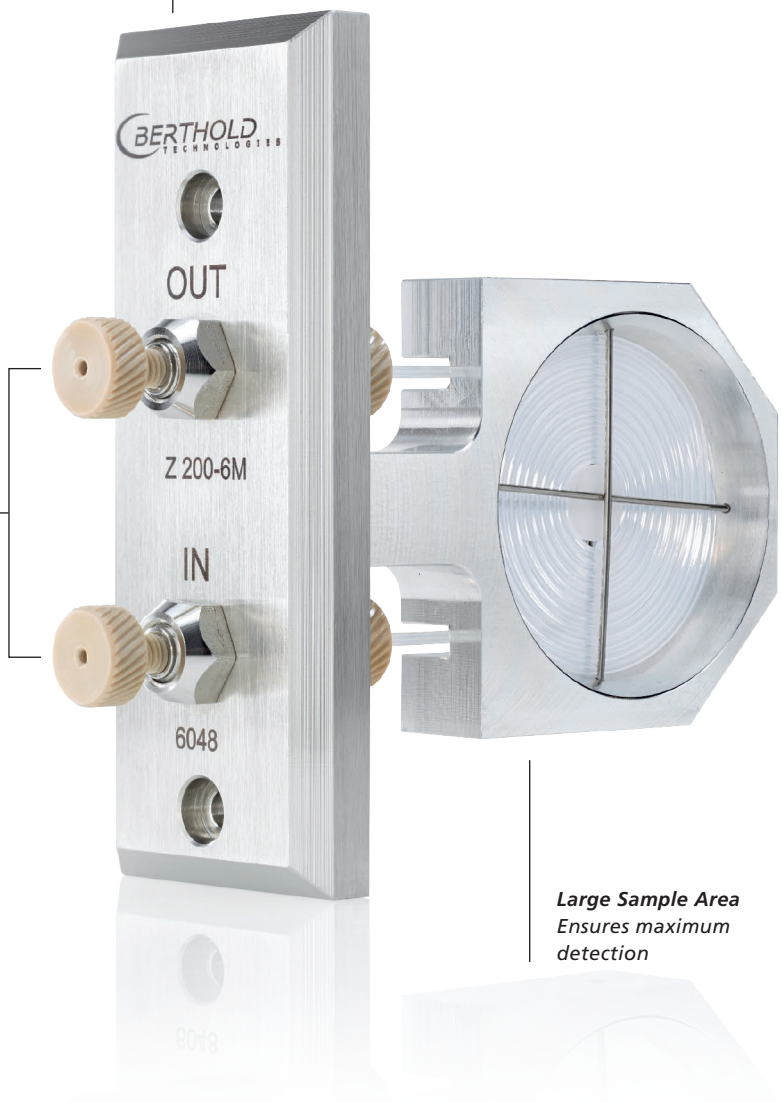
The ultimate platform for high-sensitivity radio-HPLC flow detection.

- **HIGH-SENSITIVITY DETECTION UNIT**
  Random coincidence counting and luminescence substraction for ultimate performance.
- **INTEGRATED SPECTRUM SCANNING FEATURE**
  Improved optimisation of detector setup for each isotope.

MEASURING CELLS SPECIFIC TO YOUR NEEDS

Choose from a wide range of available SmartCells to meet your application needs. These high sensitivity cells are equipped with a SmartChip to automatically set the correct cell-specific system parameters. The automatic shut-down feature of the system after removal of a cell from the detector provides additional safety.

SmartChip
Automatically sets the correct cell-specific parameters



Standard Fingertight Fittings
Easy system integration

Large Sample Area
Ensures maximum detection

Measuring Cells Overview

- Liquid scintillation (admixture) cells
- Microbore
- LC/MS
- Gamma Isotopes and Positron
- Emitter (PET) Cells
- Solid Scintillator
- Preparative SFC
- Special Iodine Cells
- Cherenkov cells for High Energy
- Beta Emitters
- GLP/GMP Validation Test Cells
- UPLC™
- Customised Cells

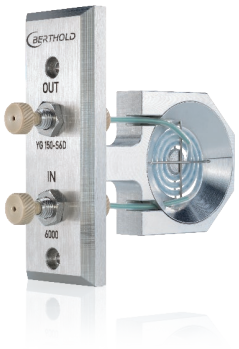
Solid Scintillation Cells

DESIGN:

Consists of a very thin Teflon or Halar hose filled with fine scintillator grains. Designed to withstand backpressure from viscose eluates and flow rate. Solid scintillation cells are available either untreated (YG-U type) or surface treated (YG-S type) to minimise memory effects by sticky analytes.

BENEFITS:

- Exceptional yield
- Chemically inert



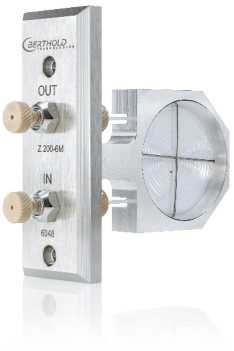
Liquid Scintillation Cells

DESIGN:

Designed to be used with the homogeneous method when liquid scintillator is added externally using a scintillation pump. Liquid scintillation cells are available for all applications including standard HPLC, LC/MS microbore and UHPLC.

BENEFITS:

- Optimised peak shape
- Best signal-to-noise ratio
- No stickiness issues



Microbore Cells for UPLC™/UHPLC

DESIGN:

Designed to meet the demands of the microbore technology by having minimised cell volume and reduced dead volume.

BENEFITS:

- Excellent peak shape
- Higher peak resolution

Gamma Cell (BGO-X Cell)

DESIGN:

The BGO-X cell consists of a 40 mm BGO crystal and is specifically designed for analyzing gamma isotopes. A selection of different cartridges is available to cover a wide range of volumes.

BENEFITS:

- High efficiency detection even for high energy gamma isotopes

Low Energy Gamma Cell (^{125}I Cell)

DESIGN:

Specific proprietary cell design optimised for low energy isotopes like ^{125}I.

BENEFITS:

- High efficiency detection
- Very low background signals

LB 514 FLOWSTAR²
CELL CONFIGURATION FINDER

H-3 α	*Liquid Cell Z 500	**Standard flow rate and activities** for lower flow rate or higher activities use Z 200 for higher flow rate or lower activity use Z 1000	■ General ■ Tritium labeled sample
	Solid Cell YG 150	**Standard flow rate and higher activities**	■ Preparative samples ■ Purification samples ■ Quality control samples (highest activity)
C-14 S-35 P-33	*Liquid Cell Z 500	**Standard flow rate and activities** for lower flow rate or higher activities use Z 200 for higher flow rate or lower activity use Z 1000	■ Peptides, proteins high molecular weight lipids ■ Phenolic compounds
	Solid Cell YG 150	**Standard flow rate and activities** Samples with sticking problems use YG 150-S6D for higher flow rate or lower activity use YG 400	■ Urine, blood, liver, bile etc. extracts ■ Plant and soil extracts ■ Metabolides of fungicides, herbicides and pesticides
	*Liquid Microbore Cell Z 200-6M	**Microbore flow rate and activities** for lower flow rate or higher activities use Z 100-6M for higher flow rate or lower activity use Z 500-6M	■ Peptides, proteins, high molecular weight lipids ■ Phenolic compounds
	Solid Microbore Cell YG 40-x6M	**Standard flow rate and activities** Samples with sticking problems use YG xx-S6M for higher flow rate or lower activity use YG 75-x6M	■ Urine, blood, liver, bile etc. extracts ■ Plant and soil extracts ■ Metabolides of fungicides, herbicides and pesticides
	Solid Prep Cell YG 50-S5P	**For preparative samples with higher activity or flow rates higher than 3mL/min**	
P-32	Solid Cell YG 150	**Sometimes it could be better to measure with solid cells, depending on the application**	
	Cherenkov Cell Z 200	**Standard flow rate and higher activity**	
I-125	Iodine cell I 100-1000	**For all I-125 applications** Cell volume can be defined depending on the application	
γ	Gamma cell BGO-X	**For all gamma applications** Cell volume can be varied (5,30 or 150µl), depending on the activity	
PET	PET Cell MX 100	**For all PET isotopes with extremely low background** Selectable cell volume (20 to 500µl) depending on the activity	

* requires a liquid scintillation pump like LB 5037

ACCESSORIES

To meet your specific application needs

Liquid Scintillator Pump LB 5037

For admixture applications, where a liquid scintillator is continuously mixed with the column eluate.

- INSTRUMENT SAFETY – pump separated from the main detector, eliminating the possibility of scintillator leaking into the detector and associated electronics. It is also possible to split the eluate stream prior to mixing.
- EASE OF USE – the dual piston pump is completely controlled by the FlowStar^2 LB 514 for automatic handling of flow rates and start/stop signals. In addition the system uses a specific ramp function to improve the mixing of the scintillant.
- FLEXIBILITY – The wide flow rate range (0.001 – 10 mL/min) enables many applications without the need to exchange the pump head.

Test Cells

Several test cells are available to perform periodic system performance tests. These cells have been developed to meet GLP/GMP requirements and to guarantee a continuous system performance.

- SIMPLE – The instrument firmware includes specific test functions to check the system performance when using the test cells. The system performance tests are simple to run since all required parameters have been stored in the test cell Smartchip and tests run automatically.
- SAFE – All results are saved automatically in the instruments memory for further inspection. Inspection intervals can be pre-defined to remind the user automatically to run a system performance test.

Static Mixer

Mixing the eluate with the liquid scintillator is one of the key issues in radio-HPLC and can influence the quality of the results directly. We offer a static mixer to improve the mixing. Two different mixing cartridges are available with a dead volume of either 50 µl or 150 µl.

Splitters and waste valve

Valveless Splitters are available to split the eluate before mixing with scintillator, allowing part of the eluate to be diverted to a fraction collector.

- IMPROVED WASTE MANAGEMENT – a waste valve diverts the radioactive peak to a fraction collector and the non-radioactive waste to a low activity waste container.

LIQUID SCINTILLATOR

For optimised results

Flow Plus

Flow Plus has been formulated to meet the special requirements of radio-HPLC, in particular the counting of solvent/water gradients when using a Z-cell with the FlowStar² LB 514. The formulation of Flow Plus has been optimised for counting aqueous/solvent gradients from 100% water to 100% solvent at high sample-to-scintillator ratios in flow cell applications.

- Low viscosity, non-gelling
- Suitable for solvent/water gradients
- Buffer gradient capability for HPLC

Flow Safe 2

Flow Safe 2 is a scintillation cocktail for use in flow counting, especially in combination with Z-cells, that has been optimised to ensure rapid mixing with eluates and high counting efficiency.

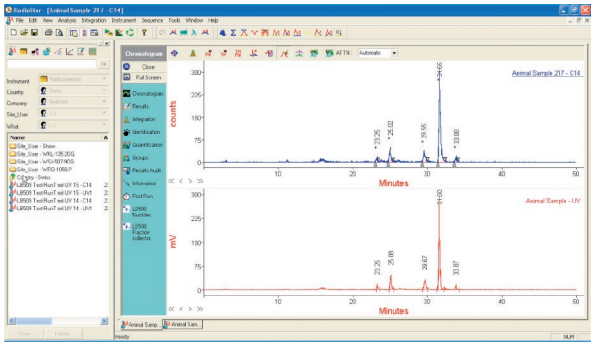
- Non-toxic solvent
- Non-flammable
- High flash point (105 °C)
- Rapid mixing
- Compatible with polar solvents
- Low odour

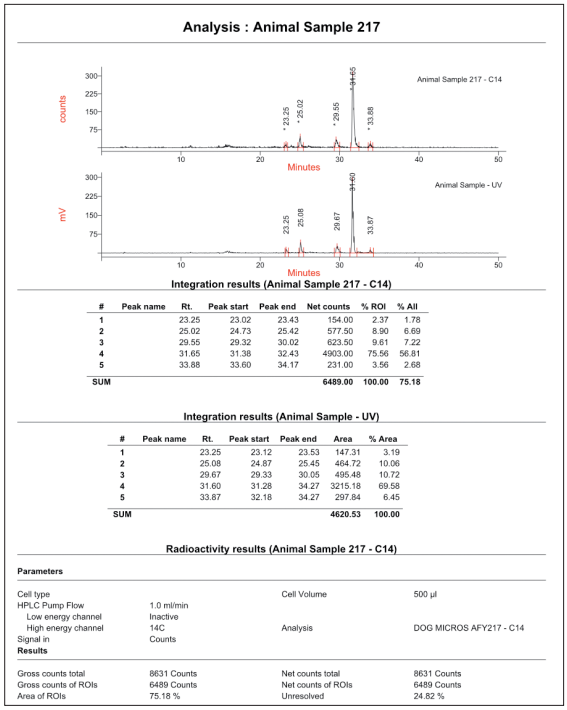
FLOWSTAR² LB 514 SOFTWARE

Easy-to-use software for maximum productivity

RadioStar

The RadioStar software combines the ability to run sophisticated measurements with a user-friendly operation and user interface.





Analysis : Animal Sample 217

Integration results (Animal Sample 217 - C14)

#	Peak name	Rt.	Peak start	Peak end	Net counts	% ROI	% All
1		23.25	23.02	23.43	154.00	2.37	1.78
2		25.02	24.73	25.42	577.50	8.90	6.69
3		29.55	29.32	30.02	623.50	9.61	7.22
4		31.65	31.38	32.43	4903.00	75.56	56.81
5		33.88	33.60	34.17	231.00	3.56	2.68
SUM					6489.00	100.00	75.18

Integration results (Animal Sample - UV)

#	Peak name	Rt.	Peak start	Peak end	Area	% Area
1		23.25	23.12	23.53	147.31	3.19
2		25.08	24.87	25.45	464.72	10.06
3		29.67	29.33	30.05	495.48	10.72
4		31.60	31.28	34.27	3215.18	69.58
5		33.87	32.18	34.27	297.84	6.45
SUM					4620.53	100.00

Radioactivity results (Animal Sample 217 - C14)

Parameters

Cell type		Cell Volume	500 µl
HPLC Pump Flow	1.0 ml/min		
Low energy channel	Inactive		
High energy channel	14C	Analysis	DOG MICROS AFY217 - C14
Signal in	Counts		

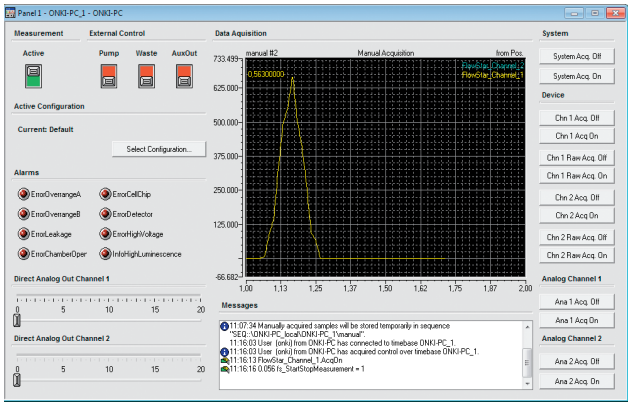
Results

Gross counts total	8631 Counts	Net counts total	8631 Counts
Gross counts of ROIs	6489 Counts	Net counts of ROIs	6489 Counts
Area of ROIs	75.18 %	Unresolved	24.82 %

- **USER-FRIENDLY** – unique RadioStar menu bar and help wizard function, including short video clips explaining each function.
- **MEETING YOUR NEEDS** – flexible context definition for user-specific definiton of data structures.
- **MORE FLEXIBILITY** – flexible display and evaluation of up to four channels (2x radio-channels and 2x external analogue channels). In addition, the integrated A/D converter function eliminates the need for external devices.
- **BETTER RESULTS** – the built-in half life correction function enables applications with short-lived isotopes to be processed online.
- **CUSTOMISABLE REPORT FUNCTION** – the integrated report generator enables to customise the report structure according to your needs and to help you meet your specific reporting rules. Furthermore, the powerful built-in measuring units converter makes unit conversion easy.
- **CONVENIENT EXPORT-FEATURE** – simply export your data to standard HPLC data formats (ANDI etc.) by using our sophisticated export features.
- **ENABLING THROUGHPUT-FLEXIBILITY** – built-in batch integration function to handle large sample throughput.

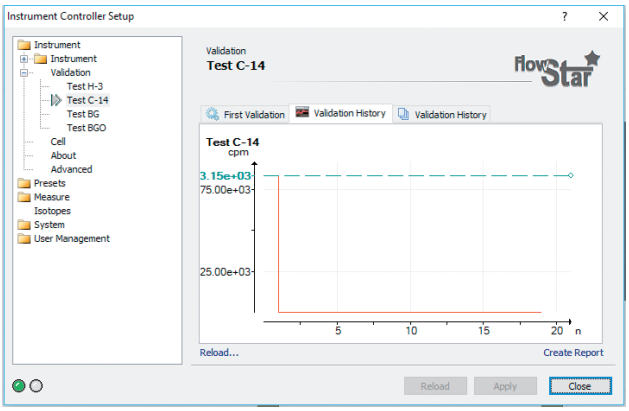
Chromeleon™ Driver

Chromeleon™ is known as a very versatile Chromatograpy software package supporting many different hardware 2 solutions. Berthold Technologies has developed a driver to control digitally the FlowStar² LB 514 through the Chromeleon™ user interface. The driver is fully certified and digitally signed by Thermo Scientific™ and runs with versions 6.x and 7.x.



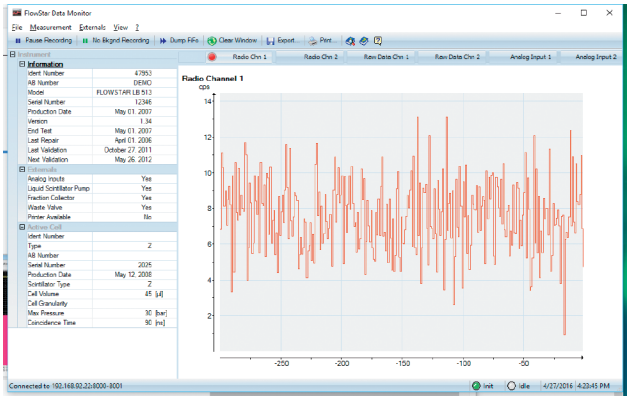
FlowStar Controller

The free FlowStar Controller is the software interface to the FlowStar² LB 514. It controls all functions and collects the data.



- **EASY DATA MANAGEMENT** – administrators log-in function enables simple control of instrument setup and validation data. Summary reports can be printed out for documentation purpose.

- **FLEXIBLE SOLUTION** – the external data viewer enables data visualisation without the need to install additional software.



TECHNICAL SPECIFICATIONS

FlowStar²

Detection Unit	State-of-the-art ultra sensitive dual 2"PMT detection system with random coincidence counting and luminescence subtraction.
Display	Graphical touch screen with 320 x 240 pixel resolution.
Communication	USB port (B-Type) RS-232 for pump control.
Inputs	Start-, Stop- and Ready signal (TTL). 2 analog inputs (24 bit resolution) variable voltage (bipolar, max 2.5V).
Outputs	Scintillator pump control (RS-232 and analog). 2 analog signal outputs 0-1V (2,5 times oversampling) with 16 bit resolution. Waste valve and fraction collector control output (open collector output).
Software	Built-in software operated with touch screen or external control and evaluation via RadioStar software or Chromeleon™ driver.
Power supply	90-264VAC, 50/60Hz
Temp. range	Storage: 5–40°C Operation: 15–35°C
Humidity	10-90% non condensing
Dimensions	410 x 170 x 410 (WxHxD) Horizontal and vertical operation possible
Weight	16 kg

Liquid Scintillator specs

Sample Ratio Capacity		
Water	2:1	33%
Acetonitrile	1:1	100%
Methanol	1:1	100%
Sodium chloride 0.15M	2:1	40%
Potassium phosphate 0.2M	3:1	33%
Ammonium formate 2M	3:1	25%
Acetonitrile 50% water 50%	2:1	33%
Methanol 50% water 50%	3:1	33%
Acetonitrile 50% 0.05M K2HP04 50%	2:1	40%

Sample	**5:1**	**3:1**	**2:1**
Water	23%	21%	19%
Acetonitrile 50% O.O5M K_2HP0_4 50%	20%	18%	16%
Methanol 50% water 50%	20%	19%	11%
Sodium chloride 0.15M	21%	20%	–
Ammonium formate 2M	–	21%	–

ORDERING INFORMATION

	Order Number
FlowStar² Detector LB514	62777-10
Scintillator pump LB5037	64452
Static mixer housing	33762
Cartridge 50 µl for static mixer	33763
Cartridge 150 µl for static mixer	33764
Capillary T-piece mixer	32458
Waste valve, cpl.	15681
Analytical splitter AS15	80871
Analytical splitter AS25	24818
Analytical splitter AS33	24819
Analytical splitter AS50	24821
Analytical splitters AS-X complete set (15%, 25%, 33%, 50%)	24822
RadioStar software for LB514	36627-16
RadioStar software process version (evaluation only)	36627-13
Chromeleon™ driver*	58440

*Class 3 Chromeleon™ software is required.

Measuring Cells

Type	Volume	Order Number
Standard Solid Cells		
YG 150-S6D	150 µl	64976
YG 150-U6D	150 µl	64978
YG 400-S5D	400 µl	50138
YG 400-U5D	400 µl	50137
Standard Admixture Cells		
Z 500-6	500 µl	64980
Z 1000-6	1000 µl	64979
Microbore Solid Cells		
YG 10-S6M	10 µl	55215
YG 10-U6M	10 µl	55216
YG 40-S6M	40 µl	53262
YG 40-U6M	40µl	53263
YG 75-S6M	75 µl	53259
YG 75-U6M	75 µl	53261
Microbore Admixture Cells		
Z 20-6M	20 µl	64345
Z 50-6M	50 µl	58178
Z 100-6M	100 µl	54672
Z 200-6M	200 µl	54419
Z 500-6M	500 µl	55196
Preparative Solid Cells		
YG 50-S5P	50 µl	50152
Gamma Cells		
MX 20-6	20 µl	58534
MX 50-6	50 µl	54421
MX 100-6	100 µl	61886
MX 200-6	200 µl	54303
MX 500-6	500 µl	61887
J 100-1000-5	variable	80080
BGO-X	5,30,150 µl	51114

Other volumes on request.

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