RapidFire, StreamSelect

Технические характеристики

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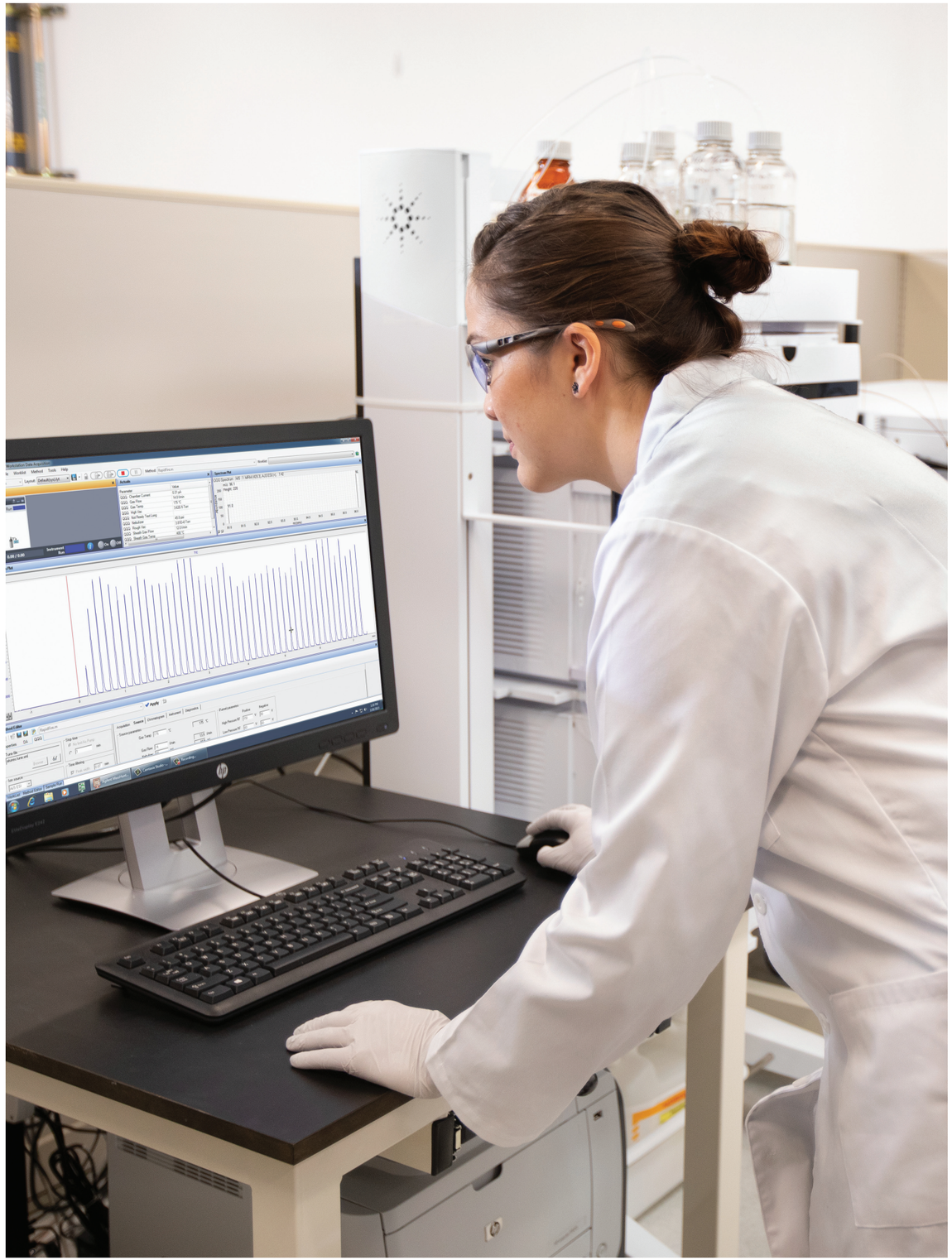


Leverage over 14 Years of User-Driven Product Innovation and Proven Application Success

Do you want to open new avenues for pursuing small- and large-molecule targets—without using surrogates, radioactivity, coupled assays, or indirect measurements? The Agilent RapidFire 400 high-throughput mass spectrometry system delivers tested and trusted productivity.

The RapidFire 400 integrates with triple quadrupole or time-of-flight mass spectrometers, enabling

- Faster identification of drug candidates, reducing time to market
- New approaches for profiling targets in metabolomics research
- Accelerated testing for forensic compounds where speed is essential
- And more

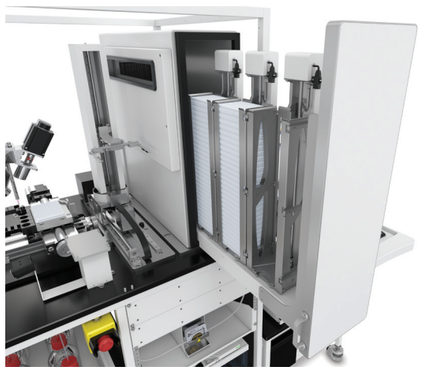
No matter what area of research you are engaged in, you will benefit from shorter time to results—plus more efficient use of staff time and financial resources.

Cool things in small places

RapidFire 400 offers temperature-controlled sample storage, assuring samples are stored properly and increasing confidence in results. Samples remain accessible with a user-friendly pull-out drawer capable of holding up to 64 standard height sample plates. With support for up to 90 1,536-well plates, that means space for up to 138,240 samples. Furthermore, RapidFire 400 can house an Agilent Ultivo triple quadrupole MS within the same footprint, saving valuable lab space.

The RapidFire 400 can be connected to TOF, Q-TOF, or triple quadrupole MS.

A Complete Approach to High-Throughput MS



Temperature-controlled sample storage

Store samples longer without compromising integrity.

Integrated plate handler robot and barcode reader

Simplify batch configuration and sample tracking.

Rapid data acquisition

Reduce data acquisition from minutes to seconds by eliminating chromatography.

Large sample capacity

Perform longer unattended runs with storage for up to 138,240 samples.

Fully integrated system

Control the RapidFire system and MS with a single computer.

Optimized footprint

Save valuable lab space by coupling an Agilent Ultivo triple quadrupole MS with the RapidFire 400 system.

Rapid Results, Capacity for Weekend-Long Runs

Bring five generations of user-driven product innovation and customer success to your lab. The RapidFire is a fully integrated solution combining automated method development, high sample capacity, auto-sampling, rapid sample injection, sample management, and data analysis. Facilitate rapid analysis of thousands of samples.

Unlock challenging targets

The RapidFire system, coupled to your MS instrument, delivers high throughput, accurate, and reliable measurements. Now you can qualify drug targets, assess compound binding, elucidate metabolic processes, discover novel metabolomics targets, and more, even faster.

Maximize productivity and efficiency

Identify compounds faster and speed up your product development. The RapidFire system features a 12-cartridge carousel, 64 standard height sample plates and automated plate handling via an integrated robot. That means researchers can perform unattended weekend runs that exceed thousands of injections. You can also automate method development and solvent switching for assays in a single batch using innovative fluidics with three Agilent 1260 Infinity II quaternary pumps.

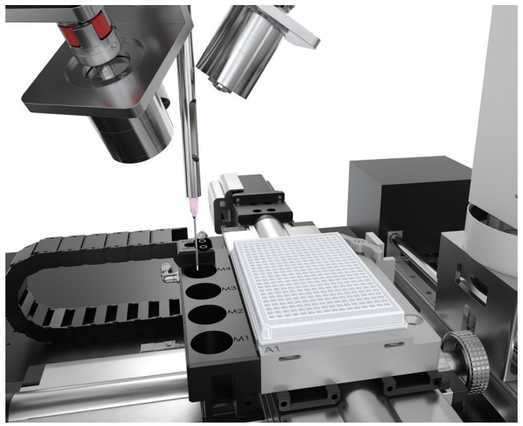
For a closer look, read our application note:
Automated Method Development Using the Agilent RapidFire High-Throughput Mass Spectrometry System (5991-5222EN)

Reduce costs

The RapidFire system requires less than 0.5 mL of solvent per sample, and each SPE cartridge is reusable for thousands of samples. That means you can substantially reduce solvent and consumable use, not to mention waste generation, lowering your cost per well.

Shorten time-to-results

Accelerate critical decisions with cycle times measured in seconds per sample. Plus, eliminating upfront sample preparation or chromatography requirements makes getting to your answers simple and direct.



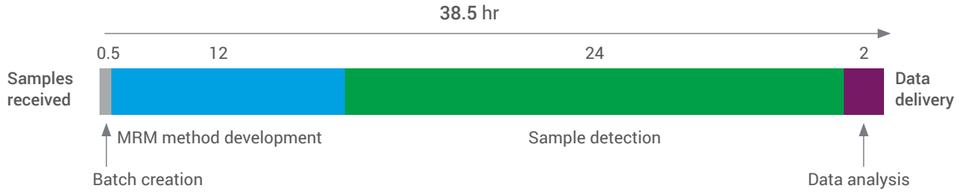
How Does RapidFire Save You Time?

RapidFire technology reduces data acquisition time 10-fold. How? By replacing HPLC with online SPE sample cleanup while producing equivalent results to LC/MS. That means you can:

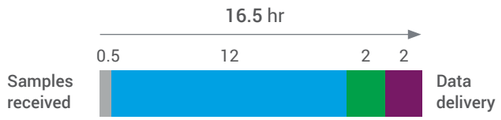
- Achieve the fastest possible results, with cycle times of seconds per sample.
- Eliminate MRM method development using TOF or Q-TOF mass spectrometers.
- Maintain assay quality without requiring offline sample preparation before analysis.

Ten-Fold Reduction in Data Acquisition Time

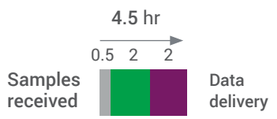
Traditional LC/MS workflow



RapidFire TQ workflow



RapidFire TOF workflow



Significantly reduce time to results

Traditional chromatographic separations take several minutes per sample, which reduces lab productivity and increases cost per analysis. The RapidFire 400, on the other hand, can reduce cycle times down to seconds by leveraging online SPE. Instead of 38.5 hours, the same analysis can be performed in 16.5 hours, without compromising analytical fidelity. If RapidFire is combined with TOF or Q-TOF, this time can even be reduced to 4.5 hours, by eliminating MRM method development.

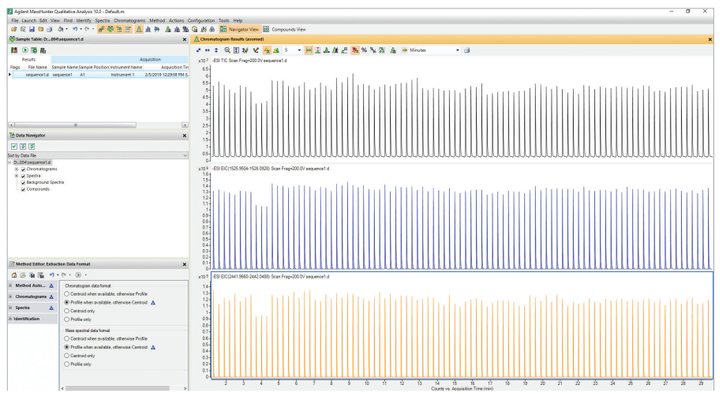
Intuitive, Flexible Software Tools Take You from Results to Insights

Comprehensive and easy to use, Agilent MassHunter software delivers powerful data acquisition and analysis. RapidFire Integrator software lets you visualize your data, helping you identify data integrity issues at the experiment level, across thousands of injections.

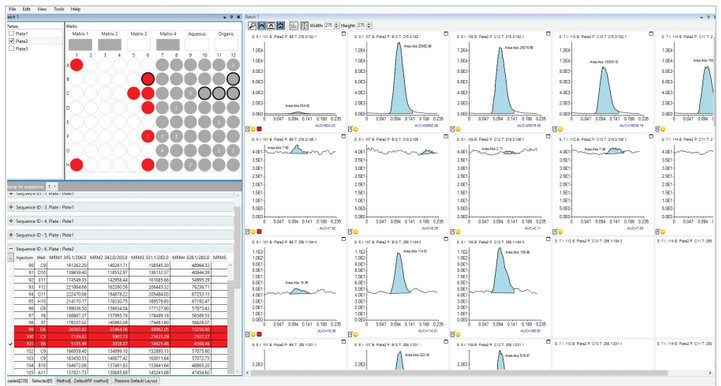
Enhanced productivity for triple quadrupole MRM data

Agilent RapidFire Analyzer software efficiently processes MRM data acquired on RapidFire systems coupled to TQ instruments. The software allows you to rapidly process, review, and report thousands of results in seconds for any semiquantitative workflow. Other advantages include:

- Excellent data quality through a novel peak detection algorithm
- Customizable views and desired calculations
- Fast reporting and data review using Review-by-Exception
- Elegant error handling using self-assessment of sampling errors



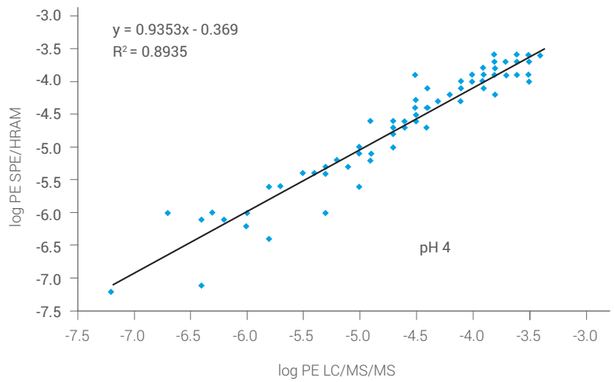
Agilent MassHunter software provides powerful analysis tools for handling large data sets.



RapidFire Analyzer interface enables plate view and fast data review.

Tailored Solution Suitable for Diverse Applications

Leverage over a decade of peer reviewed publications. Compatible with many sample matrices the RapidFire can be coupled with different detectors enabling a broad range of assays. Combining mass spectrometry with the speed of Rapidfire provides rapid, label-free detection of native substrates for diverse applications.

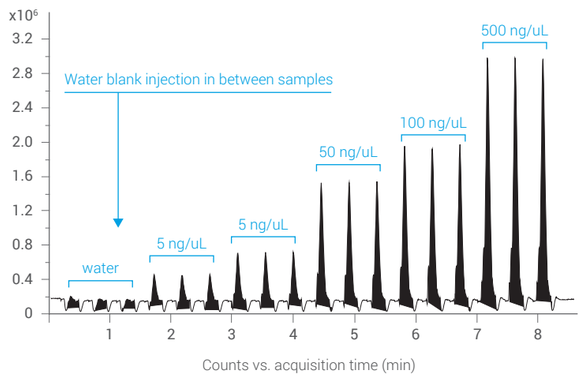


Correlation of permeability values from PAMPA assays of 81 drug discovery candidates. The data from RapidFire/TOF correlated well with standard LC/MS/MS analysis.

During drug discovery, for example, parallel artificial membrane permeation assays can mimic the absorption of potential drug candidates by the cells. The candidate's potential efficacy is then ranked according to its permeability characteristics. Since the drug discovery process involves large sample sets, a high-throughput approach is desirable.

For more details, read our application note: **High-Throughput In Vitro ADME Analysis with Agilent RapidFire/MS Systems: Permeability Assays (5990-9081EN)**

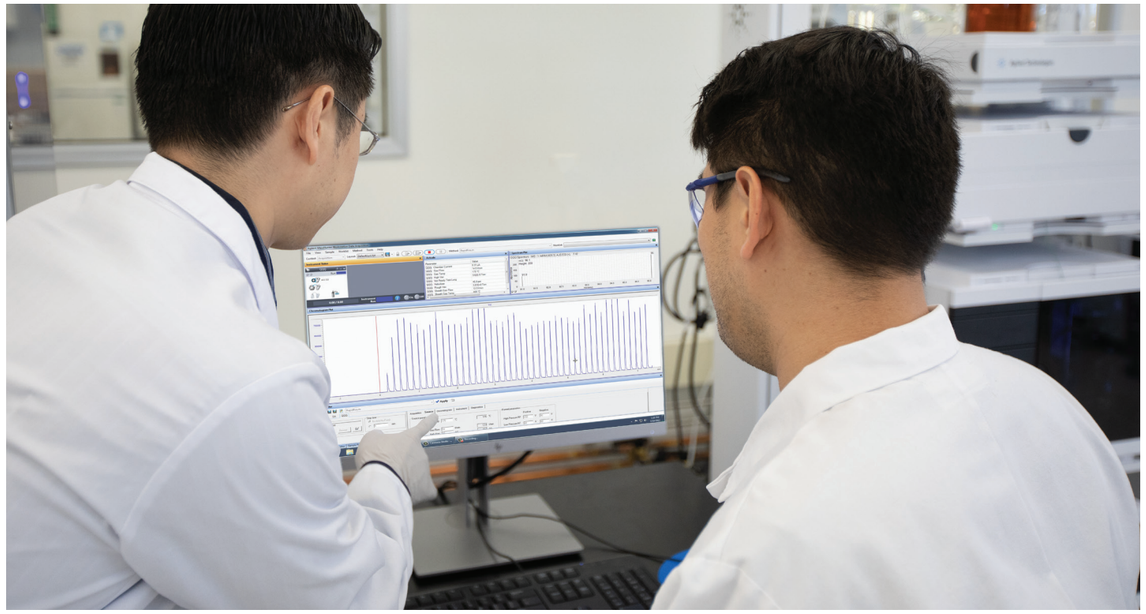
Intact NIST Monoclonal Antibody: Triplicate Injections 5 to 500 ng/µL



Outstanding sensitivity and reproducibility. Intact NIST monoclonal antibodies at varying concentrations were injected as triplicates using a RapidFire system.

Coupling the RapidFire system with a time-of-flight instrument enables a wider range of applications. These applications include characterizing proteins/antibodies/oligonucleotides, studying covalent protein-inhibitor binding, assessing plasma protein binding, and quantifying proteins in biological matrices.

To learn more, read our poster: **Ultra-Fast Analysis of Intact Proteins Using SPE-TOF**



Expand Your Reach with RapidFire SPE Cartridges

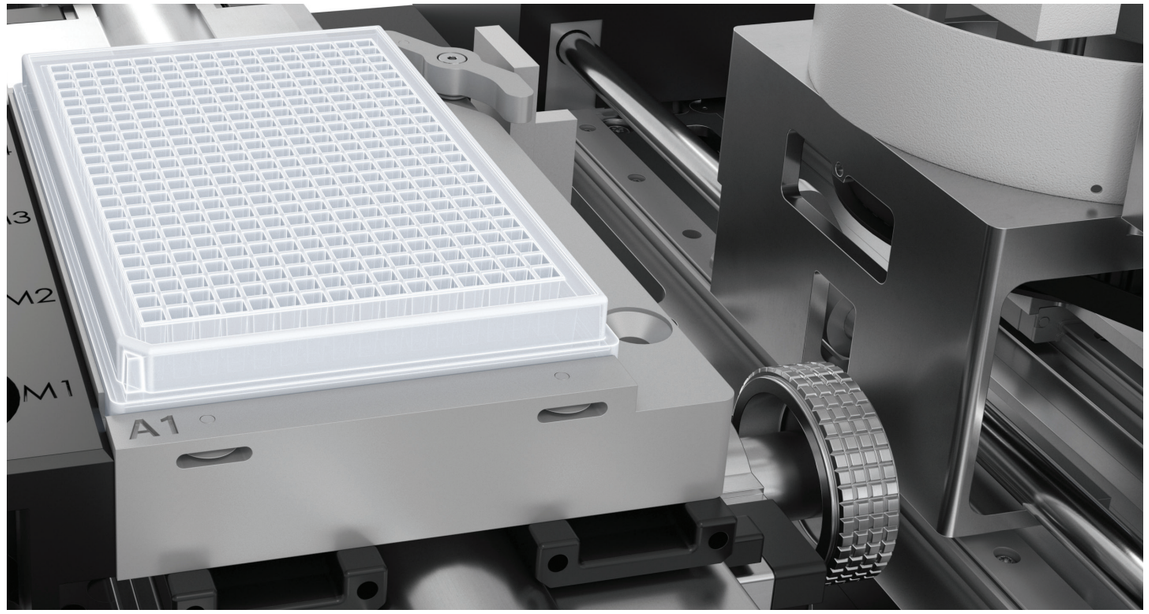
Agilent RapidFire SPE cartridges are available in many chemistries for a wide range of screening, drug discovery, and clinical research applications. Plus, they offer these advantages:

- Reusable for thousands of injections
- Custom bed volumes of 4 to 20 µL
- Reduce or eliminate offline sample preparation

Choose from one of our standard cartridges, or have custom cartridges created in any chemistry.

Ten years of value, guaranteed

Our value promise maximizes your return on investment by making sure that your purchase is safe. From the date you buy select Agilent chromatography, spectrometry, and spectroscopy instruments, we *guarantee* you at least 10 years of use. Otherwise, we will credit you with the residual value of the system toward an upgraded model.



Cartridge ordering Information

No matter what analytes you are interested in, our wide selection of cartridge chemistries can help you achieve your best results.

Type	Packing	Typical Applications
A	C4	Small molecules, peptides, oligos
B	Cyano	Hydrophilic compounds
C	C18 (4 µL)	Reversed phase, 100 Å pore size
D	Graphitized carbon	Hydrophilic compounds, small molecules
E	C8	Proteins, peptides, small molecules
F	Phenyl	Aromatic compounds
H6	HILIC	Hydrophilic compounds, small molecules
C12 µL	C18 (12 µL)	RapidFire cartridge, C18, 12 µL type C12 µL
O	Blank	RapidFire cartridge, blank
4, 12 µL	Custom	RapidFire cartridge; custom packing

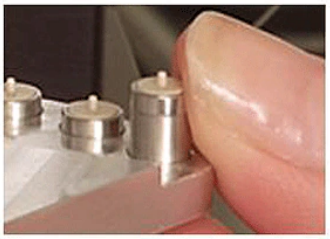
High Throughput LC/MS

RapidFire Cartridges

Agilent RapidFire cartridges are used by the RapidFire High-Throughput MS system. The cartridges are available in a variety of chemistries for a wide range of screening, drug discovery, and clinical research applications. Typical applications include analysis of small molecules, peptides and oligos, hydrophobic compounds, proteins, hydrophilic compounds, and aromatic compounds.

Cartridges are compatible with all models of the RapidFire instrument. Users can choose one of our standard cartridges or a custom cartridge in any chemistry.

For Research Use Only. Not for use in diagnostic procedures.



Part Number	Description
G9203A	RapidFire Cartridge, C4 (20 µm, type A)
G9204A	RapidFire Cartridge, Cyano (type B)
G9205A	RapidFire Cartridge, C18 (4 µl, type C)
G9206A	RapidFire Cartridge, graphitic carbon (type D)
G9207A	RapidFire Cartridge, C8 (type E)
G9208A	RapidFire Cartridge, Phenyl (type F)
G9211A	RapidFire Cartridge, blank (type O)
G9525A	RapidFire Cartridge, C4 (40 µm, type A2)
G9526A	RapidFire Cartridge, C18 (12 µl, type C)
G9527A	RapidFire Cartridge, HILIC (type H6)

Features

- Reusable SPE cartridges
- Large sample capacity per cartridge
- Custom bed volumes of 4 µL to 20 µL available
- No offline sample preparation
- RapidFire System has 6-slot cartridge changer for automated, walkaway processing

High Throughput LC/MS

RapidFire Integrator Software

Agilent RapidFire Integrator is data acquisition and analysis software for the RapidFire High-Throughput MS Systems, providing seamless data integration with MassHunter and LIMS. It transforms direct mass spectrometry output into data files similar to that of plate reader-based systems.

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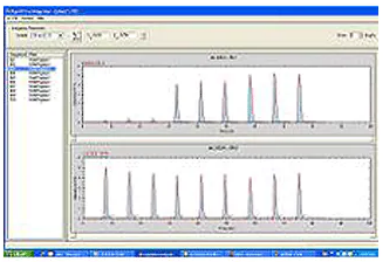

Features

- Sequence-based protocol
- Injections from plates in any well order
- Multiple MS methods per plate
- Barcode scanner
- 24-hour unattended operation
- Active monitoring and flagging of aberrant samples

High Throughput LC/MS

RapidFire Analyzer Software

Agilent RapidFire Analyzer software efficiently processes data acquired on the RapidFire platform coupled to an LC/triple quadrupole MS instrument. Designed to handle large RapidFire data sets, the software can rapidly process, review, and report thousands of results in seconds—for any semi-quantitative workflow.

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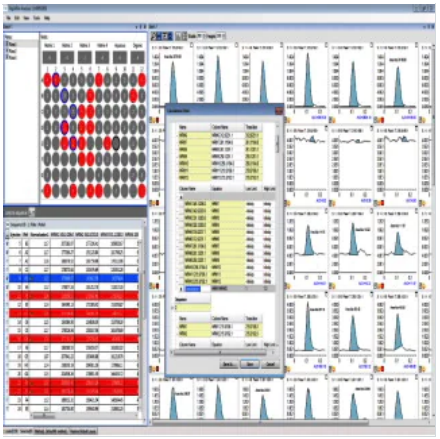


Features

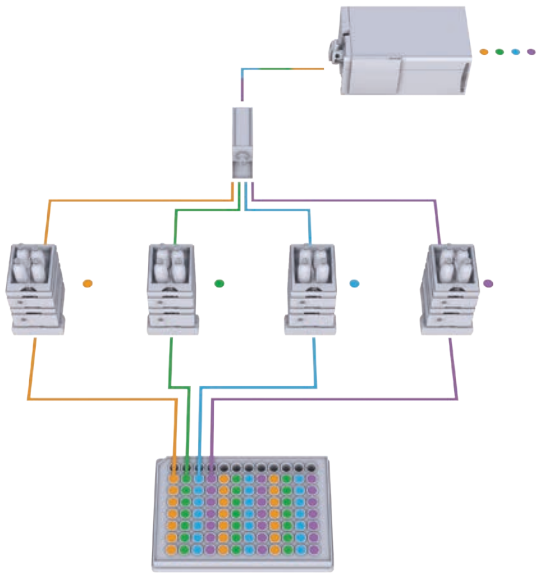
- Excellent data quality through a novel peak detection algorithm
- Customizable views and desired calculations
- Fast reporting and data review using Review-by-Exception
- Customizable export formats
- Elegant error handling using self-assessment of sampling errors

Boost Lab Productivity Without Compromising Data Quality

Sample volumes are increasing, and demands for higher throughput are growing. You need the results provided by LC/MS—but you don't have the budget or space for four individual LC/MS systems.

Expand your laboratory capabilities with the Agilent StreamSelect LC/MS system

StreamSelect technology lets you multiplex up to four liquid chromatography systems with a single mass spectrometer, allowing full utilization of the detector. This configuration is also fail-safe in that your workflow will continue uninterrupted, even if an LC goes down. This innovative solution improves workflow efficiency with:



Intuitive automation software seamlessly controls the system—greatly enhancing throughput.

- **Higher throughput.** Generate results two, three, even four times faster, compared to standard LC/MS systems.
- **Intuitive data collection, processing, and reporting** with MassHunter software.
- **Intelligent error handling.** When one HPLC goes down, the software seamlessly switches to the next LC in the system. No dropped samples, no lost data. Peace of mind.
- **Superior data quality,** with equivalent performance across all streams.
- **Increased flexibility.** Run single or multiple methods.
- **Hassle-free online sample cleanup.**
- **Cost-effective implementation.** Easily transfer your existing Agilent LC/MS methods.
- **Excellent return on investment.** Efficient use of a single MS lowers your cost-per-sample.

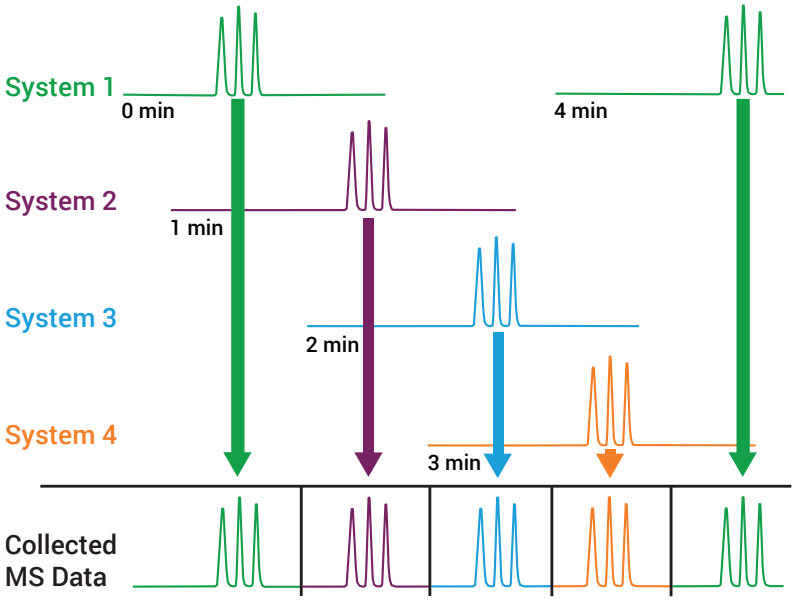
Increase Your Throughput and Lower Your Stress

One of your most expensive lab resources—your mass spectrometer—is often idle when used in a traditional single LC configuration. Meanwhile, samples are stacking up, waiting for the next run.

Maximize the use of your mass spectrometer

Agilent StreamSelect LC/MS software sends only the analytes you specify from each LC run to the MS for analysis. Staggering injections from multiple LCs sends more samples to the MS—resulting in more samples analyzed in the same timeframe.

Increase productivity by two, three, even four times over traditional MS



The Agilent StreamSelect LC/MS system can collect four times the results in the same time window by reducing MS idle time.

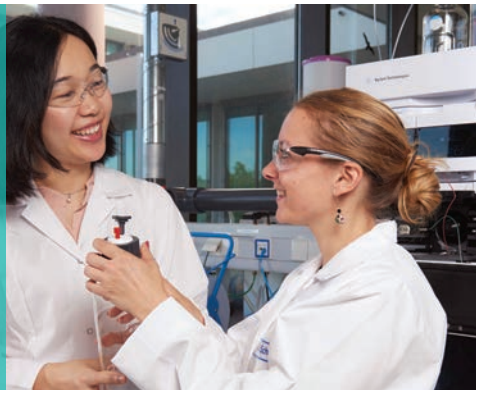
StreamSelect system core configuration

- MassHunter StreamSelect software
- Up to:
  - Four Agilent 1260 Infinity II binary pumps or
  - 1290 Infinity II high-speed pumps and 1290 Infinity II multicolumn thermostats
- StreamSelect CTC autosampler with up to four injection ports
- Agilent 6400 Series triple quadrupole LC/MS system

Add functionality with online sample cleanup

- Use workflow enhancements like trap-and-elute or elution loop to remove matrix
- Add up to four Agilent Infinity II quaternary or flex pumps
- Add column switching valves and capillary kits

Robust Sample Handling



No more lost samples

MassHunter software maintains direct communication between all HPLC and mass spectrometer components. The software seamlessly orchestrates all LC functions and MS acquisition, resulting in:

- Accurate tracking of samples from each independent LC to the MS
- No misidentification of MS data files
- Sample handling peace of mind

Easily set system pressure limits

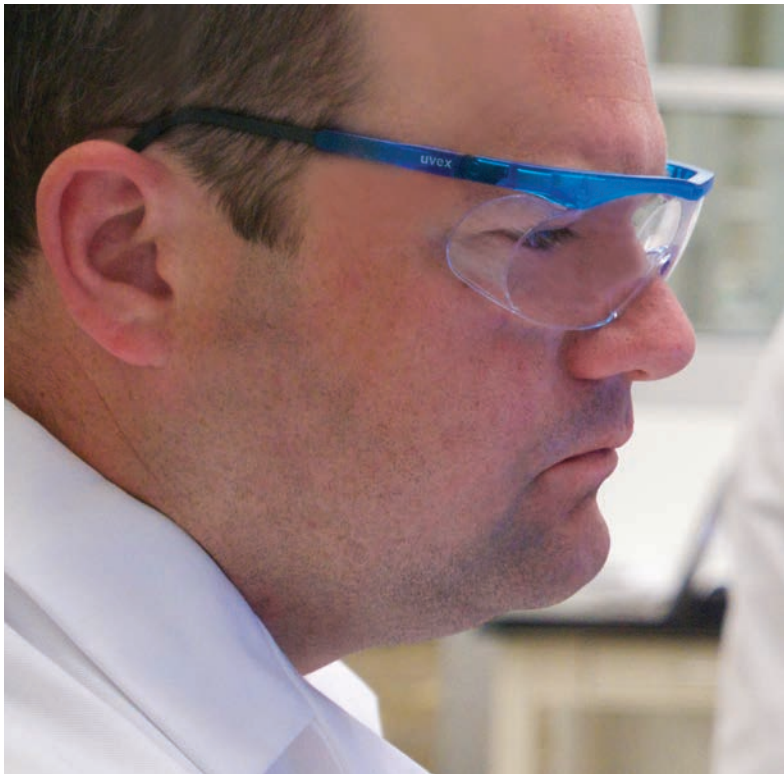
Pump pressure monitoring lets you set thresholds for out-of-range pressures throughout the acquisition run—accurately reflecting the actual pressure changes of LC gradient conditions.

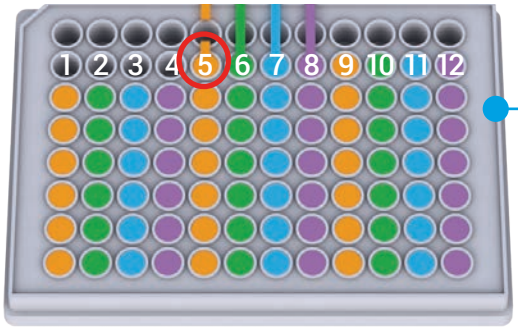
Intelligent Error Handling

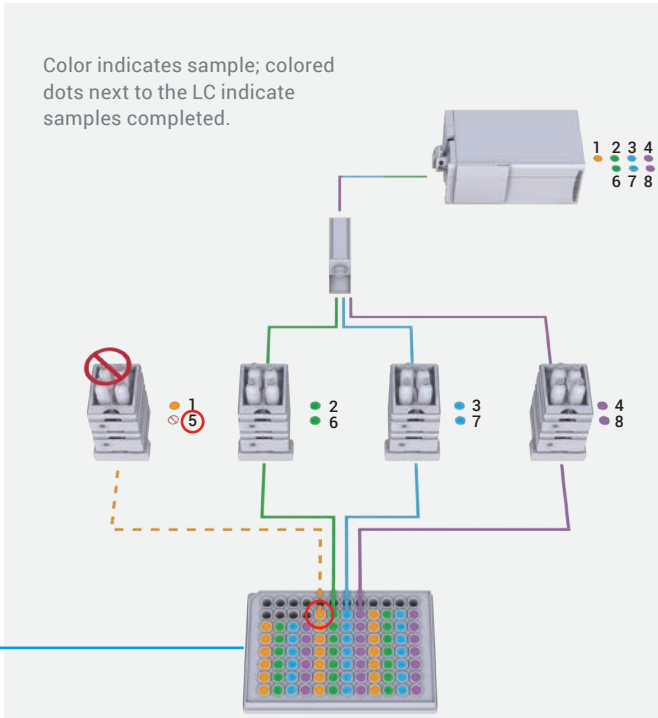
No interruptions. No data loss. No user intervention.

Agilent intelligent error handling makes sure that no samples are dropped. If one LC needs service, the sample intended for that LC is redirected to the next available LC. All other samples are sent to the next LC in the sequence, so none are missed.

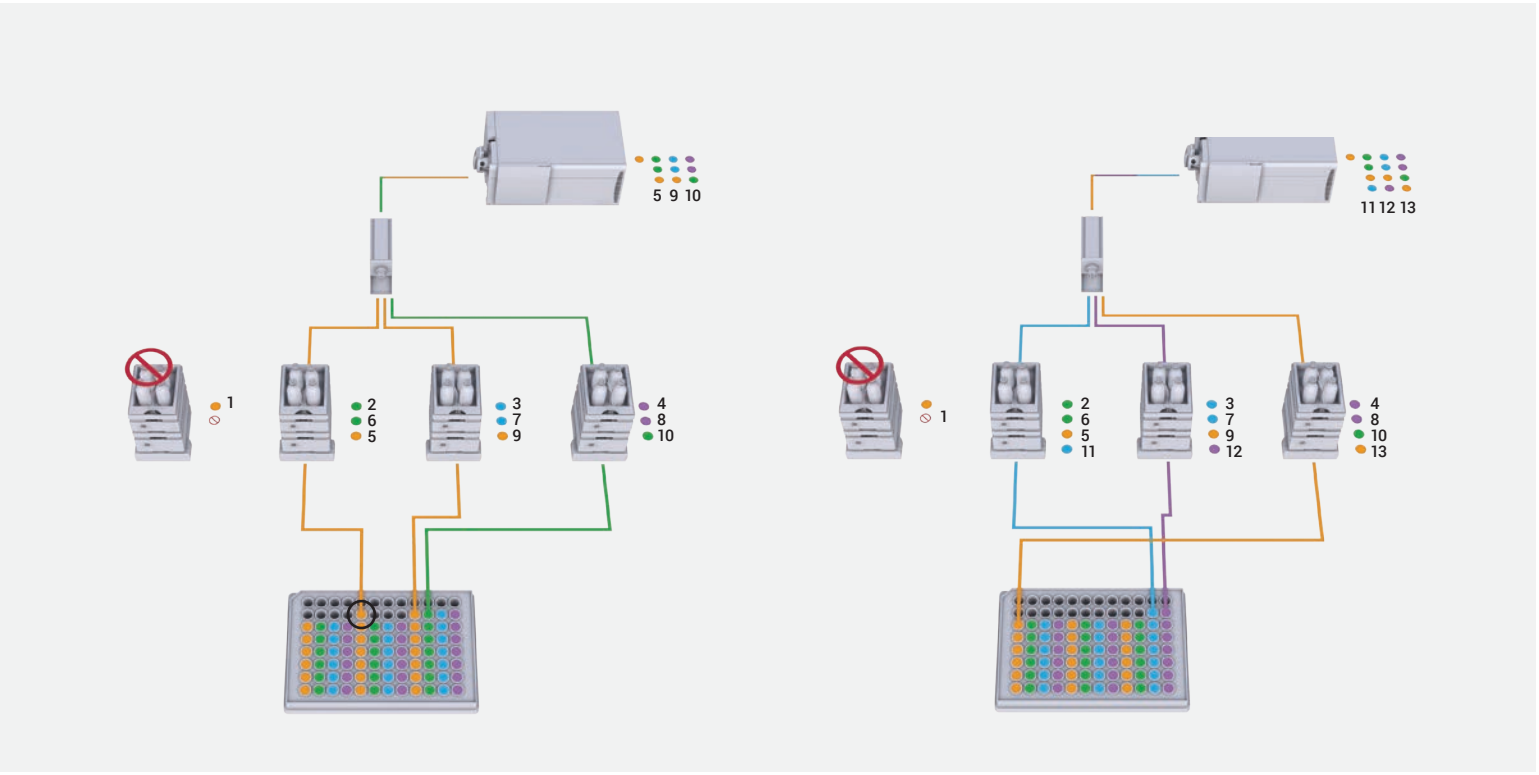
- StreamSelect automatically compensates for unexpected LC issues—like solvent leaks or pump overpressure—diverting the sample to the next available LC stream.
- No worrying about sample loss: StreamSelect keeps you running.
- No productivity loss overnight or during the weekend.





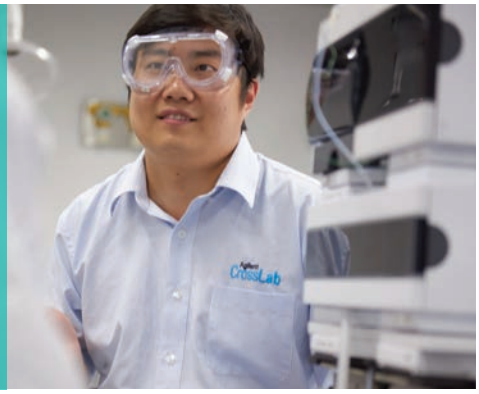


Here, there was a problem running sample number 5. Ordinarily, that would result in a dropped sample.



With StreamSelect, sample number 5 is redirected to the next available LC. Samples 9 through 13 are sent to the next LC in sequence.

More Results, Same High-Quality Data



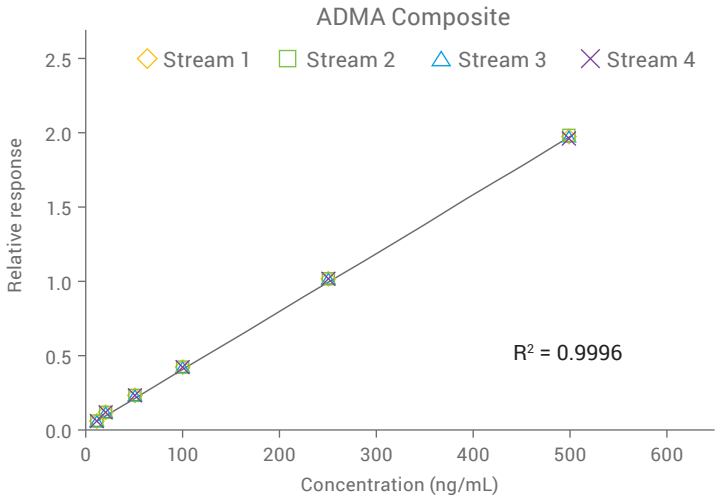
Superior data quality on every stream

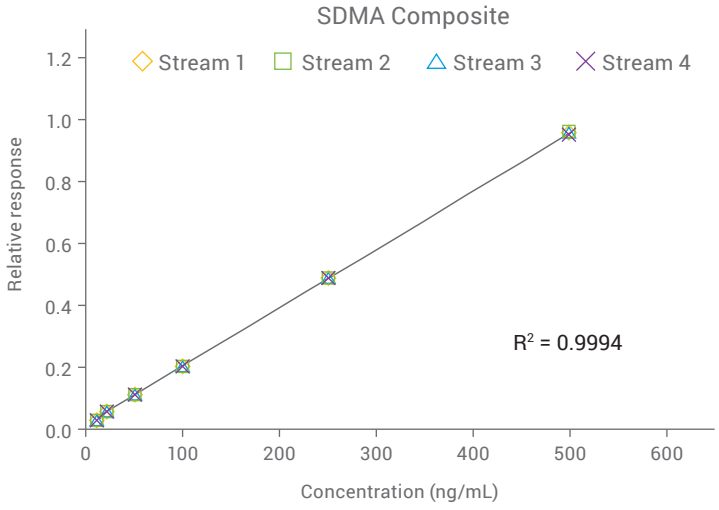
The StreamSelect system delivers the superior analytical performance you expect from Agilent. With the reliability of the Agilent InfinityLab LC Series—plus solid triple quadrupole MS—you can count on:

- Equal quantitative performance across all streams
- The same quantitative performance after intelligent error handling
- Reproducibility, robustness, and reliability

Accurate quantitation

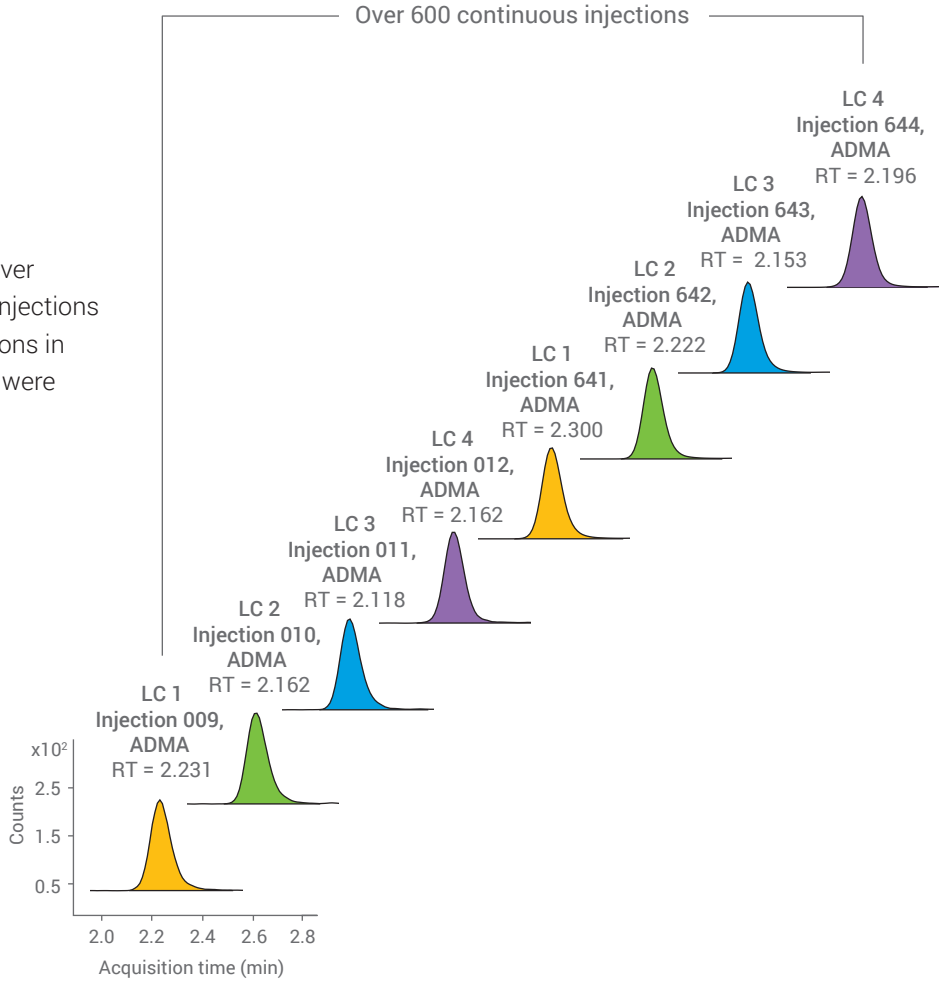
Simultaneous analysis of asymmetric and symmetric dimethyl arginine (ADMA and SDMA, respectively) from four LC streams, with combined calibration curve. The four parallel LC systems displayed excellent linearity and quantitative agreement.





Reproducible performance

Retention time reproducibility of ADMA over 600 injections across four LC streams. (Injections 1 to 8 were blanks, 2 per stream.) Deviations in retention time between the four streams were minimal, resulting in less than 5% RSD.



The Agilent StreamSelect system

Sample Throughput Needs	StreamSelect Solution Choice	Productivity Improvement	Online Sample Cleanup SPE: Trap-and-Elute or Elution Loop
Medium 100s/day	2-Stream	2X	Supported
High 100s—1000s/day	3-Stream 4-Stream	3X—4X	Supported

Integrated. Intuitive. StreamSelect Software

Complete system information at your fingertips

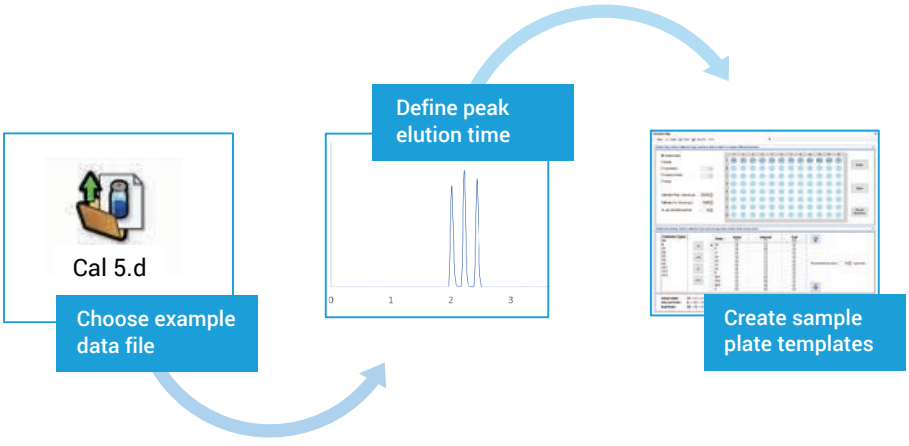
User-friendly automation software coordinates the integrated system. The StreamSelect console gives you instant access to:

- Status of all LC streams
- Mass spectrometer chromatograms
- Sample batch queue
- Customizable window arrangement

Easy adoption, easier method development

You can easily implement your existing LC/MS methods in StreamSelect. Simply load the data file, define the window of interest for your analytes, and create plate templates, if desired. Setting up batch acquisition is as simple as identifying the sample list and specifying sample location.

What's more, StreamSelect is fully integrated into MassHunter Acquisition software, making method development a breeze.



How Much Could Your Return on Investment Be with StreamSelect?

To find out, use our easy StreamSelect ROI calculator. Simply answer a few quick questions about your method, LC/MS use, and sample volume, and watch how your savings can add up.

StreamSelect ROI calculator

See what your return on investment could be with the StreamSelect LC/MS system.

How many hours a day do you use a single LC/MS?	How long is your method? (min) (injection-to-injection)	How many samples do you want to run per day?	Your revenue per sample (USD$)
18	8	850	80

How many systems do I need?

Single LC/MS	StreamSelect 2-Stream	StreamSelect 3-Stream	StreamSelect 4-Stream
7	4	3	2

How many samples can I run per system daily?

Single LC/MS	StreamSelect 2-Stream	StreamSelect 3-Stream	StreamSelect 4-Stream
135	270	405	540

Potential daily revenue per system

Single LC/MS	StreamSelect 2-Stream	StreamSelect 3-Stream	StreamSelect 4-Stream
$10,800	**$21,600**	**$32,400**	**$43,200**

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