Agilent 1200 Series Rapid Resolution LC System

All the Performance. All the Time.

- Up to 20 times faster than HPLC
- 60% higher resolution than HPLC
- Throughput of 2000 samples per day
- Peak capacity of 500 in 30 minutes
- Full compatibility with HPLC methods
- Agilent intelligent services

Fastest, most efficient and most flexible LC system in the world

Increasing productivity, confidence in analytical results and cost-effectiveness are key objectives in today's analytical laboratories.

The Agilent 1200 Series Rapid Resolution LC system (1200 Series RRLC system) is designed to meet these challenges with a universal LC system for analytical flow rates ranging from 0.05 to 5 mL/min. The system provides a new world of RRLC and RRLC/MS performance, accompanied by all the capabilities of conventional 1200 Series HPLC instruments. In addition, the Agilent 1200 Series Rapid Resolution LC system offers new levels of serviceability, uptime and compliance.

Speed

The Agilent 1200 Series RRLC system, equipped with new, second generation ZORBAX Rapid Resolution HT 1.8-µm columns, enables analysis that is up to 20 times faster than HPLC, while maintaining the high quality resolution, precision and sensitivity that HPLC is known for.

Resolution

150-mm long ZORBAX Rapid Resolution HT columns provide 60% higher resolution than HPLC columns with the same dimensions, making it possible to resolve more trace level impurities than ever before and to achieve peak capacities of more than 600.

Flexibility

The 1200 Series RRLC system provides full support for narrow and standard bore columns 10 – 300 mm in length, with internal diameters from 1 to 4.6 mm and particle sizes ranging from 1.5 to 10 µm. This enables RRLC methods using columns with particle size < 2 µm, as well as HPLC methods with particle size > 2 µm, to be run without limitations. This unique flexibility gives users confidence that they have made a secure investment in an instrument which fulfills today's requirements and is prepared to meet the requirements of the future.

Reliability and compatibility

With more than 60,000 installed systems throughout the world, the Agilent 1100 Series LC system technology has a well-earned reputation for excellence. The new Agilent 1200 Series RRLC system builds on the design of the highly successful Agilent 1100 Series to provide highest analysis speed and resolution, while keeping system pressure at a minimum. Consequently, the system maintains the robustness, performance and operating principles of conventional HPLC instruments and methods. Users familiar with running an HPLC instrument will immediately feel at home with the 1200 Series RRLC system, with no need to retrain.

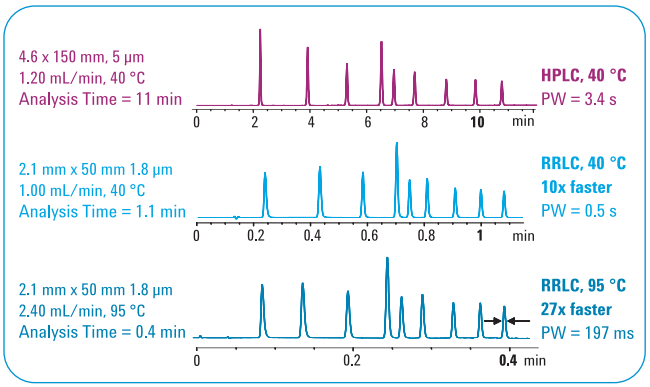
Agilent Technologies

A New Level of Analysis Speed – for a New World of Lab Productivity and Cost Effectiveness

Speed

Short rapid resolution HT columns with 1.8-µm particles offer a unique opportunity to dramatically reduce analysis time by increasing flow rate and temperature, without loss of separation performance. The Agilent 1200 Series Rapid Resolution LC system has been optimized for lowest pressure at high flow rates in order to achieve highest analysis speed. Combined with increased temperatures of up to 100 °C, linear flow rates of more than 15 mm/s can be achieved on 50-mm RRHT columns. This represents gains in analysis speed of up to 20 times that of conventional HPLC methods.

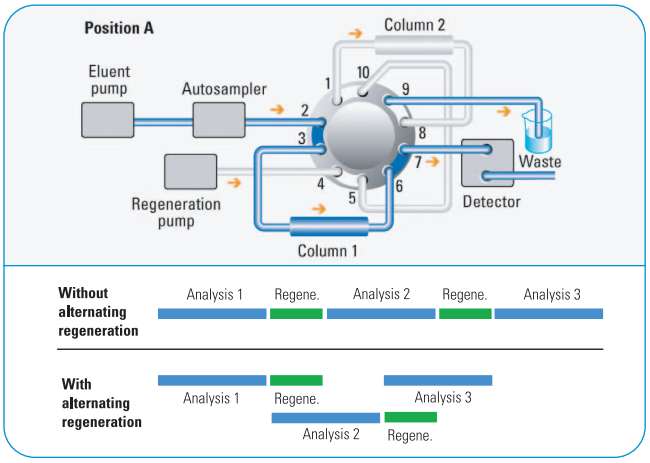
Shorter time-to-result increases lab productivity and reduces the overall cost-per-analysis significantly, typically by more than 70%.



RRLC provides speed gains of 10x at unchanged temperature and 27x at increased temperature versus HPLC. Sample: phenone mix

Throughput of 2000 Samples per Day

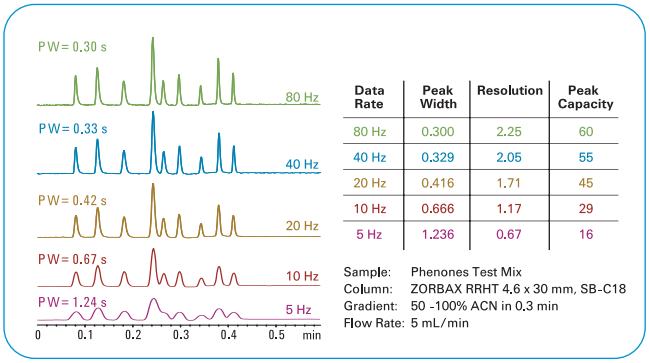
A special high-throughput (HT) configuration of the 1200 Series RRLC system enables maximized productivity for laboratories with high sample loads. While one column is used for the analysis the second column is washed and regenerated by a second regeneration pump. After the last peak has eluted the 2-position/10-port valve is switched and the next run can be started immediately. With this HT configuration cycle times can be reduced by up to 50%.



Throughput of more than 2000 samples/day can be achieved by alternating column regeneration (ACR).

Maintaining resolution in ultra-fast RRLC separations

Ultra-fast RRLC applications can generate peak widths as narrow as 0.2 seconds. To keep up with the separation speed delivered by RRLC, the 1200 Series Rapid Resolution LC system is equipped with high-speed UV-visible and MS detectors to provide uncompromised resolution in ultra-fast RRLC separations.



Data Rate	Peak Width	Resolution	Peak Capacity
80 Hz	0.300	2.25	60
40 Hz	0.329	2.05	55
20 Hz	0.416	1.71	45
10 Hz	0.666	1.17	29
5 Hz	1.236	0.67	16

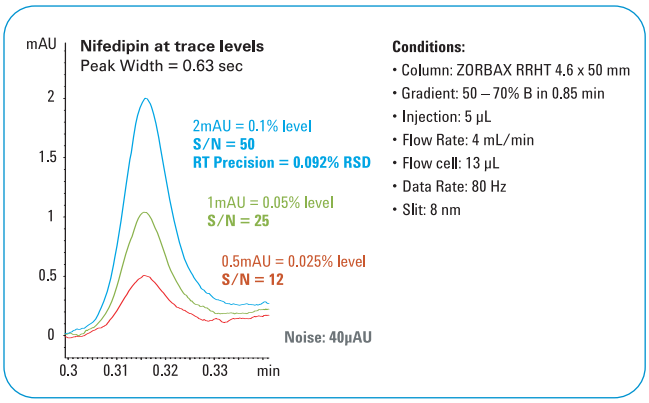
Sample: Phenones Test Mix
Column: ZORBAX RRHT 4,6 x 30 mm, SB-C18
Gradient: 50 -100% ACN in 0,3 min
Flow Rate: 5 mL/min

80-Hz sampling rate of the Agilent 1200 Series DAD SL provides resolution and peak capacity gains of 90% (30%) relative to 10-Hz (20-Hz) sampling rates.

Maintaining sensitivity in ultra-fast RRLC separations

The 1200 Series DAD SL and MWD SL have new low-noise flow cell design, new low-noise diode-array electronics, and new electronic temperature control (ETC), which minimizes baseline noise and drift, even under harsh and fluctuating ambient temperature and humidity conditions.

Combining these innovations enables accurate quantification, peak purity analysis and spectral identification, even at trace level, working with data rates of up to 80 Hz. This exceptional capability of the new 1200 Series DAD SL means that your ultra-fast RRLC methods achieve the same limit of detection as HPLC methods, complying with the strictest regulatory performance requirements.

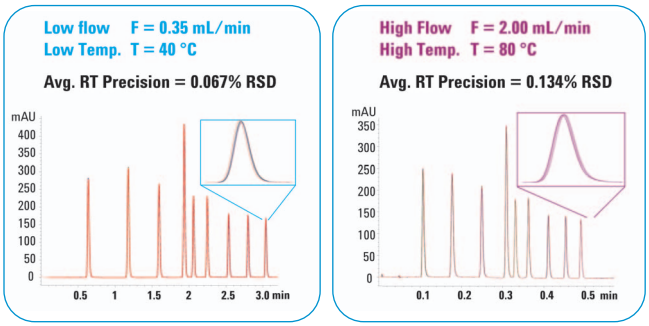


Lowest detector noise, even under demanding ultra-fast RRLC conditions, allows accurate simulteanous quantitation of main compounds and trace level impurities at levels smaller than 0.05% of the main compound – all from a single run.

Maintaining retention precision in ultra-fast RRLC separations

The new electronic damping control (EDC) of the 1200 Series binary pump SL, combined with improved Peltier temperature control of mobile phase and column, provides highest RT precision and baseline stability under the most demanding ultra-fast RRLC conditions.

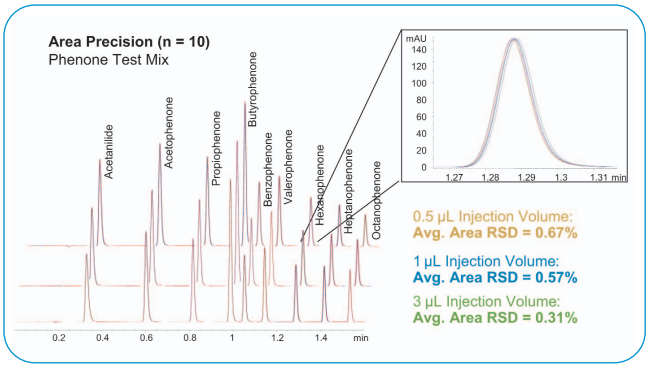
Even at the highest linear flow rates of more than 14 mm/s and temperatures up to 100 °C, the reproducibility of the 1200 Series Rapid Resolution system fullfills the most demanding requirements.



Highest retention time precision is achieved under both low speed and highest speed RRLC conditions.

Maintaining area precision in ultra-fast RRLC separations

The new injection valve technology of the 1200 Series high-performance autosampler SL enables precise and robust high-speed injections at pressures up to 600 bar. The flow-through design, together with overlapped injections, delivers cycle times of less than 30 s, while keeping carryover below the limit of detection. Variable loop technology ensures highest injection volume linearity from 0.1 to 100 µL, without loop change, making the autosampler compatible even with smallest sample amounts.



Precise high-speed injections using the Agilent 1200 Series Rapid Resolution LC system ensure highest area precision in RRLC applications, even at very small injection volumes of 3 µL and less.

A New Level of Efficiency – for a New World of Information and Confidence

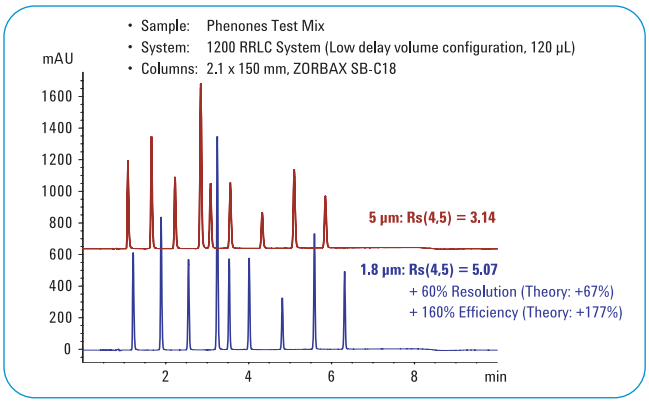
Resolution

Long Rapid Resolution HT columns with 1.8-µm particle size offer the unique opportunity to increase the chromatograhic efficiency and resolution, thereby increasing knowledge of the analyzed sample and, ultimately, the confidence in analytical results.

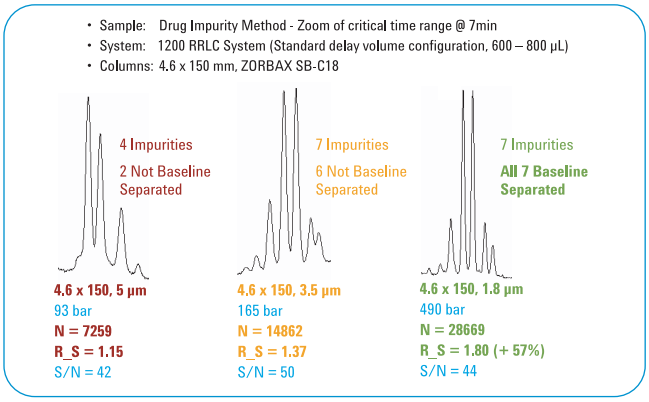
Pressure and delay volume optimization of the 1200 Series Rapid Resolution LC system allows usage of both narrow and standard bore rapid resolution HT columns 150 mm in length. This provides efficiencies of close to 30,000 plates, enabling a gain of up to 60% in chromatographic resolution compared to conventional HPLC, in the same analysis time and with the same or improved precision and sensitivity.

Peak capacity

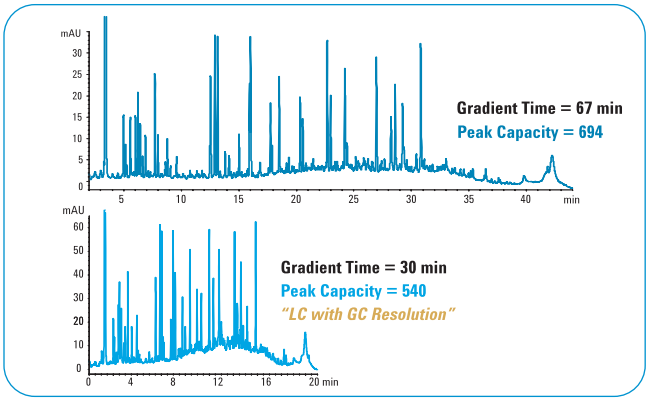
150-mm RRHT columns are also the first choice for the analysis of complex samples. Depending on gradient time, peak capacities of 700 and more can be achieved, providing a new dimension of information in both LC and LC/MS applications. The increased temperature range of up to 100 °C even allows coupling of several RRHT columns to achieve efficiencies of more than 50,000 plates on 1.8 µm RRHT columns and more than 80,000 plates on 3.5 µm and 5 µm columns.



Using a narrow bore 2.1 x 150 mm, 1.8-µm Rapid Resolution HT column on the Agilent 1200 Series RRLC system in a low delay volume configuration provides a 60% gain in resolution compared to a 5-µm particle size column of same dimension.



Using a standard bore 4.6 x 150 mm, Agilent 1200 Series RRLC HT column on the Agilent 1200 Series RRLC system in standard delay volume configuration gives 57% gain in resolution compared to a 5-µm particle column of same dimension, with the same sensitivity or S/N.



Peak capacities of more than 700 can be achieved using a ZORBAX 1.8 µm RRHT SB-C18, 2.1 x 150 mm column to analyze a peptide map of tryptic digest of BSA.

A New Level of Flexibility – for Maximum Method Freedom and Minimized Investment Costs

Two tasks – one system

The 1200 Series Rapid Resolution LC system not only complies with new RRLC applications but also with traditional HPLC methods giving users the confidence of a secure investment that fullfills the requirements of today and the future. It supports narrow and standard bore columns with internal diameters from 1 to 4.6 mm, 10 – 300 mm in length and particle sizes ranging from 1.5 to 10 µm. This unique flexibility and scalability is enabled by the configurable delay volume of the 1200 Series binary pump and the ability to optimize the hydraulic path of the instrument and flow cell volume of the UV detector for any analytical condition.

The standard delay volume configuration makes it possible to run both standard bore RRLC and HPLC methods on a single instrument configuration – without compromising performance or needing to revalidate methods.

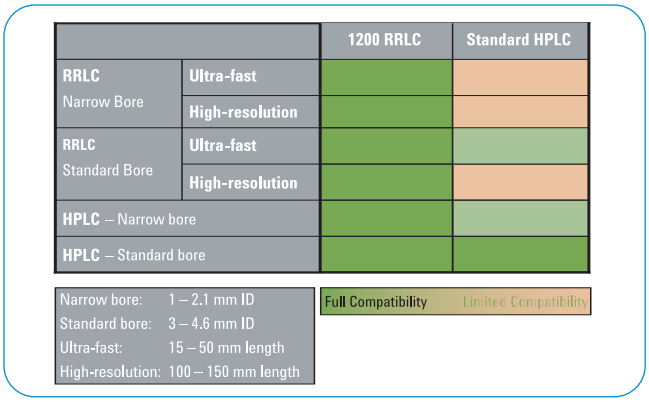
The low delay volume configuration with 120 µL provides optimum support for high-speed, narrow bore LC and LC/MS applications.

Method development flexibility

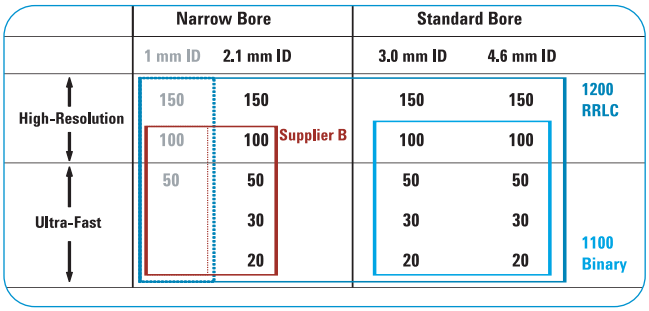
More than 80 ZORBAX 1.8-µm RRHT columns are available in various bonded phases, from 20 to 150 mm in length, with internal diameters from 1 to 4.6 mm. They provide a wide range of selectivity and efficiency choices for maximized method flexibility.

RRHT columns use the same chemistry as ZORBAX 3.5 and 5-µm particle columns. As a result, all bonded phases with 5, 3.5 and 1.8-µm particle size provide identical selectivity, which allows for easy, fast and secure method transfer from HPLC to RRLC and vice versa.

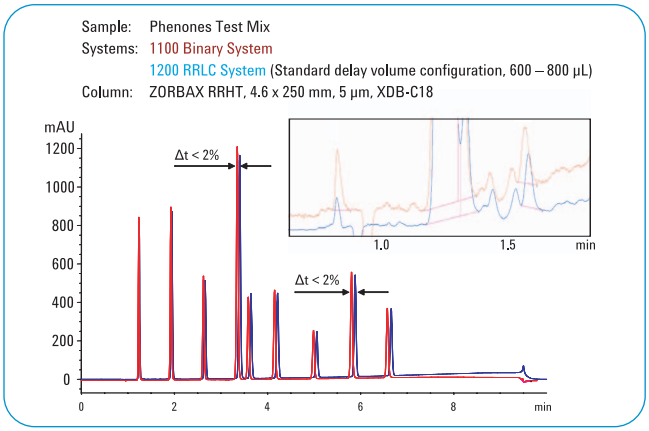
The standard delay volume configuration of the 1200 Series Rapid Resolution LC system allows HPLC methods to be run with minimum RT-shifts of less than 2%. This enables unambiguous peak tracking and ID and eliminates the need to revalidate HPLC methods.



The Agilent 1200 Series RRLC system offers uncompromised support of RRLC and HPLC methods on both standard and narrow bore columns.



Supported sub-two micron column dimensions on different systems. The Agilent 1200 Series RRLC system offers full support of standard and narrow bore 1.8-µm ZORBAX RRHT columns from 20 to 150 mm in length.



The standard delay volume configuration allows to run not only RRLC but also traditional HPLC methods without compromising performance or changing chromatographic pattern.

The 1200 RRLC System – New Modules for a New World of Performance and Flexibility

ZORBAX Rapid Resolution HT 1.8-µm Columns

- Choice of more than 80 columns covering a broad range of phases and dimensions for greatest flexibility
  - Internal diameter: 1 – 4.6 mm
  - Length: 20 – 150 mm
- Engineered particle size distribution reduces pressure and enables higher analysis speed and resolution
- SB-C18 columns allow stable operation at temperatures of up to 100 °C for even more speed and resolution
- RRHT columns have the same chemistry and, consequently, same selectivity as ZORBAX 3.5 and 5 µm columns, which facilitates easy, fast and secure method transfer from HPLC to RRLC and vice versa

Agilent 1200 Series Binary Pump SL

- Configurable delay volume from 600-800 µL down to 120 µL, flow rates up to 5 mL/min and 600 bar pressure provide universal applicability in narrow and standard bore HPLC and RRLC with column IDs from 1 to 4.6 mm
- New Electronic Damping Control (EDC) provides highest RT precision and baseline stability
- Optimum support of analytical LC/MS applications with 120-µl delay volume

Agilent 1200 Series High-Performance Autosampler SL

- High-speed 600-bar injector with new µ-valve design for highest instrument and column robustness at high pressures
- Cycle times < 30 s with overlapped injections
- Highest precision and linearity from 0.1 to 100 µL without loop change

Agilent 1200 Series Thermostatted Column Compartment SL

- Up to 100 °C for higher speed and resolution in RRLC
- Two independently controllable heat exchangers with configurable volumes allow optimized pre-column heating and post-column cooling for lowest detection limits in ultra-fast, high-temperature applications for both narrow and standard bore columns
- Improved Peltier control provides temperature stability of ± 0.05 °C for minimized baseline noise in high-flow, high-temperature ultra-fast RRLC applications
- 600-bar 2-position/10-port valve enables minimized cycle timess by alternating column regeneration to allow for highest throughput of more than 2000 samples/day

Agilent 1200 Series Diode Array Detector SL

- 80-Hz data acquisition of full spectra and up to 8 signals provide maximum resolution and sample information in ultra-fast RRLC applications
- New flow cell design, low-noise electronics and electronic temperature control for highest sensitivity in ultra-fast RRLC applications
- Data recovery card provides "data-never-lost insurance"
- RFID-tags of flow cells and lamp provide new level of data traceability

Agilent 1200 Series Variable Wavelength Detector SL

Cost-effective, 55-Hz high-speed detector for highest resolution and sensitivity in ultra-fast RRLC applications

New Instrument Control, Data Analysis and Services – for a New Level of Usability, Uptime and Robustness

Agilent 1200 Series instant pilot

- Cost-effective, standalone solution for single instrument control
- Provides full instrument, method and sequence control and display of online signals

New ChemStation for faster data analysis and review

A new user interface enables you to analyze and review large amounts of data in a much shorter time.

- Level 5 instrument control for your Agilent instruments
- Control of LC/MS, GC/MS, CE, CE/MS and generic A/D converters
- Built-in macro language enables easy customization and software supports numerous add-ons
- Seamless integration of 3rd party detectors (ESA CAD and CCIII)

EZChrom Elite for maximum flexibility and compliance

An easy to use software solution for labs with instruments from multiple vendors.

- Full compliance features
- Powerful and flexible reporting capabilities with automated spreadsheet calculations
- SMART sequencing for flexible automation tasks
- Easy scale-up from workstation to client-server system

Agilent OL ECM reaches beyond the single laboratory

The Enterprise Content Management system (ECM) enables you to acquire and organize your data across laboratories and departments.

- Saves all documentation and data in a single repository
- Organize and retrieve data using advanced search engines
- Enables several people to rapidly and easily review a complete result set for a sample, including graphical results

Agilent intelligent services

Agilent intelligence services provide a new generation of services with on-demand remote connectivity for a new level of productivity.

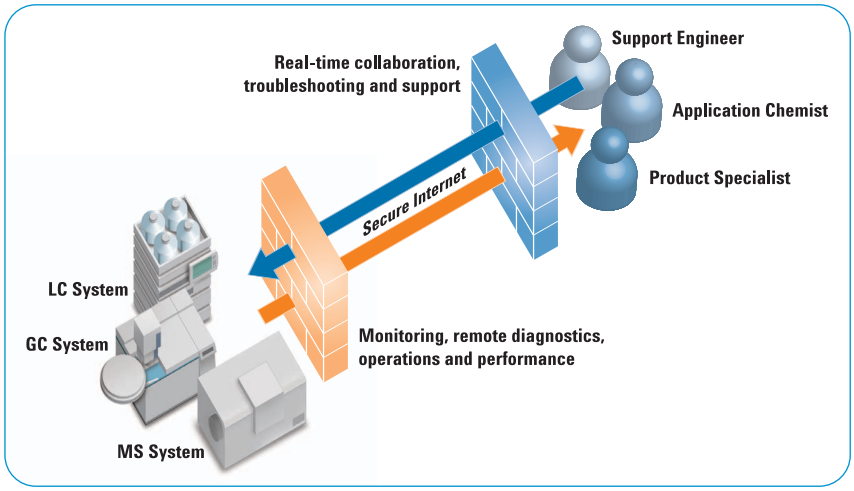
- Push for Help: Agilent LC diagnostics instrument status report includes all important information, e.g. error log book, system configuration, EMF and guidance report
- Secure, streamlined communication between your lab and the Agilent support organization
- Proactive monitoring of instrument performance and utilization

Agilent system intelligence

- Early Maintenance Feedback (EMF) tracks system usage and alerts you for timely replacement of parts
- Column identification module records column parameters (such as number of injections, particle size), maximizes pressure and provides a unique column signature
- Patented RFID tracking technology in the DAD SL saves all relevant meta data from the flow cells and UV lamp
- Control Area Network (CAN) provides inter-modular, real-time communication for reliable operation, regardless of PC failures or network interruptions
- Software independent LC diagnostic tool assists users and the support experts interpreting the instrument status

Compliance Enterprise Edition

Agilent can now streamline compliance procedures across your entire company and save you time and money with Enterprise Edition, a new qualification service built on a new software – the patent-pending *Agilent Compliance Engine (ACE)*. With ACE you can configure every step in your protocol from tests, limits and set points to the size and detail of your reports.



Agilent 1200 Series Rapid Resolution LC System Specifications

Selected System Specifications	
Pump delay volume:	Configurable • Low delay volume configuration: 120 µL • Standard delay volume configuration: 600 – 800 µL
Flow rate range:	0.05 – 5 mL/min
Maximum pressure:	600 bar
Injection volumes:	0.1 – 100 µL without loop change or hardware modification, no overfill (drawn = injected volume), up to 1500 µL with multiple draw kit
Column dimensions:	Length: 10 – 300 mm, ID: 0.05 – 8 mm
Maximum Column Capacity:	Three 300 mm columns
Temperature range:	10 °C below ambient – 100 °C
Temperature stability:	< ± 0.05 °C

Performance Specifications	
Maximum linear velocity:	> 15 mm/s on 50-mm ZORBAX 1.8-µm RRHT column (water/ACN gradient)
Flow precision:	< 0.07 % RSD, or ≤ 0.02 min SD whatever is greater, based on retention time at constant room temperature
Flow accuracy:	± 1% or 10 µL/min whatever is greater
Composition precision:	≤ 0.15% RSD at 1 mL/min
Composition accuracy:	± 0.35% absolute
Injection volume precision:	typically < 0.25 % from 5 – 100 µL, < 1 % from 1 – 5 µL
Injection cycle time:	< 30 sec using 5 µL injection volume
Carry over:	< 0.01%
UV baseline noise:	< ± 0.8 × 10 – 5 AU, at 254 nm and 750 nm (1200 DAD SL and MWD SL)
UV baseline drift:	< ± 0.9 mAU/h at 254 nm (1200 DAD SL and MWD SL)
Linearity:	> 2 AU upper limit
Maintenance and system test:	Front access to all maintenance parts Maintenance instructions on multimedia CD-ROM Time for full system test (OQ/PV) < 4 hours
Standard GLP features:	Early Maintenance Feedback—EMF (tracks lamp burn time, usage, number of injections, with limits and feedback messages)
Extended GLP features: (for systems incl. MWD SL or DAD SL)	Data Recovery Card (DRC) for data security (prevents data losses due to communication breakdowns) Radio Frequency Identification (RFID) for data traceability (RFID tags for flow cells and UV lamp allow unambiguous traceability of measurement conditions)
System control:	Through local workstation software, client/server network data system and/or local handheld control module (1200 Series instant pilot). Default control: LAN/CAN

www.agilent.com/chem/1200RR

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