

Agilent 7700 Series ICP-MS

**Extraordinary design.
Unparalleled performance.**

The Measure of Confidence



Agilent Technologies

The Agilent 7700 Series ICP-MS

Advancing ICP-MS technology. Simplifying trace metals analysis.

Whether you need to analyze hundreds of complex samples in less time, or confidently detect ultra trace metals in high purity reagents, **Agilent's 7700 Series ICP-MS** can help you meet the analytical challenges of today... and of the future.

The 7700 Series redefines the benchmark for ICP-MS: more productive, simpler to use, higher sensitivity, lower backgrounds, better interference removal, increased flexibility, easier to maintain and service. All within the smallest commercial ICP-MS mainframe ever made.

The robust workhorse 7700x is the instrument of choice for most applications, and in high-throughput commercial labs, the **all powerful 7700s** is designed specifically for semiconductor applications, and the **new 7700e** offers a simplified and easy to use system for routine analysis. Featuring a new, configurable MassHunter software platform and a host of hardware developments, including a new frequency-matching RF generator and 3rd generation Octopole Reaction System (ORS³), all three 7700 Series mainframes provide unrivalled levels of performance and ease of use, while delivering results you can trust – even in the toughest sample matrices.



The Agilent 7700x ICP-MS provides unparalleled accuracy in high-matrix samples, redefining cell performance in helium mode with a revolutionary 3rd generation cell design – the ORS³.

To learn more about the Agilent 7700 Series ICP-MS, visit www.agilent.com/chem/ICPMS.

Extraordinary 3rd generation ICP-MS

As ICP-MS has evolved over the last two decades, Agilent has been the driving force in the technique's development, introducing many key innovations. With the 7700, we build on this legacy by bringing ICP-MS into the world of routine laboratories and non-expert operators, through new levels of performance, reliability and automation.

Robust enough for your complex matrices

The 7700 has been developed to handle the toughest sample types with ease, due to its high-performance sample introduction, matrix tolerant interface and fast, frequency-matching RF generator.

A unique 3rd generation collision/reaction cell is utilized in all 7700 Series instruments to remove spectral interferences that might otherwise bias results. Helium (He) mode is already established as the *only* reliable cell method for complex and variable samples, because it filters out *all* polyatomics, even unidentified ones.

He mode in the 7700 Series benefits from an innovative new ion lens and 3rd generation cell design, together delivering higher sensitivity, lower backgrounds and more effective interference removal – eliminating the need for reactive cell gases in most applications.

Simple enough for your routine analysis

The 7700 Series provides many user-friendly features that reduce training costs and improve productivity:

- Reproducible operation from day to day and instrument to instrument, using one-click pre-set plasma conditions
- Consistent, reliable operation with Expert Auto Tuning – the fastest, most effective system optimization program ever developed for ICP-MS
- One-touch access to the interface area, plus easier sampling cone removal/refitting during routine maintenance
- Powerful new MassHunter software platform for enhanced data analysis and reporting

Forward-thinking innovation



High Matrix Introduction (HMI) kit

*The unique patented HMI, standard on the 7700x, enables high dissolved solids samples (such as undiluted seawater) to be run directly – a first for ICP-MS. **Page 6***



ShieldTorch System (STS)

*The Agilent STS is a key feature of the 7700 Series. It provides effective plasma grounding, reducing and narrowing the ion energy spread – essential for optimum interference removal in He mode. **Page 6***



Octopole Reaction System (ORS³)

*Works effectively using He mode, for simplified operation and consistent results, even in complex sample matrices. **Page 4***

Backed by more than 15 years of ICP-MS leadership



Agilent 4500 Series

The world's first benchtop ICP-MS, featuring full computer control, Auto Tuning, and superior cool-plasma performance using our proprietary ShieldTorch System. Nearly 1000 units installed worldwide.



Agilent 7500 Series

The flagship successor to Agilent's 4500 Series – and the most widely used ICP-MS in history, with almost 3000 units installed worldwide.

ORS³ – unmatched interference removal in complex matrices

Removing polyatomic interferences in ICP-MS

The 7700 incorporates a newly-developed 3rd generation Octopole Reaction System (ORS³) with improved ion focusing and increased collision efficiency. ORS³ redefines the capability of He mode, and delivers unmatched performance for multi-element analysis of complex sample matrices.

Reliable results with He mode

ICP-MS delivers simple spectra, compared to optical spectroscopy techniques, such as ICP-OES. However, the plasma, solvent and sample matrix give rise to polyatomic interferences on many analytes, so modern quadrupole ICP-MS instruments employ a collision/reaction cell (CRC) to reduce these interferences.

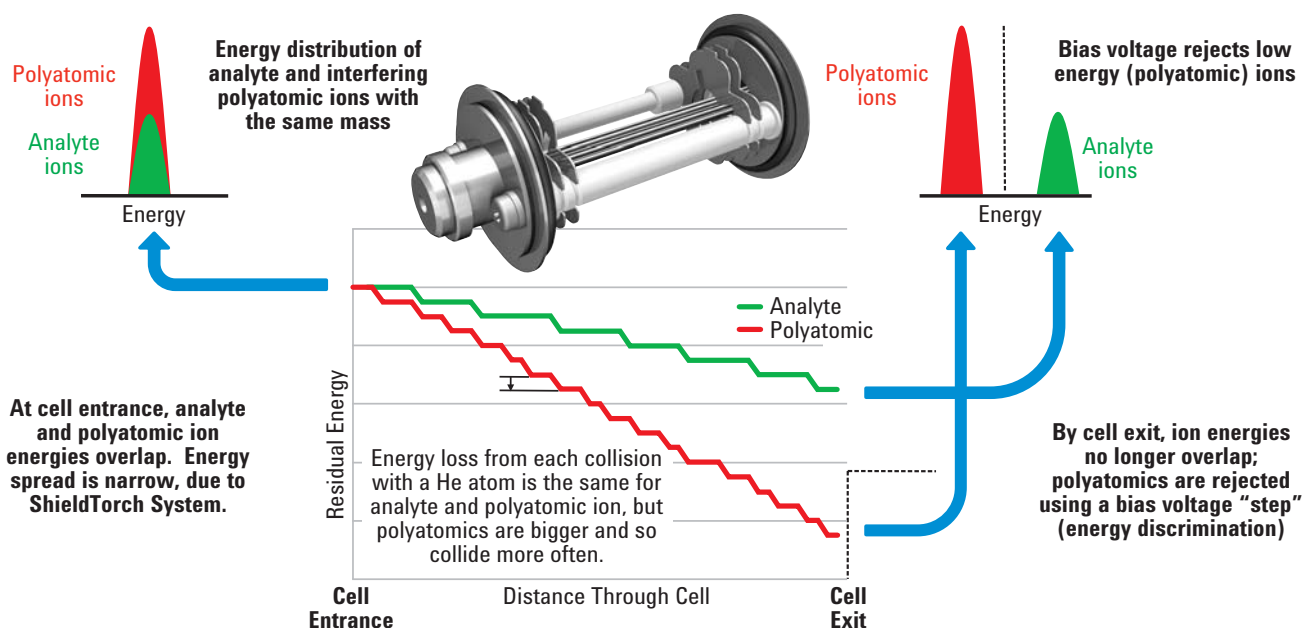
Most CRCs only operate with reactive gases, which must be targeted at specific, known interferences on individual analyte isotopes. Reaction mode can be effective when the interferences are predictable and constant (i.e. in simple, consistent samples such as high-purity semicon

duct process chemicals), but reactive cell gases cannot be used successfully for multi-element analysis in complex, unknown or variable samples because:

- Each reaction gas will only remove interferences which react with that cell gas, so unreactive polyatomic ions remain, leading to residual interferences.
- Users must know which interferences they want to remove, before selecting the reaction gas – not possible with unknown or variable samples.
- All reaction gases form reaction product ions, creating unpredictable new interferences in complex samples.
- All reaction gases react with some analytes, leading to lower signals in reaction mode. For example, severe loss of sensitivity has been reported for Cu and Ni when H₂ or NH₃ cell gas is used.

He mode on the 7700 provides simple, consistent and reliable analysis of unknown samples, with no new interferences and no reactive signal loss for analytes.

Interference removal using He mode and Kinetic Energy Discrimination (KED)



To learn more about the Agilent 7700 Series ICP-MS, visit www.agilent.com/chem/ICPMS.

One 7700 Series, three models, configured for your application

The Agilent 7700x: Powerful ICP-MS workhorse for most standard routine and high-matrix applications

The 7700x is configured for routine analysis of high matrix samples, and includes HMI, pre-set plasma conditions and He mode ORS³ as standard.

With its high-temperature plasma (low oxides), matrix tolerant interface, and 9 orders dynamic range, the 7700x provides the analytical performance required in busy routine laboratories, but also retains the hardware and software flexibility to handle more advanced research applications. Many of the features expected of the highest specification ICP-MS systems are standard on the 7700x, making it suitable for most challenging analytical tasks. A range of options and accessories is available to further customize the 7700x for advanced applications, such as discrete sampling; chromatographic coupling; and analyzing organic solvents, highly corrosive acids, and more.

The Agilent 7700s: High performance for high-purity semiconductor applications

The 7700s is configured for the analysis of high-purity materials such as those monitored in the semiconductor industry. With a high-efficiency sample introduction system, optional 5th plasma gas line, and second (reaction) cell gas line as standard – the 7700s offers high performance for the removal of intense interferences in known and consistent matrices.

For laboratories that currently utilize cool plasma, the 7700s makes the transition to the most up-to-date ICP-MS technology easy. With unmatched cool plasma capability, the 7700s delivers industry-leading performance for the measurement of easily ionized elements in high-purity materials (for example, Ultra Pure Water), allowing all common semiconductor analytical methods to be performed on the same instrument.

The Agilent 7700e – Simplified operation for routine applications

If you're looking for an affordable route to high-performance ICP-MS, look no further than our 7700e, which includes He mode ORS³ and core software functionality. The 7700e provides a simple, highly automated user interface and standardized hardware configuration, while field upgrades to full 7700x specification are available, should lab requirements change in the future.



Agilent offers Standard Operating Procedures for all common semicon sample types to simplify your method development.

Sensitivity and reliability by design

Every component of the 7700 Series is engineered for performance and usability

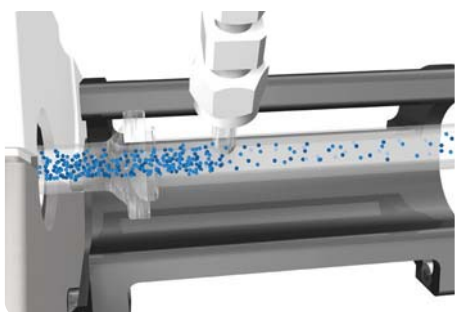
Sample introduction

A low-flow, Peltier cooled sample introduction system increases operational stability and consistency (standard on all 7700 mainframes).



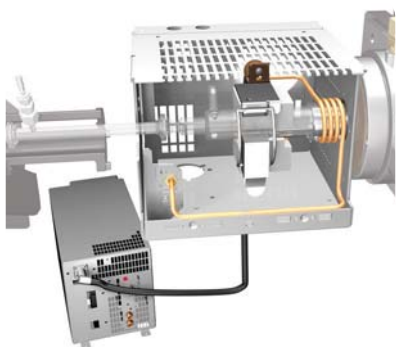
Patented High Matrix Introduction (HMI) kit

Increases matrix tolerance up to 10x compared to conventional ICP-MS instruments. HMI also improves plasma robustness, virtually eliminating matrix suppression (standard on the 7700x).



Plasma RF generator

This fast, frequency-matching RF generator increases the tolerance of changing matrices. Even volatile organic solvents can be introduced without affecting plasma stability. Includes ShieldTorch System as standard, providing the narrow ion energy spread required for effective interference removal in He mode.



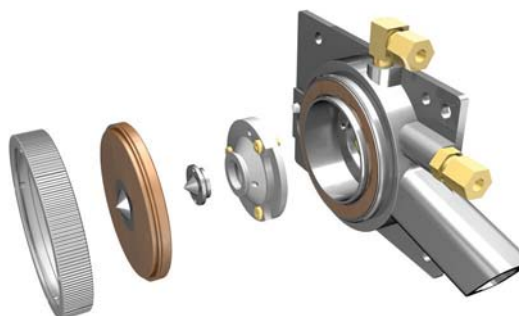
Electronic gas control

Proprietary Active Mass Flow Controllers deliver precise control of all plasma and cell gases.



Interface and cones

Robust, standard Ni, or optional Pt tipped cones are easy to access and remove/replace during routine maintenance (no tools are required for removal and refitting of the sampling cone). Torch position automatically realigns with the interface following maintenance to the torch or cones.



Off-axis ion lens

Provides continuously focused ion transmission, and the lowest mass bias of any ICP-MS. In addition, the ion lens is located *outside* the high vacuum region, making it easy to access for scheduled cleaning.

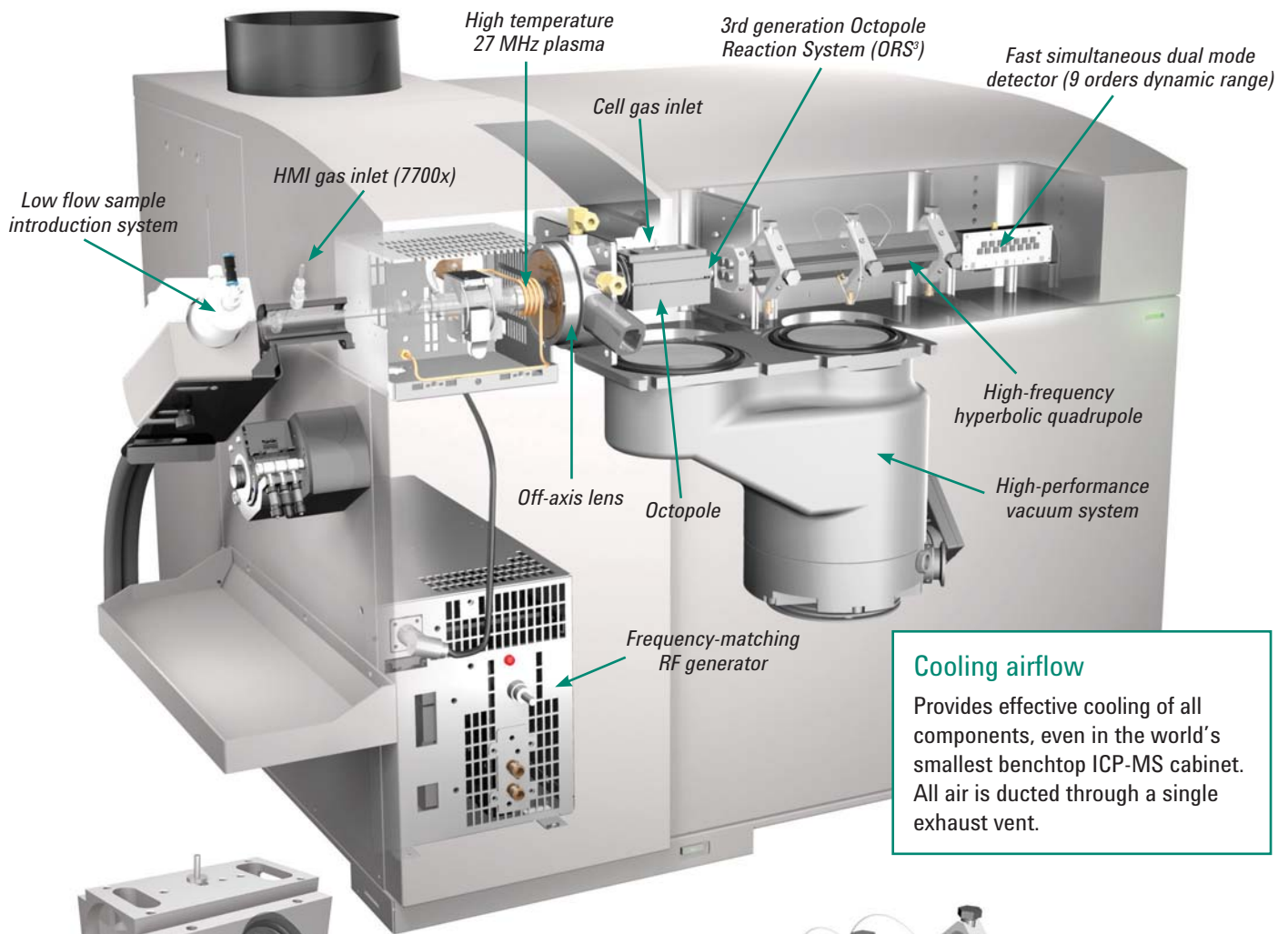


Vacuum system

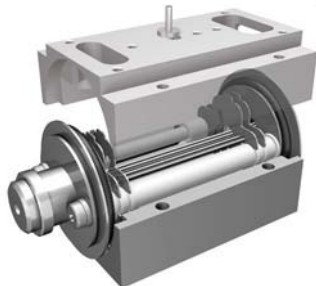
A single, high-performance split-flow turbo pump (pictured right) and single external rotary pump ensure fast pump-down and simple maintenance.



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Cooling airflow
 Provides effective cooling of all components, even in the world's smallest benchtop ICP-MS cabinet. All air is ducted through a single exhaust vent.



Octopole Reaction System (ORS³)

This new temperature-controlled collision/reaction cell has a low internal volume, making it ideal for high cell pressures and rapid cell mode switching. No more compromised mixed-gas conditions.

Octopole ion guide

Provides high ion transmission and superior focus, ensuring minimal ion scattering at high cell pressures. This enables efficient operation in He mode, and delivers lower detection limits without the drawbacks of reactive cell gases.



Hyperbolic quadrupole

The only hyperbolic quadrupole used in ICP-MS delivers superior peak separation and abundance sensitivity, without needing custom quad settings to separate adjacent peaks.

Electron multiplier detector

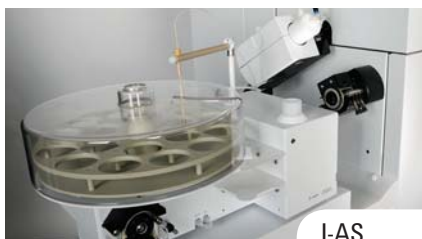
Provides a full 9 orders dynamic range with standard hardware and operating conditions. Integration time is short (100us) in both pulse and analog mode.



Extend the power of your 7700 ICP-MS

with a wide range of options and accessories

Whether you need to maximize sample throughput, achieve the lowest detection limits or separate the different chemical forms of an element, Agilent offers a range of configurable options for the 7700 Series – plus the know-how to help you achieve your specific application goals.



I-AS

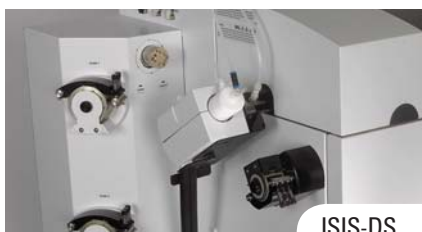
Sample delivery systems

Agilent Integrated Autosampler (I-AS). Integrated, covered autosampler with pumped rinse station; ideal for ultra-trace analysis and small sample volumes (as low as 0.5 mL). Flexible rack configurations offer a maximum capacity of 89 vials, plus 3 rinse vials. Service support and warranty by Agilent.



ASX-520

Agilent ASX-520. Ideal for medium to high sample throughput applications, with rack configurations providing up to 360 vial positions. Service support and warranty by Agilent.



ISIS-DS

Nebulizer. Agilent offers nebulizers to suit every sample type and volume, including low-flow, concentric and parallel path.

Agilent Integrated Sample Introduction System Discrete Sampling (ISIS-DS). Delivers reduced matrix loading and improved productivity in high-throughput laboratories, with USEPA compliant triplicate analysis of 30 elements or more in 75 seconds, sample to sample.



Option gas line for 7700x. Suitable for applications that require a mixed carrier gas, such as O₂ for organic solvents or LC mobile phases, and helium carrier gas for laser ablation (standard on the 7700s).

Inert Sample Introduction kit. O-ring-free and manufactured from PFA for the lowest contamination levels. Demountable torch with Pt or sapphire injector options. HF resistant, and suitable for high-purity reagents.



Laser ablation. With its fast simultaneous detector and 9 orders dynamic range, the 7700 is ideally suited to the direct analysis of solid samples – both bulk and time-resolved – by laser ablation.

Organics kit. Contains the sample introduction parts you need to run volatile organic solvents. Includes organics torch, solvent-resistant drain kit and uptake tubing.

To learn more about the Agilent 7700 Series ICP-MS, visit www.agilent.com/chem/ICPMS.

Proven speciation capability

simplifies the routine use of ICP-MS as an elemental detector for separation technologies

Agilent's 7700 ICP-MS links seamlessly with HPLC, GC and CE systems through field-proven and supported interfaces, integrated software control, documentation, and fully developed application kits.

Industry leading speciation measurement

Emerging environmental, food safety and consumer product regulations increasingly include the requirement to identify and quantify compounds as well as total elemental concentrations. Therefore, routine, accurate speciation analysis has never been more important. As the leading supplier of ICP-MS and chromatography systems, Agilent can help you identify the right system for your application, develop methods and train your staff. We can also provide you with support engineers who are factory trained on all parts of the coupled system.



7700 Series ICP-MS with 7890A GC system



7700 Series ICP-MS with 1200 Series LC system

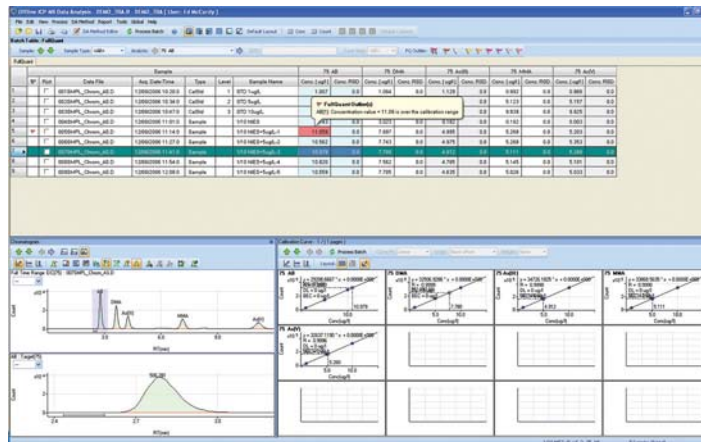
Field-proven and supported LC and GC interfaces

Pre-configured LC-ICP-MS kits are available for turnkey methods, such as As speciation in water and urine. The unique GC-ICP-MS interface is heated to the tip of the injector (up to 300° C) for routine analysis of high-BP compounds.

In addition, the inert, fully heated (Sulfinert™ lined) interface provides unparalleled performance for advanced GC-ICP-MS applications, such as separating siloxanes, brominated flame retardants, and sulfur species in fuels.

Optional software for integrated LC- and GC-ICP-MS

The 7700 Series MassHunter software provides seamless setup and operation of coupled chromatographic systems, with direct method setup and run control for Agilent LC- and GC-ICP-MS systems, and simple links to many other separation techniques. The optional chromatographic data analysis software has the same user interface and layout as the spectrum data analysis software, simplifying operation.



ICP-MS MassHunter WorkStation – Chromatographic Data Analysis

Intuitive, configurable MassHunter software simplifies your daily workload

Instrument control and data acquisition

From automated **startup** checks following plasma ignition, through **batch and queue** method setup and sequencing, to integrated data processing and final report generation, our new ICP-MS **MassHunter Workstation software** makes running your Agilent 7700 easier than ever. It includes:

- Expert AutoTune technology and application-specific pre-set methods that enable even novice operators to quickly produce reliable, consistent results
- Simplified user interface and navigation: a single control pane provides a comprehensive overview of **hardware** configuration, performance reports, early maintenance feedback, and system diagnostics
- **Batch and queue** interface puts critical method setup and sample analysis at your fingertips:
 - The **batch** pane displays tune settings, acquisition/data analysis parameters, and sample list
 - The **queue** pane displays current and scheduled tasks, current batch sequence, and real-time status of the current sample

For compliant environments, the MassHunter software can also be integrated with Agilent OpenLAB ECM.

Data analysis in a single, clear window

The flexible, customizable batch-at-a-glance data table provides a comprehensive overview of the current batch, including counts, concentrations, RSD and replicate data. It includes:

- Real-time results update during sequence acquisition
- Interactive calibration plot display (12 plots or single plot), with real-time update after edits and during sequence
- On-screen display and flags for user-selected outliers and QC failures; built-in LabQC sample charting
- Graphical display of internal standard recovery, QC stability plots, calibration curves and mass spectrum (or chromatogram)
- Easy-to-edit report templates for print, screen or electronic output (including direct export to LIMS); templates can be used for individual samples or a complete data batch

Powerful software, consistent across Agilent MS platforms

Agilent's MassHunter software family now includes ICP-MS, LC/MS, and GC/MS, simplifying and reducing the cost of cross-training staff.



To learn more about the Agilent 7700 Series ICP-MS, visit www.agilent.com/chem/ICPMS.

Robust operation in a streamlined design

Agilent's 7700 Series has been engineered to endure the toughest lab environments, while delivering operational cost savings through higher productivity, shorter training times, simpler method development, and lower service requirements (particularly important in clean-room installations).

High reliability boosts uptime and productivity

Like all Agilent ICP-MS systems, the 7700 Series is built for high sample capacity and a healthy return on your investment. The 7700 is manufactured at an ISO 9001 and ISO 14001 facility and features:

- Rugged stainless steel chassis and outer panels
- Extensive shock, vibration, temperature and humidity testing at the production prototype stage to ensure optimum performance, even under extreme conditions
- Auto-recover – saves time by safely returning the 7700 to Standby state when power is restored following a power cut
- Predictive Maintenance software to minimize unplanned downtime
- Advanced error reporting and system diagnostic tools that simplify troubleshooting
- A modular design for shorter repair times

Designed to benefit your lab and our environment

From a 30% reduction in mainframe weight (compared to the 7500), to increased use of recyclable materials, to fewer toxic compounds in electronic components – the 7700 is the *first ever* ICP-MS designed and manufactured for lower environmental impact.



7700 Series: breakthroughs in environmental impact reduction

- Lower heat output and reduced exhaust vent flow (7700s), with a redesigned cooling air-flow management system
- Less sample volume required, so there is less waste for disposal
- Stainless steel outer panels that require less paint and associated solvents
- At only 115 kg, the 7700 mainframe weighs 30% less than the 7500 Series, significantly reducing CO₂ emissions during transportation



Maximize your productivity and data quality with genuine Agilent parts and supplies

From our proprietary ICP torch, to our sample and skimmer cones, to our unique electron multiplier detector – Agilent ICP-MS parts and supplies are manufactured to our tight tolerances and stringent specifications. They are also rigorously tested to ensure that you'll always get the best performance from your instrument, and the best results for your clients.

Trust Agilent to keep your lab running at peak productivity

Agilent's Advantage Service protects your investment in Agilent instruments and connects you with our global network of experienced professionals who can help you get the highest performance from every system in your lab. Count on us for the services you need at every stage of your instrument's lifecycle – from installation and upgrade to operation, maintenance and repair.

For customers who require full system validation, Agilent offers complete qualification services (Installation and Operational Qualification) for the 7700 Series ICP-MS hardware and software.

And if ever your Agilent instrument requires service while covered by an Agilent service agreement, we guarantee repair or we will replace your instrument for free. No other manufacturer or service provider offers this level of commitment.

The Agilent Value Promise: 10 years of guaranteed performance

In addition to our continually evolving products, Agilent offers the industry's only **10-year value guarantee**. Agilent guarantees you at least 10 years of instrument use from your date of purchase, or we will credit you with the residual value of that system toward an upgraded model. It's our way of assuring you of a safe purchase now, and protecting your investment in the long run.



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agilent_inquiries@agilent.com

Europe

info_agilent@agilent.com

Asia Pacific

adinquiry_aplsca@agilent.com

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© Agilent Technologies, Inc. 2010
Printed in USA July 13, 2010
5990-4025EN



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