SPECTRO**GREEN MS** FSQ20

QUADRUPOLE ICP MASS SPECTROMETER

Engineered to Be Better For
High-Productivity Mass Spectrometry

SPECTRO**GREEN MS**

The easy-to-use ICP-MS solution for routine analysis

As a global leader in analytical instrumentation, SPECTRO has demonstrated a decades-long history of excellence, innovation, and customer support. Its specialties: perfecting *spark and inductively coupled plasma excitation optical emission* and *X-ray fluorescence* spectrometer technologies for a broad range of applications.

Now, SPECTRO meets the growing need for routine trace-level elemental analysis using complementary *mass spectrometer* technology — with the new SPECTROGREEN MS analyzer.

This compact quadrupole ICP-MS matches all the core requirements of laboratory managers everywhere. It's a routine, workhorse solution, engineered to be better — with the sensitivity, stability, dynamic range, matrix compatibility, interference control, speed, and ease of use that today's labs demand.

ICP-MS analyzers are increasingly used wherever lower limits of detection are required — as when tightened regulatory limits call for the analysis of ultra-low concentrations of toxic metals. The SPECTROGREEN MS excels at such tasks, even in cases where the sample matrix contains higher amounts of total dissolved solids.

It's ideal for routine analyses across applications including environmental, pharmaceuticals, food, consumer product testing, and other industrial tasks, in laboratories worldwide.

The SPECTROGREEN MS has been developed featuring proven technologies from SPECTRO's sister company **Nu Instruments**. For example, the designs of its interface and extractor lens are based on Nu's flagship multi-collector ICP-MS Sapphire and the ultra-high-performance Vitesse time-of-flight ICP-MS.

SPECTRO**GREEN MS** advantages

Powerful analytical performance

With state-of-the-art technologies such as a high-matrix interface, a gas dilution system, a high-powered LDMOS generator, an efficient collision/reaction cell, and a highly agile quadrupole digital sequencer, the SPECTROGREEN MS delivers ample analytical headroom for relevant routine applications. Examples: it easily meets environmental, pharmaceutical, and consumer product standards such as EPA 200.8; CLP ILM 5.3; CLP ISM 2.3; USP 232, 233; ISO 17294-2; and ISO 8124.

Exceptional ease and speed

The SPECTROGREEN MS is built to deliver the ease and speed that today's labs and worksites demand. Sample introduction and interface are easy to access and maintain, generator stabilization times are short, workflows can be customized — and when speed is needed, the optional SPECTRO Intelligent Valve System offers extremely short sample-to-sample times and fast washout.

Powerfully simple software

Proven yet state-of-the-art SPECTRO ICP-MS Analyzer Pro software is fast, customizable, and intuitive. It makes training, startup, and operation surprisingly simple. It provides automatic instrument optimization and step-by-step method setup. And its flat-file data storage technology contributes to powerful reprocessing functions, including an audit trail for total traceability of results.

Minimal maintenance

The SPECTROGREEN MS demands little maintenance, which can be accomplished quickly and effortlessly. Sample introduction components are all easily accessible, so exchanges can be performed rapidly and reliably. A novel ratchet-based, torque-limiting torch holder ensures safe and reproducible torch mounting, while the bonnet-supported shield guarantees high mechanical stability and a long lifetime. And XYZ-stage-mounted sample introduction makes interface maintenance hassle-free.

Focused support

Instead of an overly wide array of products, SPECTRO concentrates on leading OES, XRF, and now MS spectrometer technologies. Focused support for each user's SPECTROGREEN MS analyzer is delivered by a worldwide network of service experts, highly trained and with exceptional knowledge of their products.

State-of-the-art MS technologies

The **SPECTROGREEN MS** achieves fast, convenient, and reliable routine analysis of liquid samples via an array of high-quality components, including:

Interface
The interface design enables a laminar gas flow that permits the direct analysis of solutions with increased levels of total dissolved solids (TDS), while preventing deposits and improving stability. SPECTRO's newly developed two-dimensional ion beam deflection system (2D-IDS) efficiently eliminates photons and neutrals, and shapes the ion beam for maximum transmission.

- High-matrix interface design analyzes high-TDS samples — without manual dilution.
- Calibration is simplified; preparation errors are avoided.
- XYZ-stage-mounted sample introduction & torch box provide easy access & simplify maintenance.

Vacuum systems
An efficient three-stage differential vacuum system comprises two turbomolecular pumps plus an external rotary pump. Vacuum control is fully automatic. All pumps are exceptionally service-friendly. The rotary pump's long-life option saves oil exchange and eliminates oil vapor contamination. The turbo pumps' bearings service kit enables replacement in the field, saving exchange and maintenance at the manufacturer.

Collision/reaction cell
The SPECTROGREEN MS is equipped with effective collision/reaction cell technology. This substantially simplifies operation, and reduces polyatomic interferences before they reach the mass analyzer.

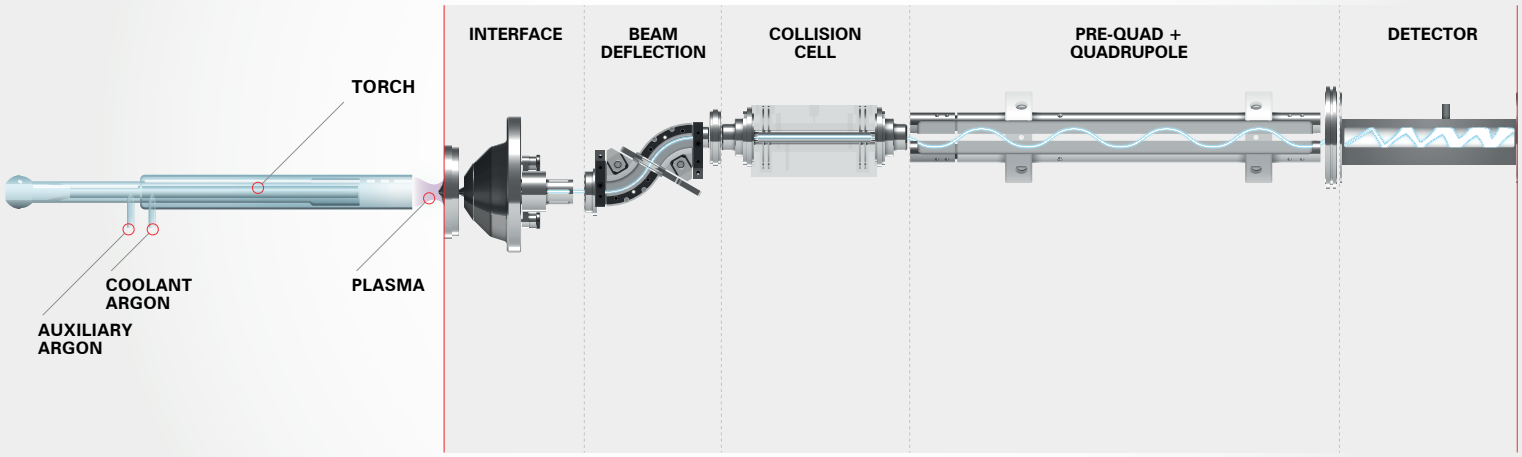
The instrument offers fast switching between different cell modes, providing maximum flexibility while significantly reducing sample-to-sample times for higher throughput.

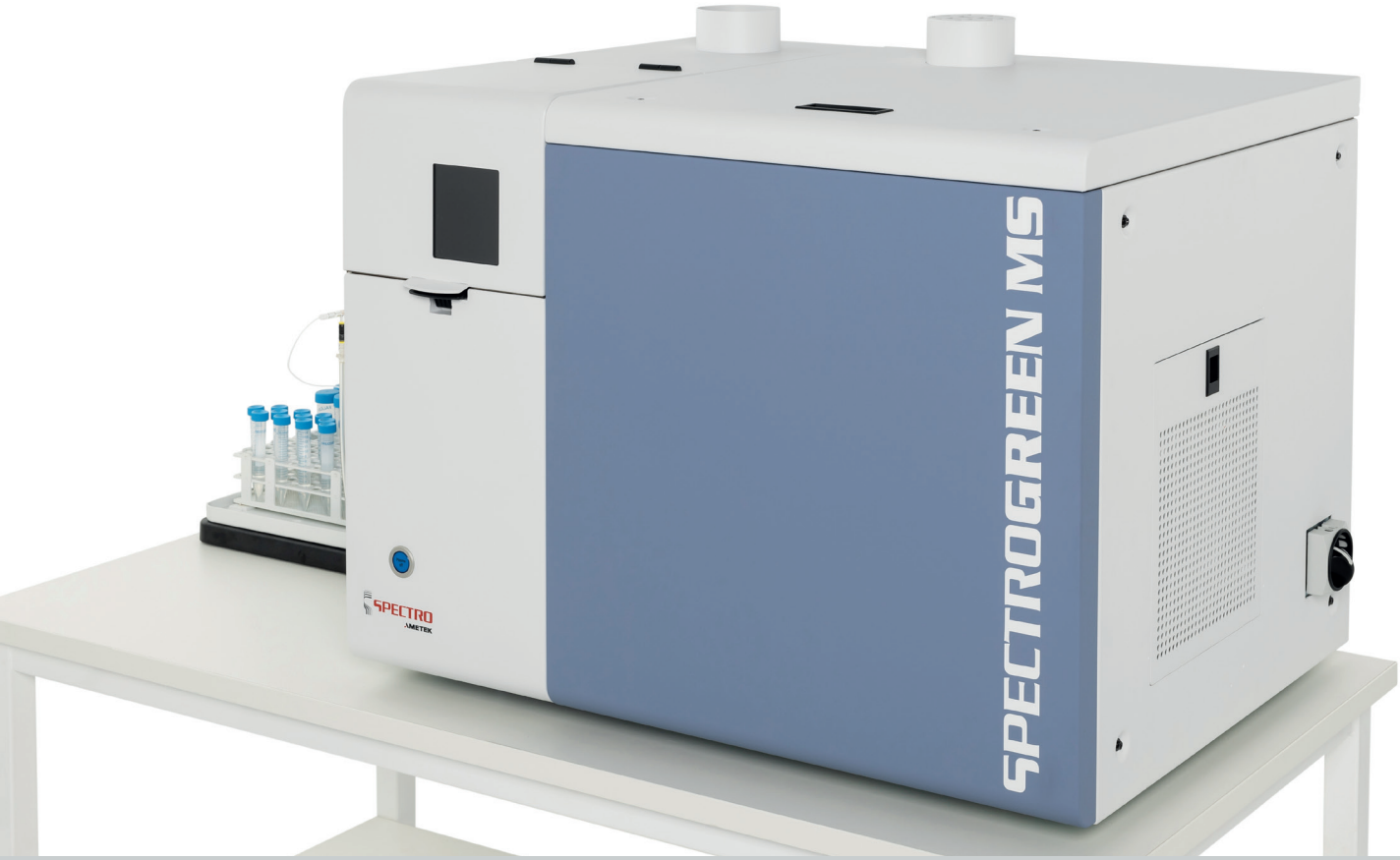
Collision cell mode
- Simple, reliable, effective interference removal using kinetic energy discrimination (KED) — even with complex/varying matrix samples.
- Compact, self-tuning hexapole collision cell.
- Simplifies method development & ensures accurate results.
- Low-flow mode minimizes expensive helium (He) — typically only 4 mL/min.

Reaction cell mode
- Uses hydrogen (He - H_2 mixture) as reactive gas to remove interferences by atom, proton, or charge transfer.
- Includes second gas line for internal mixing of the gases.

Mass analyzer and detector
The SPECTROGREEN MS mass analyzer comprises an RF-only pre-filter, to eliminate fringing field effects, plus a large, 200 mm length quadrupole with 12 mm molybdenum (Mo) rods operated via a fully digital 10 kV power supply at a high frequency level. This design offers enhanced selectivity combined with a larger beam spot size for better transmission. For ion detection, a dual-stage electron multiplier with an exceptional dynamic range of 10 orders enables analysis from sub-ppt to ppm levels, without the need for specific setup or tuning — simplifying calibration and eliminating further sample dilution.

- 2.4 MHz quadrupole design.
- Advanced, ultra-agile Quadrupole Digital Sequencer (QDS).
  - Allows fast, stable switching between different sensitivity levels.
  - Can enable analysis of major & trace isotopes in one measurement; no need for multiple analyses.
- State-of-the-art, dual-stage electron multiplier ion detector.
  - Dynamic range: up to 10 orders of magnitude.
  - Fast signal acquisition in spectrum mode: Minimum integration time (≤ 100 μs per channel) in pulse & analog modes.





Designs for maximum performance and ease

At every step, SPECTROGREEN MS systems, components, and construction deliver reliable results, attained with maximum ease of use.

Strong, compact build
- Space-saving benchtop design.
- Corrosion-resistant aluminum & steel construction.
- Direct visibility of and access to all sample introduction components.

Efficient sample handling
- Fast, exchangeable, lock-in-place sample introduction.
- Trouble-free introduction of high-matrix samples.
- Short fluid path.

Dependable gas dilution system
- Ideal for high-matrix samples.
- Saves time with less preparation.
- Avoids sample preparation errors & contamination.
- Reduces matrix effects.

Reliable plasma generator
- Proven SPECTRO LDMOS high-wattage, solid-state, free-running type design.
- Extreme agility — handles even substantial load changes with ease.
- Highly robust when using mixed gases.
- Unique, energy-efficient air cooling (without external liquid cooler!). Greater operational safety & lower operational costs.
- Rapid stabilization time (< 10 minutes) for increased productivity.

Choice of fixed or demountable torch
- Fixed plasma torch for applications allowing maximum ease of use.
- Easy-assembly demountable plasma torch (separate torch & injector tube) for applications with specialized injector tube requirements.
- Glass bonnet to protect & extend life of platinum (Pt) shield.

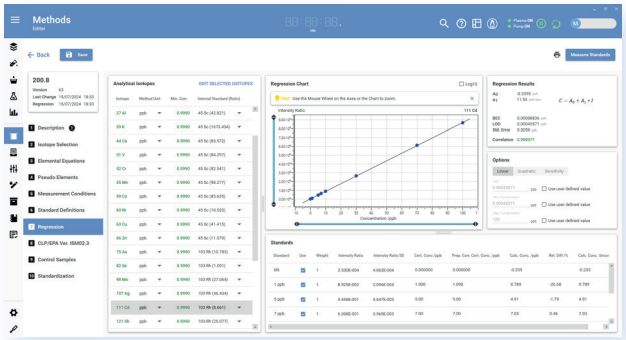
Optional SPECTRO Intelligent Valve System
- Inert 6-port valve with sample coil & high-speed vacuum pump.
- Bypasses lengthier tubing by injection of sample from a coil next to the nebulizer.
- Best reduction of sample load — to extend maintenance intervals.
- Proven technology to increase sample throughput.
- Reduces signal stabilization & flow path washout times.
- Magnetic mounting to enable optimal positioning.

Intuitive, customizable software for easy setup and operation

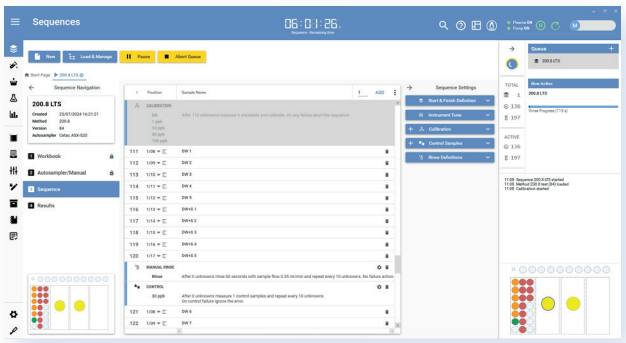
The system's **SPECTRO ICP-MS Analyzer Pro** operating software is intelligent, intuitive, customizable — and maximally easy to learn and operate.

Up-to-date usability

Today's instruments often still rely on legacy software originally devised for pure research. Such packages may offer all required functions, but be cumbersome to use. By contrast, SPECTRO ICP-MS Analyzer Pro represents a new development — based on SPECTRO ICP Analyzer Pro, which has proven itself with SPECTRO's leading OES analyzers, installed worldwide.

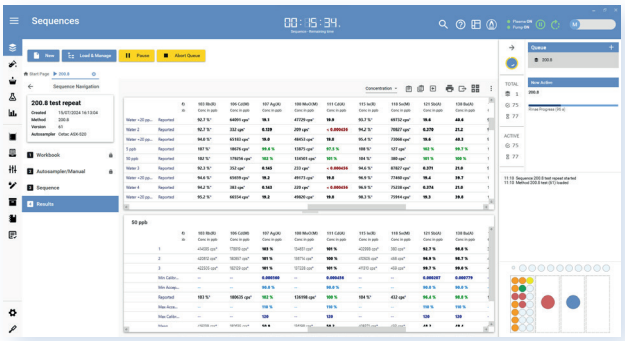


Built on the latest material design software concepts, familiar from the Android operating system, a minimalist flat design deploys animations and shadows for depth effects. Guiding the user intuitively, it highlights which areas contain information, and where interaction is required. An "overview-to-details" workflow streamlines routine tasks while keeping specific information available as required.



Less learning curve

Modern laboratories and worksites often require users to operate a number of instruments using different, demanding technologies. So SPECTRO ICP-MS Analyzer Pro is made for a minimal learning curve — requiring little training even for less experienced operators.



Customized workflows

Streamlined workflows are backed by a module-and-plug-in architecture to tailor the experience for each user's needs. While the entire package is available for specialized tasks such as method development, routine operation may require activating only the modules for instrument setup, measurement, and possibly result management — providing an exceptionally clear, easy-to-learn interface. Needed modules can be selected via a dialog box beforehand, while configurations for daily use can be saved and accessed via easy shortcuts.

Each screen is based on a common design, which presents a natural workflow sequence from left (overview) to right (detail). More comprehensive tasks like method development follow a step-by-step navigation that also provides intuitive guidance.

Streamlined software for total traceability

In modern mass spectrometry, powerful tools for retrospective analysis are a must. Often they can allow errors to be corrected easily without needing to reanalyze the sample. This saves time and money, and, in cases with little sample material, preserves analyses that otherwise would be lost. Full traceability of the analytical process is paramount. As regulations proliferate — for environmental, pharmaceutical, and food analyses, as well as for laboratories following GLP guidelines — logging of every change with total traceability is not just desirable, but demanded.

This generates a lot of data — data that is traditionally handled based on a ***database architecture as data management*** concept. The method often requires multiple databases, each managing different versions of result and method files: making data reprocessing both time-consuming and cumbersome.

Instead, SPECTRO ICP-MS Analyzer Pro software utilizes an advanced “flat-file” data management approach. All versions of a result are stored in a single file, with a reference to the method version. The same applies to each method. So when reprocessing data, only small result and method files need be loaded; spectra are only loaded when required. Thus even with large amounts of data, processing speeds are ultrafast — allowing 100 results to be calculated in less than 60 ms.

In addition, sophisticated audit trail functionality logs all changes, events, messages, and errors for retrieval in clear text format. So SPECTROGREEN MS makes the analysis process fast, efficient, fully transparent — and totally traceable.

SPECTROGREEN MS

QUADRUPOLE ICP MASS SPECTROMETER

PREMIER PRODUCTS

Rely on SPECTRO for global analytical excellence across a range of spectrometer solutions. It provides elemental analysis of materials in a wide array of applications within industry, research, and academia. SPECTRO is a business unit of AMETEK, Inc.

The new SPECTROGREEN MS is SPECTRO's pioneering mass spectrometry product. It complements leading SPECTRO instruments employing optical emission (stationary and mobile arc/spark OES and ICP-OES) and X-ray fluorescence spectrometry (XRF) technologies.

Across its entire product range, SPECTRO's 45 years of experience — plus its heritage of technical innovation and outstanding performance — help ensure the best possible analytical results.

SUPERIOR SUPPORT

Maximize SPECTROGREEN MS reliability and uptime with AMECARE Performance Services. Hundreds of support engineers, based in over 50 countries, are highly trained in just the relevant technologies. So they can deliver focused, fast, smart, on-the-spot service.

Results: virtually uninterrupted performance plus maximum ROI over the instrument's life.

Available programs include targeted training (onsite as well as ultra-convenient online versions), proactive performance maintenance, performance upgrades, application solutions, consultation, and ongoing support. Secure, unidirectional SPECTRO PROTEKT global monitoring even offers remote diagnostics and alerts!

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