

Expera

Simultaneous ICP-OES



ICP-OES





ISO 9001
Quality Accreditation

GBC has always placed a strong emphasis on quality in all aspects of our operation, from design and manufacture to the provision of service and support to our customers, and we are fully committed to continuous evaluation and improvement in all areas.

The GBC Quality Management System has been accredited to the ISO 9001 quality standard by Lloyd's Register Quality Assurance Limited. This certification is your assurance that the procedures and processes used to produce the goods and services which GBC provides comply with the relevant International Standard, and demonstrates commitment to meeting the needs and expectations of our customers.

Since 1978 GBC has been at the forefront of scientific technological development, manufacturing and marketing a wide range of award winning, quality scientific instruments.

GBC's Product Lines

AAS



HPLC



ICP-OES



UV-Vis



ICP-MS



XRD



GC



GC-MS



Visionary Technology

GBC Scientific Equipment will advance people's knowledge and their capacity to enhance the quality of life for all humankind.



Expera

Simultaneous ICP-OES



Product Features

- **Simultaneous Full-Spectrum Acquisition:** Capture all elements across the entire wavelength range in a single measurement. High-throughput performance ensures comprehensive results for all target elements are delivered within minutes.
- **Eco-friendly Efficiency:** Dramatic reduction in analysis time significantly lowers argon consumption, minimizing the total cost of ownership and daily operational overhead.
- **Standard-less Qualitative Screening:** Instantly identify unknown elements and estimate concentrations without the need for standard solution preparation or prior method setup.
- **Optimized for Micro-Samples:** Fully characterize unknown samples even with strictly limited sample volumes, ensuring no data is lost during exploratory analysis.
- **Retrospective Data Analysis:** Advanced "Measure First, Analyze Later" capability. Since the full spectrum is saved, you can add new elements or re-evaluate wavelengths after the measurement is complete without re-running the sample.
- **Real-Time Background Correction:** Simultaneous collection of both analyte signals and background data ensures superior peak processing and enhanced analytical precision.
- **Precision-Engineered Source Optimization:** Motor-driven control of torch positioning and observation height allows for rapid, automated optimization to capture maximum signal intensity for every matrix.
- **Dynamic Parameter Monitoring:** Accelerate method development by monitoring spectral signals in real-time to instantly optimize instrument and analytical parameters.

High Resolution Echelle Optical System

The Expera ICP-OES utilizes an advanced Echelle spectrometer with cross-dispersion technology, achieving a superior spectral resolution of 0.007 nm at 200 nm. This high-resolution performance effectively resolves complex spectral interferences, significantly reducing analytical errors in challenging matrices. By providing continuous full-spectrum coverage, the system allows for the flexible selection of optimal analytical lines. This capability enables users to bypass interferences entirely, eliminating the need for tedious manual spectral correction and ensuring high-integrity data across all elements.

All-Solid-State RF Generator for Unrivaled Plasma Stability

At the heart of the Expera ICP-OES's analytical performance is a cutting-edge, all-solid-state RF generator. Utilizing patented signal source technology and real-time closed-loop power control, the system maintains a stable plasma discharge even when injecting the most complex sample matrices. To ensure long-term reproducibility, all three Argon gas channels are regulated by high-precision Mass Flow Controllers (MFCs). Fully integrated with the software, these MFCs provide ultra-stable gas delivery, ensuring consistent results during extended high-throughput analytical runs.

Megapixel CCD Detector

Equipped with a high-definition Megapixel CCD detector, the Expera ICP-OES achieves a pixel resolution of less than 3 μ m. This allows for ultra-precise spectral profiling, capturing dense data points across the entire emission contour to ensure unparalleled qualitative and quantitative accuracy. To manage the high-intensity emission of argon and matrix elements, the detector features advanced anti-blooming technology, protecting trace-level signals from interference by neighboring high-intensity peaks. Furthermore, the sensor utilizes thermoelectric cooling to minimize dark current, significantly enhancing the signal-to-noise ratio and enabling industry-leading detection limits for trace analysis.

Dual-View Technology with Vertical Torch Design

The Expera ICP-OES features a high-performance vertical torch configuration supporting dual-view (axial/radial) observation. The Axial View provides industry-leading sensitivity and ultra-low detection limits for trace-level analysis, while the Radial View ensures robust measurement of high-concentration elements by minimizing complex matrix interferences. In Simultaneous Mode, the system intelligently optimizes both views to deliver superior sensitivity alongside enhanced matrix tolerance. The vertically oriented torch is specifically engineered to prevent salt deposition, significantly extending the service life of glassware and ensuring long-term stability during high-throughput analysis of brine or high-solid samples.

Advanced Dual-Purge System for Maximum Gas Economy

Features high-efficiency purge systems for both the detector and the optical chamber. Our Smart-Purge technology automatically modulates gas flow rates in real-time based on internal humidity levels, ensuring optimal optical integrity while significantly reducing gas wastage. To further minimize the total cost of ownership, the independent design allows for the seamless use of Nitrogen as a purge gas. This flexibility provides a cost-effective solution for long-term operation without compromising the stability of vacuum-UV spectral measurements.

Qualitative & Semi-Quantitative Analysis

The Expera ICP-OES features a comprehensive built-in spectral database that enables rapid qualitative analysis of unknown samples without the need for standard solutions or complex method development. By leveraging the high stability of the RF generator and optical system, the system provides reliable semi-quantitative results, allowing users to estimate concentration levels across the entire periodic table in a single measurement. This significantly streamlines the initial screening process for unknown matrices.

Quantitative Analysis

Supports quantitative analysis from ppb to ppm levels, depending on the element, based on different calibration curves types-linear, quadratic, polynomial, bracketing standards and standards addition.

Sample Introduction System Achieves Stable Analysis for Long Periods

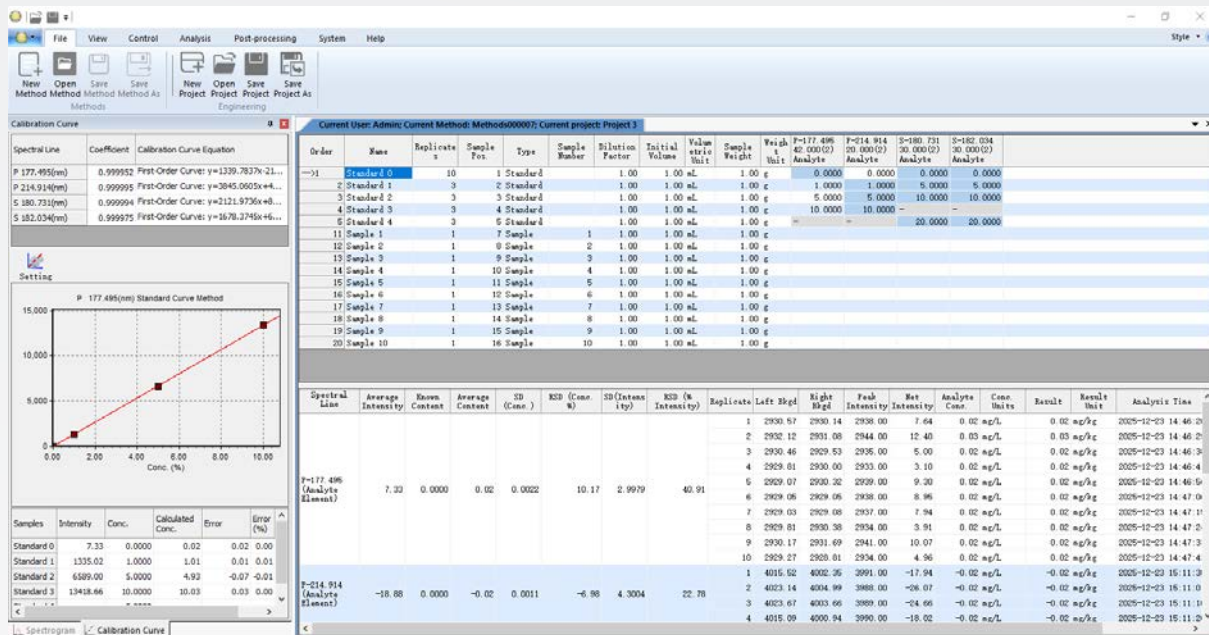
The Expera ICP-OES utilizes a 12-roller, high-precision peristaltic pump to ensure pulsation-free sample delivery. This ultra-smooth flow significantly minimizes signal noise, resulting in exceptional analytical precision. To provide maximum application versatility, the system supports a wide array of nebulizers, spray chambers, and torch configurations. Whether analyzing high-purity chemicals or complex industrial wastewater, the sample introduction system can be optimized to meet the most demanding matrix requirements. Expera can be ready for operation in less than 30 minutes since instrument start.

Long-Term Stability through Precision Thermal Control

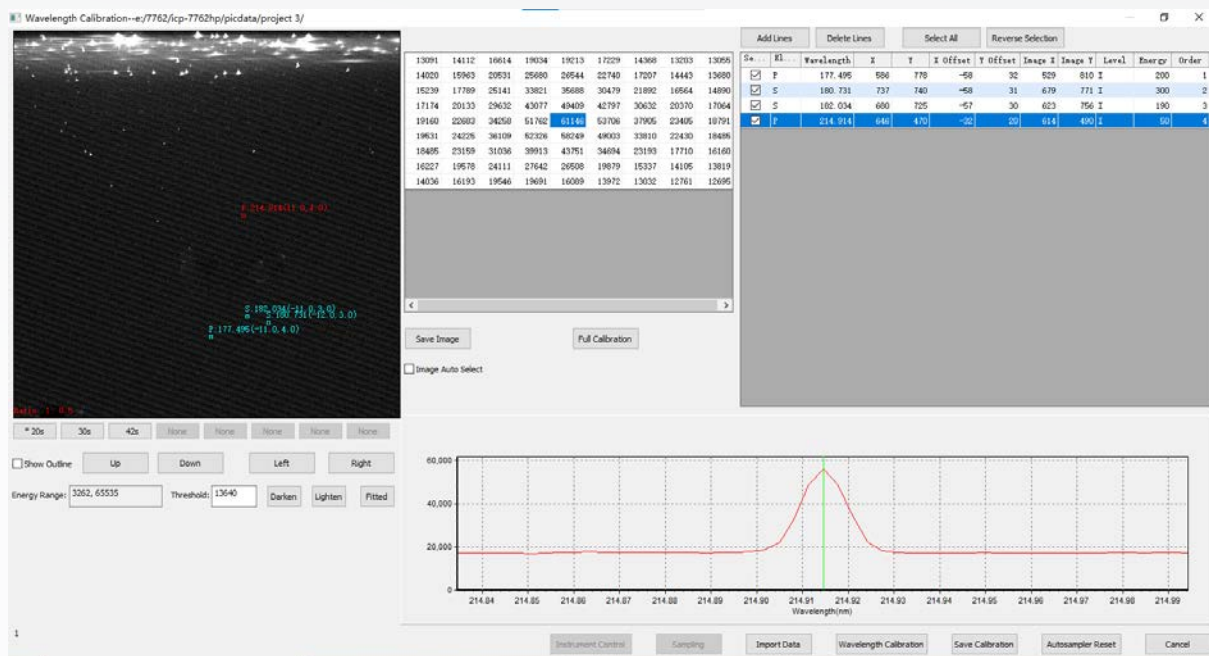
To ensure maximum analytical integrity, the Expera ICP-OES features a high-precision thermostatic optical chamber. By maintaining the entire optical bench at a constant, regulated temperature, the system virtually eliminates spectral drift caused by fluctuations in the laboratory environment. Furthermore, the fixed-optics design contains no moving parts, ensuring superior wavelength reproducibility and consistent quantitative accuracy during extended, high-throughput analytical sessions.

Scope of Applications

Geology, metallurgy, rare earth separation, rare earth magnetic materials, medicine and health, environment, biology, ocean, petroleum, chemical industry, nuclear industry, agriculture, water quality and other scientific fields are widely used.



Data processing interface



Spectrum calibration interface

Overall machine requirements

- Plasma excitation and impedance matching use fully automatic technology, with low reflected power and a standing wave ratio not exceeding 1.25.
- Use a bidirectional observation method, with an extended torch tube to reduce the fluctuation of the tail flame, and place a cold cone at the tail flame position to prevent the tail flame from entering the observation hole.
- All three gas paths of the plasma use mass flow meters, which are computer-controlled and adjustable.
- The inner diameter of the working coil is small, the energy conversion efficiency is high, the power is 1000W, and when the carrier gas is 0.7L/min, the robustness is greater than 9.
Before measuring the samples, a wavelength calibration should be performed to avoid measurement inaccuracies caused by wavelength shifts due to prolonged measurement.
- Spectral Line Database Upgrade, with data information reaching up to 50,000 entries.
- 1.7 Automatic Filtering Function for Interference Spectral Lines
- USB Communication
- Analysis speed: Analyzes more than 60 elements in one minute at the fastest scan.
- Scanning range: 165~900nm
- Wavelength measurement error: $\leq 0.005\text{nm}$
- Repeatability: $\leq 0.005\text{nm}$
- Correlation coefficient: ≥ 0.9995
- Precision: Relative standard deviation $\text{RSD} \leq 0.5\%$
- Stability: Relative standard deviation $\text{RSD} \leq 1.0\%$
- Measurement range: from ultra-micro to constant
- Detection limit:
Zn $\leq 0.003\text{mg/L}$ Cr $\leq 0.002\text{mg/L}$
Ni $\leq 0.008\text{mg/L}$ Cu $\leq 0.002\text{mg/L}$
Mn $\leq 0.0003\text{mg/L}$ Ba $\leq 0.0001\text{mg/L}$
- Measurement method: simultaneous measurement of multiple elements

Detailed parameters of instrument components

- Radio Frequency Generator (RF)
- Circuit Type: It is an all-solid-state RF generator.
- Operating frequency 27.12 MHz
- Frequency stability: 0.01%
- Output power: 700W~1200W, step 50W
- Output power stability: 0.1%
- Electromagnetic field leakage radiation intensity: $< 2\text{V/m}$
- Sample Injection Device
- Output work coil: inner diameter 22mm, 3 turns
- Torch Tube: Integrated Concentric Quartz Torch Tube
- Coaxial Sprayer: Concentric Atomizer
- Spray Chamber: Standard equipped with a dual-tube and swirl composite spray chamber, further removing large spray droplets, which is beneficial for improving aerosol atomization efficiency and stability.
- Observation Method: Vertical rectangular tube bidirectional observation technology, axial observation, low detection limit, high sensitivity; radial observation avoids matrix interference; simultaneous observation neutralizes both axial and radial observations, achieving relatively high sensitivity while partially avoiding matrix interference; at the same time, the vertical rectangular tube can avoid high salt deposition, extending the service life of the tube.

- Observation Position: The sampling position and depth are three-dimensionally adjustable, making it easy to obtain the best observation position and achieve stable and reliable experimental data.
- Argon gas flow rate: 11.5 L/min.
- Plasma gas: Mass flow meter 0-20L/min, accuracy ± 0.1 L/min, stability ± 0.2 L/min
- Auxiliary gas: 0-2 L/min accuracy ± 0.01 L/min, stability ± 0.02 L/min
- Carrier gas: 0-2 L/min accuracy ± 0.01 L/min, stability ± 0.02 L/min
- Purging Gas: The CCD and optical chamber are purged independently. The CCD uses automatic purging, adjusting the gas flow rate based on humidity levels, which can both increase the purging speed and save gas; the independent purging system can use nitrogen as the purging gas alone to reduce gas costs.
- Sample Pump: Uses a 12-rotor 4-channel high-precision peristaltic pump for sampling, with low pulsation and high analytical precision.
- Optional high-salt or HF-resistant sample introduction system; optional automatic sampler.

Spectroscopic System

- Grating Specifications: Intermediate Step Grating and Prism Cross-Dispersion Structure
- Resolution: ≤ 0.007 nm (at 200 nm)
- Wavelength range: 165 nm ~ 900 nm
- Spectrometer Constant Temperature Device: Adjustable constant temperature light chamber from 30-38°C to accommodate most laboratory external environments.

Detector

Back-illuminated high-speed CCD with 1024 x 1024 pixels, cooled to -40 °C using a semiconductor cooling system.

AS-302 Autosampler Sampler



Dual sample trays are optional, automatically identifying the sample tray; standard configuration includes an 80-position sample tray with 25 mL sample tubes; optional configuration includes a 160-position sample tray with three 50 mL sample tubes and 157 ten 10 mL sample tubes; the cleaning liquid speed can be adjusted based on the concentration of the samples (10-100 r/min) to ensure the cleaning liquid is uncontaminated.

HG3000PII Hydride Generator



Use the HG3000PII hydride generator for the determination of sub parts per billion of hydride-forming elements such as As, Hg, Sb, Se, Pb, Bi, Sn, Ge and Te. The HG3000PII hydride generator accessory incorporates precision glassware for highly efficient mixing of reactants and gas-liquid separation to ensure reproducibility and high sensitivity. This easy-to-use accessory takes less than a minute to interchange from the Quantima standard set of sample introduction components and is totally made from inert polypropylene material for long-lasting performance, essential in highly corrosive environments.

Ordering Information

Adopts echelle spectroscopy and dual-view observation for rapid multi-element detection.

99-2157-00 **Expera**

Accessories

99-0126-03 HG3000PII Hydride Generator

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GBC Scientific Equipment
Manufacturer of world-class scientific instruments and accessories
— AAS, HPLC, ICP-OES, ICP-TOFMS, UV-Vis, XRD, GC and GC-MS

1/2 Naxos Way
Keysborough Victoria 3173
Australia

Telephone: +61 3 9588 6666
Fax: +61 3 9588 6677
Email: gbc@gbcsci.com
Web: www.gbcsci.com

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