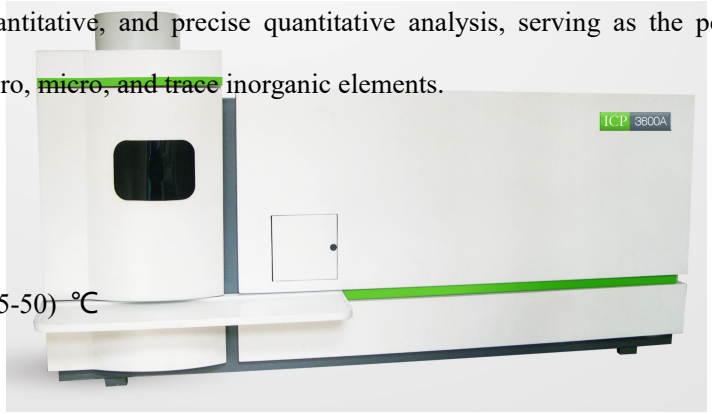
Technical Specifications for ICP3600A Inductively Coupled Plasma Emission Spectrometer

1. applied range

The ICP3600A Inductively Coupled Plasma Emission Spectrometer (ICP-OES) features exceptional interference resistance and analytical performance, making it ideal for high-end applications in R&D and testing. It enables convenient qualitative, semi-quantitative, and precise quantitative analysis, serving as the perfect instrument for simultaneous analysis of macro, ~~micro, and trace~~ inorganic elements.



2. work environment

Voltage: 220V AC±10%

Room temperature: Ambient temperature (25-50) ℃

Relative humidity: (50-70)%RH

3. technical specifications

3.1. Plasma RF source:

3.1.1: Solid-state radio frequency power supply, power range 400W-1800W, power can be adjusted continuously, with stronger sample adaptability;

3.1.2: Self-Excited RF Generator: Featuring rapid oscillation matching upon startup, this self-excited power supply delivers robust power load capacity and enables direct analysis of 100% toluene samples. With automatic oscillation tuning and water-cooled heat dissipation, it supports complex sample analysis with power switching, while maintaining reliable performance under shock and interference conditions.

3.1.3: Low-power mode: Features 400W ultra-low standby power with a mini torch tube for reduced argon consumption by over 50%, maintaining argon flow at ≤5L/min during standby.

3.1.4: Plasma Observation Modes: The system supports four operational modes-axial, radial, bidirectional, and simultaneous bidirectional. The vertical rectangular nozzle prevents high-salt deposition, thereby extending torch tube lifespan and reducing consumables costs. Axial observation employs a metal cold cone to eliminate tail flames, achieving higher sensitivity without requiring an air compressor, thus saving external components and operational expenses. The adjustable radial observation position provides enhanced interference resistance tailored to specific elemental analysis requirements.

3.1.5: Automatic signal attenuation: With axial attenuation and radial attenuation functions, it can attenuate

samples with more than 30% content, so that high content elements of samples can be analyzed in one time without repeated dilution, reducing the difficulty of sample pretreatment and supporting simplified analysis;

3.1.6: RF frequency: 27.12MHz/40.68MHz (optional), with efficiency over 75%;

3.1.7: RF power stability: ≤0.05%; RF frequency stability: ≤0.01%;

3.18: Working coil: 25mm inner diameter of purple copper tube/3 turns.

3.19: Quartz torch tube with three concentric rings and 20mm outer diameter

3.20: Atomizer: Universal high-salt resistant atomizer with outer diameter 6-6.2mm

3.20: Mist chamber: double-tube type/rotary vortex atomization chamber

3.2. Learning System:

3.2.1: The constant-temperature optical system features a C-T optical path design with minimal reflections and low energy loss. All optical components are sealed within a thermally balanced chamber, while the main unit is thermally isolated from the chamber to better withstand environmental temperature fluctuations. The chamber maintains a precise temperature of 35℃±0.1℃.

3.2.2: Stable and efficient full fixed high resolution grating splitting system, strong anti-seismic, stable and reliable;

3.2.3: Wavelength range: 165-850nm, full wavelength coverage of three gratings;

3.2.4: Monochromator: Using concave mirror instead of convex lens as optical focusing element, it solves the problem of chromatic aberration caused by different focal points of different elements and improves the efficiency of optical system.

3.2.5: Grating Type: Ion-etched holographic grating. Higher etching resolution leads to better resolution (available configurations: 2400L/3600/4320L).

3.2.6: Wavelength Correction: During each ignition cycle, the system automatically performs spectral position calibration using only the Ar spectral lines to ensure accurate analysis wavelength determination, eliminating the need for wavelength calibration solution.

3.2.7: Real-time calibration technology of argon spectral lines: Using non-interfering argon characteristic spectral lines, the subtle offset of the spectrum is corrected in real time to achieve optimal spectrum integration, ensure long-term stability, and effectively eliminate the influence of spectral drift on measurement.

3.2.8: Purge-type light chamber: For measurements below 190nm wavelength, nitrogen is used to purge the optical path.

3.2.9: Spurious light: ≤2.0 mg/L (determined at As 188.980nm using a 10,000 mg/L Ca solution);

3.2.10: Optical resolution: 0.007nm (3600-line grating); 0.014nm (2400-line grating); 0.004nm (4320-line grating);

3.3. Detector: Imported Hamamatsu detector (R928/R212UH)

3.3.1: Anti-saturation Overflow: Each spectral line is equipped with back-illumination anti-overflow design, completely eliminating spectral line saturation overflow issues, eliminating concerns about spectral line saturation affecting adjacent spectral lines;

3.3.2: Intelligent integration design: The signal background is collected synchronously, and the integration time depends on the light intensity of the spectral line. The optimal integration time of the spectral line is automatically calculated, and the high intensity signal and weak signal are obtained with the optimal signal-to-noise ratio, so as to broaden the dynamic range, so that the elements with high and low content can be detected at the same time, avoiding repeated dilution of the sample;

3.3.3: The surface of the detector has no photo-conversion chemical coating, so the detector will not be damaged or replaced due to aging of the coating.

3.3.4: Select the elements to be measured, set the measurement parameters, leave everything to the instrument, and finally get the measurement results of all elements directly, simple and easy.

3.3.5: Powerful graphical diagnostic function can help customers fully understand the working state of the instrument, and observe the running condition of the instrument under different conditions through appropriate parameter setting, so as to grasp the best measurement condition.

3.4. Sample Import System:

3.4.1: Sample injection system: standard quartz concentric atomizer, quartz swirl atomizer chamber, classic quartz double-tube atomizer chamber, and integrated quartz torch tube;

3.4.2: Optional online argon dilution with high-precision MFC controls enables efficient dilution of high-salt samples (over 10%) for direct injection.

3.4.4: Optional features include a high-salinity/high-temperature resistant injection system, an organic injection system, and a hydride generator.

3.4.5: Gas Path Control: In the injection system, the carrier gas, plasma gas, and auxiliary gas are all regulated by advanced mass flow controllers (MFC). These controllers provide continuous flow adjustment and stable flow characteristics, ensuring the system's stability and providing robust support for the light source's performance.

3.5. Software performance:

3.5.1: The software has powerful functions, full Chinese is more suitable for Chinese people to use, graphical operation interface, easy and intuitive operation, qualitative, semi-quantitative and quantitative analysis functions;

3.5.2: It has the function of data reprocessing, automatic calculation of element content, automatic generation of test report, data screening function to eliminate unwanted data, and perfect database management, which can be freely saved and deleted.

3.5.3: It has the function of recording all element spectral line data collection at the same time, and the data can be stored safely. It supports the function of data preservation and date retrieval, which is convenient for future reference and analysis;

3.5.4: Equipped with a spectral line database containing over 50,000 spectral lines, each of which can be calibrated and measured;

3.5.5: It has the function of spectrum acquisition. The software can directly obtain the complete spectrum line spectrum to understand the sample spectrum and the state of spectral interference;

3.5.6: It has a variety of interference correction methods and real-time background deduction function, such as standard comparison method, internal standard method, normalized coefficient method, standard addition method, etc., which enriches the user's analysis and research methods;

3.5.7: Equipped with instrument calibration functions, including torch tube alignment and light source optimization, facilitating daily maintenance; featuring visual monitoring of instrument operational status;

3.5.8: The main interface of the software integrates the main functions of the software, including plasma state control, instrument state control, analysis parameters, analysis spectrum lines, wavelength spectrum display, curve fitting, data processing, historical spectrum, historical data, user management and many other functions;

3.5.9: With a visual flame observation module;

3.5.10: Software with both Chinese and English versions;

3.5.11: With network remote service function, built-in remote service assistant and remote diagnosis, it is convenient for the instrument to realize remote diagnosis and maintenance;

3.5.12: The software complies with regulatory requirements such as 3Q certification. Upon completion of testing, a report can be generated with customizable content including method name, instrument model, element, wavelength, intensity, content, relative standard deviation, unit, tester, notes, and calibrator, facilitating user analysis.

3.5.13: Software operation for integration with automated analytical instrument platforms and online

analytical instrument platforms.

1.1. Analysis performance:

3.6.1: Analysis speed: about 25 elements per minute;

3.6.2: Sample consumption: only 5ml;

3.6.3: Determine the linear dynamic range of the spectral line: ≥105 (measured in Mn257.6nm, with a correlation coefficient of ≥0.999);

3.6.4: Precision: For a 1ppm or 10ppm multi-element mixed standard solution, the repeatability coefficient (RSD) after ten repeated determinations should be ≤0.5%.

3.6.5: Stability: The long-term stability (8-hour) of the multi-element mixed standard solution at 1ppm or 10ppm shall demonstrate an RSD ≤1%.

3.6.6: Detection Limit (in ug/L, for elements specified in JJG768-2005)

Zn213.856	Ni231.604	Mn257.610	Cr267.716	Cu324.754	Ba455.403
0.5	1	0.5	1	1	0.1

3.6.7: It can perform qualitative, semi-quantitative and quantitative analysis on any spectral line of the analyzed element, and support methods such as internal standard method, standard addition method and normalization method;

3.6.8: Preheating time: The time from standby state to plasma ignition is less than 3 minutes.

1.2. Instrument interface (including LC-MS analysis software):

3.7.1 Automatic sampler,

3.7.2 Hydrogen generator

4. Appendix System:

4.1 Computer systems

4GB RAM, 1TB hard drive, DVD drive, keyboard and mouse.

4.2 Cooling Circulating Water System

The cooling capacity is 1600W and the temperature range is 20-50℃.

4.3 Black and white laser printer

4.4 Single-phase AC voltage stabilizer (15KVA, 1% accuracy, input voltage 160V-280V, output voltage 220V)

4.5 UPS Power Supply 10KVA

4.6 Grounding copper tape

5. After-sales Service

Project construction is a complex and long-term technical service. In order to effectively do a good job in the system service, the following principles are formulated as the main principles to guide the work:

- **Principle of Timeliness of Response**

The technical service department and customer service center of Rui Guang Technology Company will be responsible for the rapid response to the construction of this project and provide timely technical consulting services.

- **Service standardization principle**

Our implementation engineers and technical support and maintenance engineers not only have professional technical skills, but also have passed the company's customer service specification training, and provide customer service in strict accordance with our company's customer service specification.

- **Principle of problem-solving efficiency**

Problem resolution efficiency is achieved through the professional skills of on-site support engineers to quickly locate and resolve issues.

- **Customer service response process**

"Customer-centricity" is a core philosophy of Ruiguang Technology. To fully implement this principle and ensure prompt, standardized service responses to customer inquiries, the company has established a scientific and efficient customer service system. The Customer Service Center provides technical consulting services to clients.

- **Perform preventive system maintenance regularly**

Regular inspections require status reports containing detailed error records of hardware components, enabling early intervention to eliminate potential issues. Through the Internet, engineers from our company's technical center can remotely log in to achieve 24/7 automatic reporting and tracking of problems. Based on the results, technicians can promptly perform maintenance and repairs. Regular equipment inspections help identify hidden risks and address them early.

- **Quick on-site service**

When a customer's system is diagnosed with a failure and cannot be resolved through phone, email, or remote access, our field engineers will immediately arrive on-site with the necessary tools and software for emergency maintenance. We guarantee 24-hour response to system issues and ensure on-site repairs within three business days.

- **Regular visits and exchanges**

During the operation of the customer's system, our team will conduct scheduled and unscheduled visits to monitor project implementation and maintenance. We will gather user feedback, resolve on-site issues, perform system testing and optimization, promptly identify potential problems or malfunctions, and preemptively eliminate risks. This ensures the system operates securely and stably, with comprehensive quality assessments conducted throughout the process.

The customer service response mechanisms described above are not isolated or disconnected. Instead, they are built upon the organizational structure of Ruiguang Technology's Customer Service Center, where various flexible service approaches interpenetrate and integrate seamlessly to form a cohesive and unified customer service troubleshooting system. Through practical implementation in multiple large-scale projects, this system has been validated as the most efficient and feasible approach for incident response.