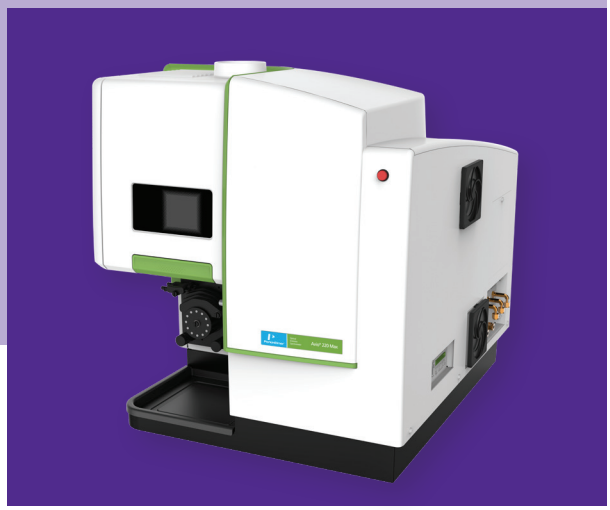
SPECIFICATIONS

ICP-Optical Emission Spectroscopy

Avio 220 Max ICP Optical Emission Spectrometer



The Avio® 220 Max is a compact, plug-and-play, hybrid simultaneous ICP-OES instrument, ideal for labs with low-to-high throughput requirements. It utilizes a vertical plasma and is engineered to handle even the most difficult, low-to-high concentration samples without dilution, delivering productivity, performance and faster return on investment. Plus, Syngistix™ software provides an intuitive and smart environment with real-time instrument diagnostics and results viewing to easily track sample analysis, quality control, and internal standard performance to guarantee sample accuracy.

Spectrometer Specifications

Double Monochromator: The Avio 220 Max ICP-OES uses a unique double-monochromator optical system. This design results in a high-speed, high-light-throughput optical system offering excellent resolution, all in a compact system. The sealed optical system can be purged with nitrogen for low UV (165-190 nm) performance. The spectral range is 165-900 nm with resolution of < 0.009 nm @ 200 nm.

Echelle Spectrometer: The high-dispersion echelle spectrometer has a focal length of 0.3 meter and a stigmatic Littrow configuration. The echelle grating used for dispersion has 79 lines/mm with a blaze angle of 63.8 degrees.

Vertical Dual View Plasma: The system incorporates a vertically oriented plasma with complete dual-viewing optics under computer and software control. Any wavelength can be used in the radial, axial or mixed viewing modes in a single method. With the dual view capabilities of the Avio 220 Max, viewing of the plasma is accomplished by computer control of a mirror located in the optical path, allowing selection of axial or radial view and adjustment of the plasma viewing in both the vertical and horizontal planes.

Detector: The UV-sensitive, dual backside-illuminated charge-coupled device (CCD) array detector is cooled directly using a single-stage integrated Peltier cooler operated at approximately -8 °C. The detector has two photosensitive segments containing 176 by 128 pixels. One section is used for analytical measurements, and the other is a wavelength reference section. The CCD-array detector collects both the analyte and the nearby background information in a single spectrum, allowing for simultaneous background correction and providing improved precision and analytical speed.

Dynamic Wavelength Stabilization – Plug and Play: The Avio 220 Max is the only ICP system able to go from cold start to sample analysis in 10 minutes – **plug and play**. The secret behind this feature is the wavelength reference section of the detector which monitors a small portion of the neon spectrum in order to create a dynamic wavelength scale used to actively correct wavelength positions. The resultant wavelength accuracy and reproducibility allows direct 'on-peak' measurements rather than time-consuming peak-search methods used in sequential ICP systems. This unprecedented cold startup time provides the analyst much needed flexibility in their laboratory.

Attenuation Mode: The Avio 220 Max ICP-OES incorporates attenuation mode, a unique mode to selectively reduce analyte signal, allowing higher concentrations to be measured. This extends the dynamic range of ICP-OES without affecting the ability to measure analytes present at lower concentrations. Attenuation mode involves moving an attenuation screen into the light path before the light enters the spectrometer, which can reduce the signal by ≈ 90%. Because the Avio 220 Max is a unique hybrid simultaneous instrument, it can attenuate the signal for a specified analyte while not affecting others, thereby providing effortless dilution, allowing both high and low concentration analytes to be measured in the same method and with the same sample preparation.

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ICP System Specifications

RF Generator: The Avio 220 Max ICP-OES features a fourth-generation 40-MHz, free-running solid-state RF generator, adjustable from 1000 to 1500 watts, in 1 watt increments. The power efficiency is greater than 79% with < 0.1% variation in output power stability. True power control maintains the plasma power at the set point, even when changing sample matrices. The compact RF supply meets all FCC certification requirements for RF emission (Part 18 of FCC rules and regulations) and complies with EC and Class A requirements.

Its unique Flat Plate™ plasma technology generates and maintains a robust, matrix-tolerant plasma with approximately half the argon consumption of helical load-coil systems.

Plasma Ignition and Extinction: Plasma ignition is computer-controlled and totally automated. The plasma can be ignited automatically at a user-determined time and turned off automatically after an analysis.

Safety Interlocks: For user safety and system protection, the system constantly monitors water flow, shear gas pressure, argon pressures, sample-compartment door closure and plasma stability, and displays the interlock status on the computer screen as graphic symbols. If an interlock is interrupted, the plasma will immediately and safely shut down.

Cooling Water: A water-recirculating cooling system is required, with approximately 4 L/min flow capacity at 310 to 550 kPa and a temperature between 15 °C and 25 °C.

Gas Flow Controls

Argon Flow: Computer-controlled solenoid valves are used to regulate the flow automatically within the range of 8-20 L/min in 1 L/min increments for plasma argon and 0 to 2.0 L/min in 0.1 L/min increments for auxiliary argon. A mass-flow controller is supplied with all systems for the nebulizer argon flow and is variable between 0 and 2.0 L/min in 0.01 L/min increments.

PlasmaShear™: A compressed-air shear gas (18-25 L/min) is used to remove the plasma tail from the optical path, minimizing interferences and extending the dynamic range. PlasmaShear provides a maintenance-free and lower-cost approach to removing the cooler plasma zone.

Sample Introduction System

Torch/Torch Mount: A unique, demountable torch design using one-piece quartz tubing for plasma and auxiliary gas flow is supplied. The standard torch includes a 2.0-mm i.d. alumina injector for full corrosion resistance to all acids, including hydrofluoric and aqua regia. A variety of other injectors are available. The externally mounted spray chamber is integrated into an easily removed sample-introduction cassette. The sample-introduction cassette can be adjusted (with the plasma on) for maximum performance in different matrices. No tools are required for torch or sample-introduction cassette removal.

Spray Chambers: Instruments can be ordered with a Ryton® HF-resistant Scott-type or a glass cyclonic spray chamber. A variety of other spray chambers are available.

Nebulizers: The Avio 220 Max can be ordered with a cross-flow or glass concentric nebulizer. The cross-flow design with GemTips™ is corrosion-resistant (sapphire/ruby tips in a PEEK body). The system can routinely handle 50% (v/v) solutions of HCl, HNO_3, H_2SO_4, H_3PO_4, 20% (v/v) HF, and 30% (w/v) NaOH. Additional nebulizers are available.

Peristaltic Pump: The integrated four-channel, computer-controlled pump has variable speeds from 0.2 to 7 mL/min in 0.1 mL/min increments, using 0.76 mm (0.030 in.) i.d. tubing. Syngistix software was designed with the user in mind, offering many smart features to make your analysis easier and more accurate. Some of these features specific to the peristaltic pump are FastPump™ and SmartRinse™, which dramatically improve the sample rinse-out and analysis times, and Tubing Saver, which increases the longevity of the tubing by slowly cycling the pump back and forth when the system is turned on but not in use.

Spares Kit: A spares kit of common replacement items is included.

Physical Data – Instrument

Power: One 200-230 VAC, 20A line, 2800 VA, single phase, 50/60 Hz (± 1%)

Dimensions: 65 x 81 x 76 cm (W x H x D), 100 kg

Environmental: The instrument will operate with a laboratory temperature between 15 and 35 °C (59-95 °F). For optimum instrument performance, the room temperature should be controlled at 20 ± 2 °C.

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