

ICP-Optical Emission Spectroscopy

PerkinElmer's Solid-State RF Generator for Flat Plate Plasma

The radio frequency generator is a critical component in any ICP-OES spectrometer. The RF power it produces must be exceptionally stable, both short-term and long-term, in order to obtain stable, reproducible emission signals. The RF power supply must provide a high coupling efficiency with the sample to generate maximum emission-signal strength. It must instantaneously compensate for any changes in impedance due to variations in the sample or solvent. Historically, RF power supplies have been based on the use of vacuum power tubes. However, power tube-based power supplies do not provide the long-term stability, lifetime, or coupling efficiencies desired for optimal ICP-OES performance.

All solid-state, free-running RF power supply

PerkinElmer continues its tradition of excellence and leadership in ICP technology with our fourth-generation, free-running solid-state RF generator on the Avio® ICP-OES spectrometers. Its unique Flat Plate™ plasma technology, which replaces previous helical-coil induction, generates a transversely symmetrical plasma (U.S. Patents 7,106,438 and 7,511,246). This approach produces a flat-bottom shaped plasma which prevents sample and vapors from escaping around the outside. With Flat Plate technology, the same robust, matrix-tolerant plasma is generated and maintained with approximately half the argon consumption of helical load-coil systems. Maintenance-free, this innovative approach to RF generation minimizes operating costs without compromising performance.

Key Benefits:

- Solid-state electronics eliminate the need for a power amplifier tube, enhancing reliability
- High coupling efficiency produces improved signal-to-background ratios at lower power
- Free-running 40-MHz design eliminates the need for mechanical matching networks
- Full power range allows the analysis of all sample types
- Maintenance-free Flat Plate plasma technology uses approximately half the argon of traditional systems

Compact, efficient and with full power

The computer-controlled, compact solid-state RF generator module is approximately 15 cm x 15 cm x 10 cm and is mounted on a single printed circuit board. It provides a full power range, from 1000 to 1500 watts, in 1-watt increments.

RF power supply efficiency is greater than 79% compared to typical efficiencies of 50% to 65% for power tube-based systems. The design is elegantly simple, with no moving parts, adjustments, or alignment for enhanced reliability.

Automatic compensation for sample changes

The free-running 40 MHz design eliminates the need for mechanical matching networks, improving reliability. In addition, the free-running design provides instant

compensation for impedance changes. This allows you to analyze samples in organic solution as easily as in aqueous solution or to handle samples with widely varying dissolved salts content with no need for operator adjustment of the plasma.

Long-term stability and enhanced reliability

The components used in the totally solid-state RF generator have rated lifetimes more than 10 times greater than for RF power tubes, glass or ceramic. And the solid-state components don't exhibit the aging characteristics common to power tube-based power supplies, which require recalibration. These features translate directly to enhanced long-term stability, improved reliability, and lower operating costs.