EQ-10SXR

Compact, Easy-to-Use Soft X-Ray Source

Electrodeless Z-Pinch™ SXR Source

Soft x-rays (SXR) for water-window microscopy and other applications have not readily been available outside synchrotron facilities. Now, thanks to a new lab-scale source from Energetiq, soft x-rays can be produced in any research laboratory at flux levels suitable for imaging and microprobing.

The EQ-10SXR is a compact, easy-to-use, reliable, and cost-effective SXR light source system based on Energetiq's unique Electrodeless Z-Pinch™ technology using Nitrogen gas.

The EQ-10SXR comprises a 19" rack containing the gas subsystems, power delivery subsystem and control electronics; the Electrodeless Z-pinch™ source assembly with integrated vacuum pumping and a high efficiency pulse modulator. This modular design allows easy integration to a microscope or other application equipment.

The EQ-10SXR is capable of delivering up to 400 milliwatts of 2.8nm power into 2π steradians and will run continuously at pulse repetition rates of up to 2kHz.

To accommodate the differing requirements of the various applications, the source operating conditions are user-adjustable. The light output can be optimized for peak power or for peak brightness as required by the user. Plasma size is typically below 1mm in diameter under typical operating conditions.

A simple and flexible optical interface is provided to the user on the front face of the electrodeless SXR source assembly to connect to the application equipment. Custom interfaces are available to meet specific customer requirements.

Features and Benefits

- Unique electrodeless design
  - Low debris / low consumable cost
- 2-4nm soft x-rays produced using Nitrogen
  - Enables tabletop SXR microscope applications
- Small plasma size
  - <1mm diameter for high brightness
- Cost-effective and compact
  - Low cost per SXR watt
  - Small footprint

Applications

- Water-Window Microscopy
- Microbeam Probing of Cells

Electrodeless Z-Pinch Source
– View of visible light

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Electrodeless Z-Pinch™ Technology

Z-pinch plasmas have been shown to be effective at producing EUV and SXR light. However, all the implementations to date have involved conducting high discharge currents into the plasma using electrodes. These electrodes, which are typically in contact with high temperature plasma, can melt and produce significant debris.

Energetiq's unique technology is also based on a Z-pinch plasma, however it avoids electrodes entirely by inductively coupling the current into the plasma. The plasma in the Energetiq source is magnetically confined away from the source walls, minimizing the heat load and reducing debris. Energetiq's Electrodeless Z-Pinch™ technology has excellent spatial stability and stable repeatable power output.

Specifications

Physical Specifications EQ-10SXR

	System Dimensions (H x W x D)	Weight
• Instrument Rack	1356 x 611 x 915 mm (53.4 x 24.1 x 36.0 in)	215.5 kg (475 lbs)
• Modulator	498 x 356 x 701 mm (19.6 x 14.0 x 27.6 in)	54.4 kg (120 lbs)
• Source	764 x 556 x 533 mm (31.9 x 27.5 x 30.3 in)	95.3 kg (210 lbs)
• Fore Pump Assembly	643 x 259 x 460 mm (30.1 x 21.9 x 21.0 in)	27.7 kg (61 lbs)

Utility Requirements

• Electrical	200-230V, 3Ø, 50/60 Hz, 30A
• Cooling Water	40-60 PSID (0.28–0.41 MPa), 1.5 GPM (5.7 lpm) min., 30°C max. inlet
• Clean Dry Air	75–90 PSIG (0.52–0.62 MPa)
• Nitrogen	15–40 PSIG (0.10–0.28 MPa), 20 sccm max. (10 sccm typ.)

Compliance

• EQ-10 Series	CE Mark, SEMI S2-0703

Patent Numbers: US 7,307,375; US 7,199,384; US 7,183,717; US 7,948,185; US 8,143,790; EP 2187711; Other patents applied for.

About Energetiq

Energetiq Technology, Inc. is a developer and manufacturer of advanced light sources that enable the analysis and manufacture of nano-scale structures and products. The Energetiq team combines its deep understanding of the high power plasma physics needed for high-brightness light generation with its long experience in building rugged industrial & scientific products. The result is that users can expect the highest levels of performance combined with the highest reliability.

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