LEE TECH TALK

TECHNICAL APPLICATION NEWS BRIEF

ULTRA-FAST HIGH TEMPERATURE MICRO VALVE ENABLES UNPRECEDENTED CONTROL FOR CHARGED PARTICLE MICROSCOPES

THE CHALLENGE

Charged particle microscopes such as scanning electron (SEM) or focused ion beam (FIB) microscopes are frequently tasked with imaging and manipulating smaller specimens than ever before, particularly to support the development of 10 nanometer node and finer semiconductor devices. In order to achieve this resolution, precise control of precursor chemicals and charge compensator fluids is required. Due to harsh application environments, these high-technology instruments require robust components capable of operating within a vacuum and at elevated temperatures.

THE SOLUTION

The Lee Company's IEP Series solenoid valve precisely controls critical fluids in adverse environments and is uniquely suited for multiple charged particle microscope applications. The valve features a body diameter of less than 6.5 mm, an axial flow configuration, and a robust welded construction with the ability to withstand high temperatures. These features allow the IEP to be located anywhere within the instrument's vacuum chamber or in other add-on modules such as high-density gas injection systems (GIS). The IEP Series is capable of high-speed actuation with frequencies up to 500 Hz, allowing for pulse width modulated (PWM) flow to deliver precise volumes of precursor chemicals or charge compensator gases to the region of interest.

THE BENEFITS

The precise fluidic control of the IEP Series enhances the micro-etching and micro-deposition processes, increasing the level of beam precision and speed at which these microscopes can operate. In addition, the delivery of precursor chemicals is simplified by the high-temperature capability of the IEP Series, making the valve suitable for use in ambient environments or when using fluids up to 135° Celsius. The welded all-stainless steel construction and inert seal materials of the IEP Series valve ensures compatibility with a wide range of chemicals used in charged particle microscopes, and standardized inlet and outlet ports allow for easy system connections with compression fittings or O-rings.

POTENTIAL APPLICATIONS

The unique combination of fast operation, durable construction, and small size offered by the IEP Series makes the valve ideal for various next generation charged particle microscope applications in both focused ion beam and scanning electron microscopes. The IEP Series valve may also be used in external charge compensator systems for sputter coating. Alternatively, the valve can mounted directly within the vacuum chamber to enable imaging of non-conductive materials without having to use an external sputtering system.

FIELD-PROVEN INNOVATION

The Lee Company has been at the forefront of fluid control technology since 1948, supplying millions of innovative products worldwide from our state-of-the-art manufacturing facilities in Connecticut, USA. We transform complex problems into deliverable solutions through ongoing research, design, development, and our commitment to quality and innovation. Our in-depth application knowledge enables us to collaborate with customers and provide personal, technical support through a wide network of experienced sales engineers who are ready to address any challenge.

THE LEE COMPANY 2 Pettipaug Rd., P.O. Box 424, Westbrook, CT 06498-0424 • Tel: 860-399-6281 • www.theleeco.com
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