

LEE TECH TALK

TECHNICAL APPLICATION NEWS BRIEF

ULTRA-FAST MICROVALVES DEMONSTRATE IMPRESSIVE FLEXIBILITY AND CELL VIABILITY FOR TISSUE ENGINEERING

The Challenge

Emerging bioprinting techniques feature a unique combination of cell types, suspension fluids, and growth factors. Many traditional processes such as extrusion or stereolithography are only suitable for certain types of solutions. These processes may exhibit low cell viability due to heat or UV light, or are not ideal for fabricating structures with pluripotent materials. Finally, as bioprinting companies engineer more homologous tissue structures, they need innovations in cell placement and flexibility to deliver a viable product.

The Solution

The Lee Company's VHS Series solenoid valve offers a unique combination of high speed and low shear which improves both throughput and cell viability after dispensing. The valve's compact size, featuring a diameter of less than 6mm, allows for the development of compact multi-functional printheads. Additionally, the VHS Series is offered in several different configurations which enables development of heterocellular constructs with a variety of spheroid sizes and viscosities on a single printhead.

The Benefits

The VHS Series solenoid valve is a self-contained microvalve which can be installed at the point of dispense and paired with replaceable precision sapphire orifices. This flexibility allows for a variety of 3D cell culture models to be developed to meet the needs of any application. The fast response time allows for repeatable dispense volumes as low as 20nL, with the flexibility to dispense over 1mL during a cycle. Biocompatible, inert materials take the guesswork out of system development and allow for flow-through sterilization. The valves can also be paired with inert screens to ensure that oversized cells do not disrupt printing.

Potential Applications

Next-generation bio-printers will need fast, precise performance coupled with versatility to create tissue spheroids and extracellular matrix hydrogels. The VHS Series has been demonstrated to print a variety of cell cultures with impressive viability and accuracy, and are currently in service with numerous commercial customers and research institutions.

VHS Series Valves

These microvalves are at the cutting edge of solenoid-driven droplet on demand technology. Featuring a response time as fast as 250 microseconds, life of up to 250 million cycles, and orifice sizes as small as 0.003", the VHS series can be counted on to dispense the right volume every time. The Lee Company has supplied millions of solenoid valves worldwide from our state-of-the-art production facility in Essex, Connecticut. Lee microvalves set the standard for size, speed, and dependability.



THE LEE COMPANY

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