DAEIL SYSTEMS

Active Vibration Isolation System

DVIA-ULF Series

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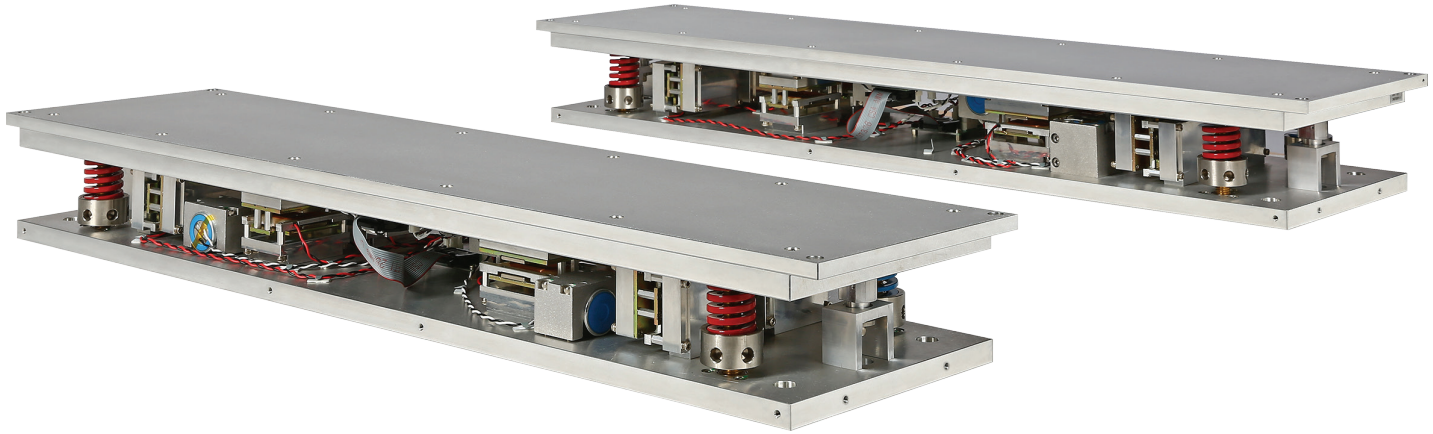
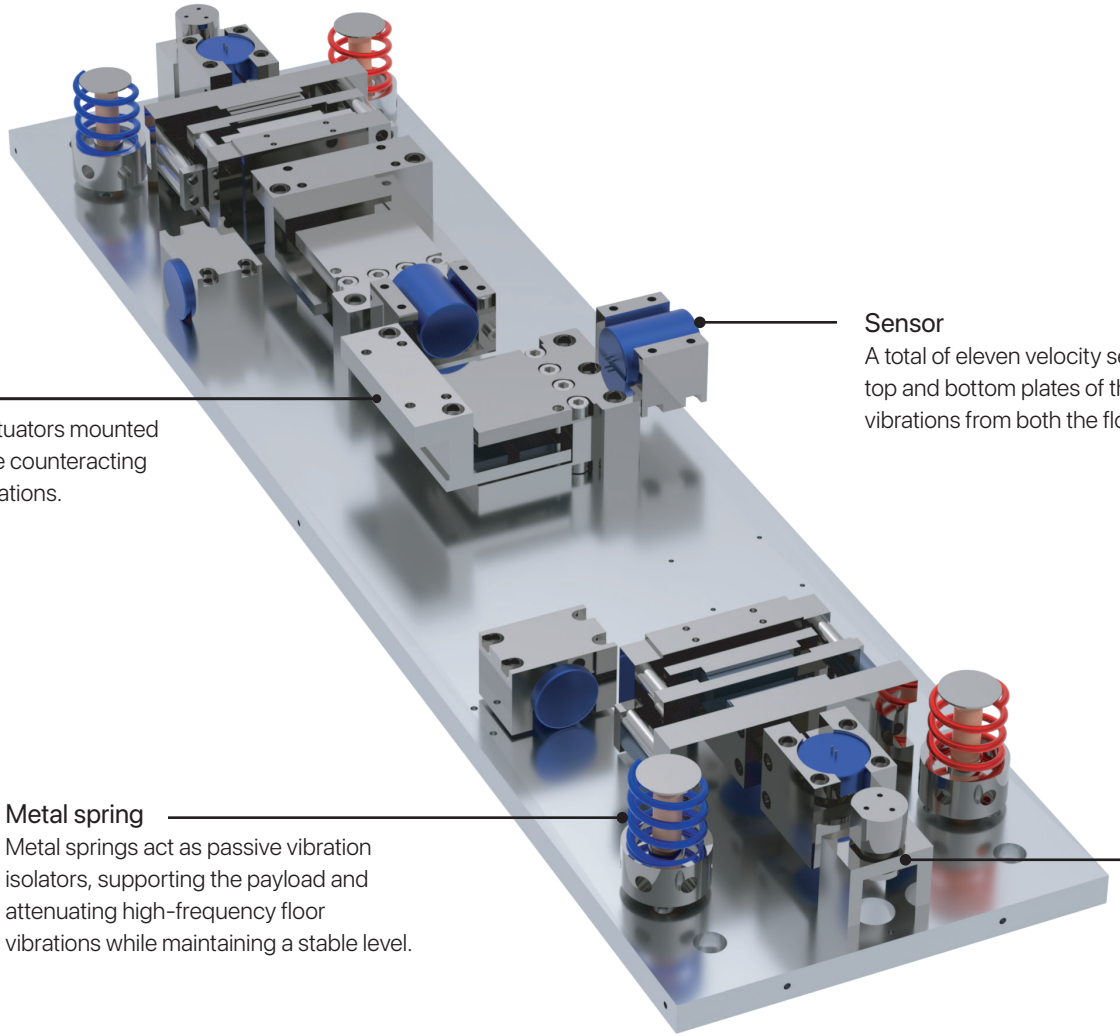
Modular Active Vibration Isolation System for Electron Microscopes.



Introducing the DVIA-ULF: a groundbreaking active vibration isolation platform engineered to meet the exacting demands of today's most sensitive instruments—such as electron microscopes and other precision research tools. Its modular architecture allows you to tailor the number of vibration isolators to your instrument's unique specifications—whether it's a compact tabletop unit or a large-scale, high-performance microscope. This adaptability ensures exceptional vibration control across diverse laboratory environments.

The DVIA-ULF's slide-in design enables swift, seamless installation into custom tables, bases, or built-in solutions. Labs can easily reconfigure or expand their setup with minimal disruption, maintaining focus on critical research objectives. Harnessing this simple, scalable, and ultra-low-frequency isolation approach elevates precision, safeguards equipment, and ultimately boosts productivity. Discover how the DVIA-ULF raises the bar in advanced vibration isolation—empowering users to achieve peak performance in nanotechnology, materials science, and beyond.

Take a closer look.



Actuator
The electromagnetic actuators mounted on the isolators generate counteracting forces to cancel out vibrations.

Sensor
A total of eleven velocity sensors are mounted on the top and bottom plates of the isolator to detect incoming vibrations from both the floor and the isolated mass.

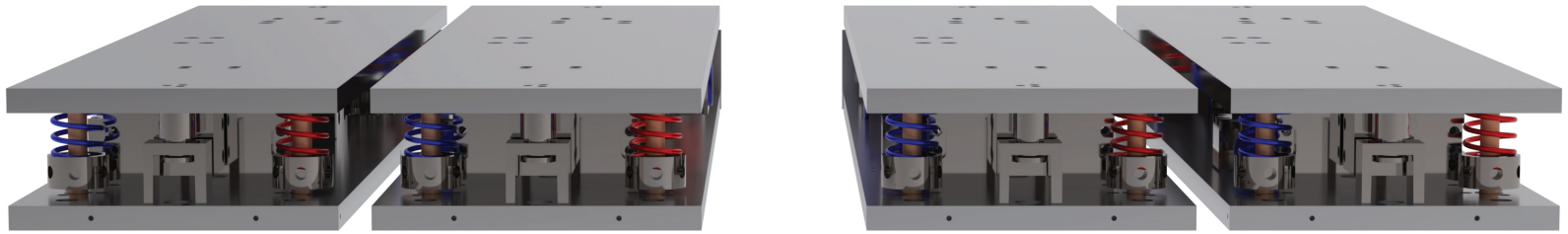
Metal spring
Metal springs act as passive vibration isolators, supporting the payload and attenuating high-frequency floor vibrations while maintaining a stable level.

Level gauge block
The level gauge block provides a visual indication that the metal springs are floating, level, and uniformly compressed to their target height.

Features

Custom modular design solution for every microscope.

The DVIA-ULF's modular isolator units allow seamless scalability. Users can effortlessly add units tailored precisely to their microscope's dimensions and weight, from compact research SEMs to large-scale TEMs. Each setup can be individually optimized according to specific weight and geometric requirements. Installation requires no extensive site preparation, making it ideal for modern cleanrooms and space-constrained laboratories. Its streamlined design integrates effortlessly into existing configurations, delivering exceptional vibration isolation even in challenging low-frequency environments.



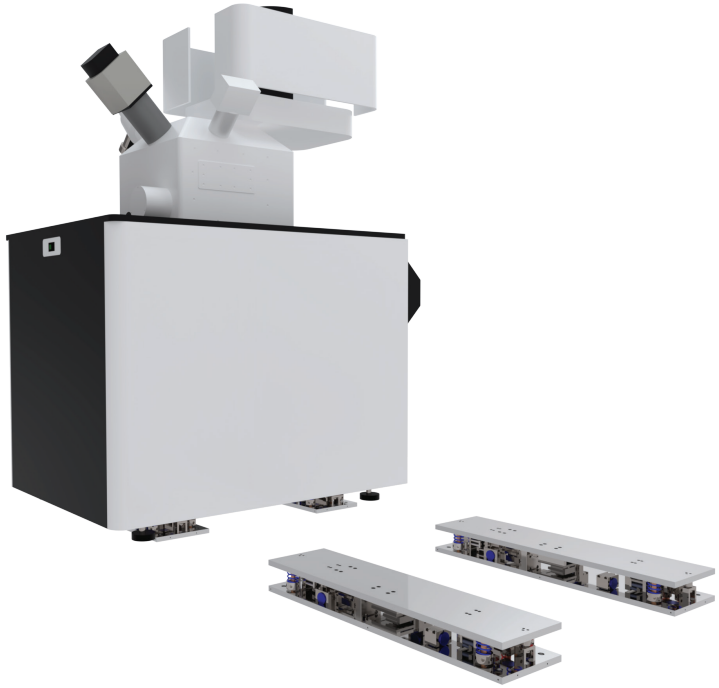
Multiple Isolators Configuration

Microscope height remains the same.

By matching the original working height of microscopes, the low-profile DVIA-ULF isolators maintain microscopes at comfortable working levels, stage clearances, and enclosure positioning. This eliminates the need for recalibration or user retraining after installation.

Straightforward installation, no heavy lifting.

The DVIA-ULF isolators feature a low-profile design, with an overall height of only 91 mm, allowing direct placement under microscope bases. This side-access design eliminates the need for cranes, forklifts, or other rigging equipment during installation. Each isolator is slim enough to fit under the microscope's frame, allowing side insertion with minimal clearance.



Slide-in installation

Install any where including "soft" floors.

The electromagnetic actuators of the DVIA-ULF isolators do not require rigid floors to isolate vibrations. Because the drive coil reacts against a stationary magnet without mechanical linkage, the isolators effectively cancel motion independently of floor stiffness. Thus, the DVIA-ULF isolators can be installed on nearly any floor, including upper stories, without the need for floor reinforcement or lab modifications such as heavy concrete pads.

Accurate vibration measurements down to 0.3 Hz.

The velocity sensor significantly enhances the detection of ultra-low-frequency vibrations—down to approximately 0.3 Hz—through a specialized amplifier board and advanced digital filtering. This dual approach ensures even subtle low-frequency signals are clearly amplified and precisely captured. By boosting the sensor's sensitivity specifically at low frequencies, the hardware-based amplifier maximizes signal clarity. The digital filter further refines this output by correcting any signal attenuation, making even the faintest vibrations detectable. The immediate benefit: outstanding vibration isolation performance starting from as low as 1 Hz, enabling optimal stability and accuracy for sensitive instrumentation.

0.0005 Seconds response time to vibration.

The DVIA-ULF Series is equipped with a high-performance floating-point digital signal processor (DSP), delivering 1800 MFLOPS and 2400 MIPS for rapid and precise vibration response. It features 16-bit A/D converters with 19 channels and 24-bit D/A converters with 10 channels, ensuring accurate and synchronized data sampling. By leveraging advanced digital signal processing and precise converters, the system can detect and respond to vibrations with minimal delay, making it ideal for high-precision vibration isolation applications.

No air, only electricity is required.

The DVIA-ULF requires only a standard electrical outlet, eliminating the need for compressed air supplies. By removing external compressors and hoses, it simplifies setup, reduces maintenance, and minimizes noise. The system actively adjusts electronically, with no air leaks or ongoing pressure adjustments.

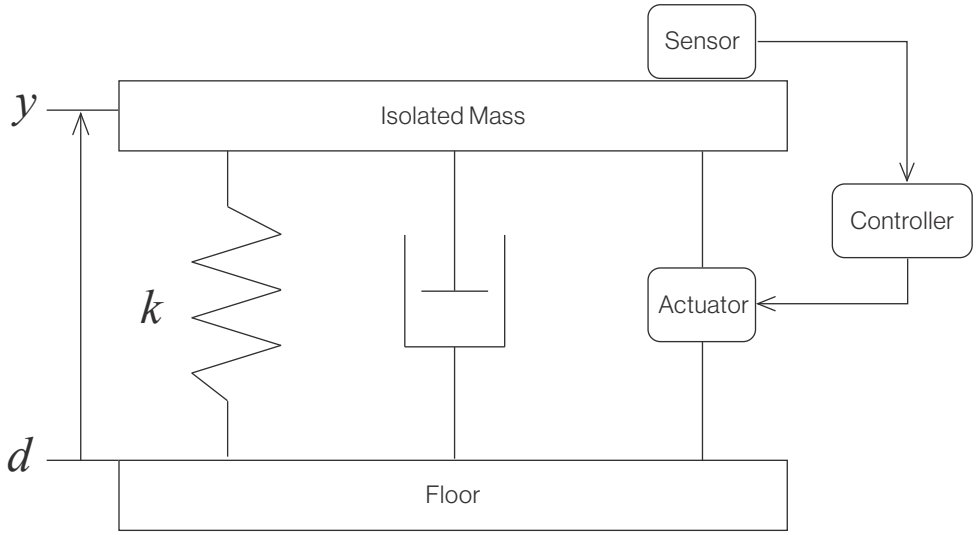
Stiffer passive vibration isolator to support motorized linear stage.

The DVIA-ULF Series utilizes metal springs for its passive vibration isolators, eliminating the need for an air supply while providing increased stiffness. This higher stiffness reduces settling time compared to pneumatic isolators, making the system particularly well-suited for metrology tools with motorized linear stages.

Feedback Control for Superior Stability.

The feedback control algorithm embedded in the DVIA-ULF continuously delivers superior stability through an intelligent, real-time feedback control mechanism. Unlike traditional passive systems, the sensors measure incoming vibrations and immediately corrects disturbances, maintaining precision and eliminating vibration interference. Imagine a platform that intelligently "feels" and reacts to motion—any vibration or drift is instantly detected by sensors, transformed into precise electrical signals, and swiftly corrected by actuators guided by a sophisticated controller. This closed-loop system consistently compares actual movement to an ideal stable state, automatically applying corrective forces to maintain optimal equilibrium. If the isolated mass moves upward, the actuator pushes it down; if downward, it pushes it up, ensuring the mass remains consistently still.

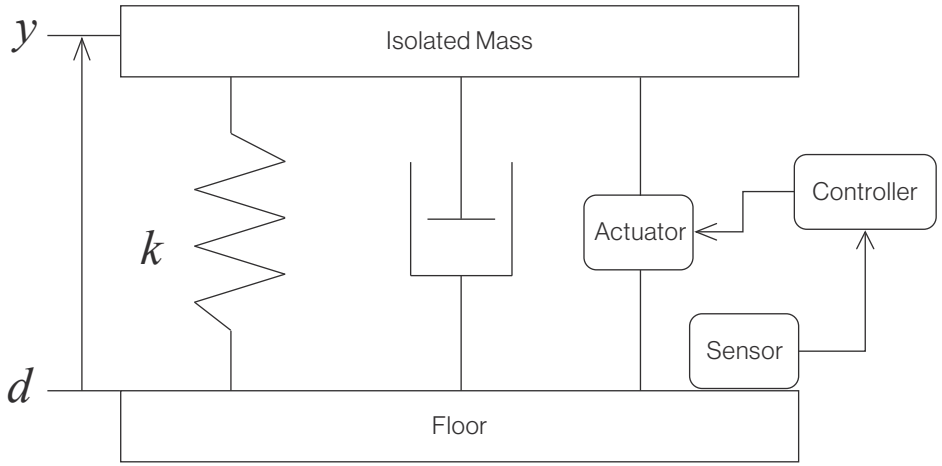
This dynamic response provides powerful benefits: the feedback mechanism inherently prevents resonance, the destructive amplification of vibration common in passive systems. The moment vibrations or resonances begin, the system counters them instantly, preserving stability and precision. The result is unmatched vibration control, ensuring users' sensitive equipment remains precisely where users need it, delivering optimal performance every time.



Feedforward Control for Exceptional Performance.

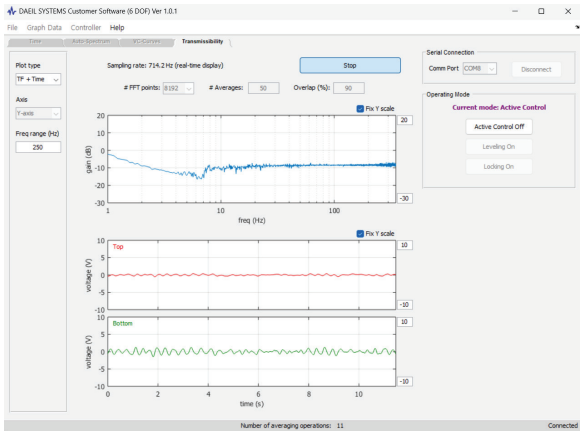
The feedforward control algorithm embedded in the DVIA-ULF system actively cancels floor vibrations before they reach the isolated mass(the end-user's tool). Ground sensors detect vibrations in real-time, instantly sending signals to the controller, which calculates and applies an equal-and-opposite force through actuators. This proactive approach dramatically reduces vibrations at low frequencies, ensuring the isolated mass experiences minimal disturbance from the outset.

The feedforward control algorithm handles the majority of predictable floor-induced vibrations, effectively neutralizing these disturbances and creating a stable baseline. Concurrently, the feedback control loop precisely fine-tunes the isolation by suppressing any residual vibrations affecting the isolated mass. Integrating these two control architectures produces a robust and highly effective solution: the feedforward mechanism accomplishes the substantial task of mitigating low-frequency vibrations proactively, while the feedback loop swiftly corrects any residual errors or unforeseen disturbances. Together, they deliver exceptional low-frequency vibration isolation performance, ensuring unmatched stability and precision for sensitive applications.

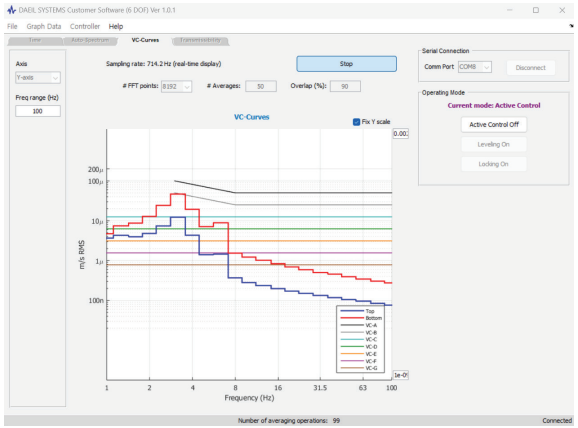


User Interface for data transparency

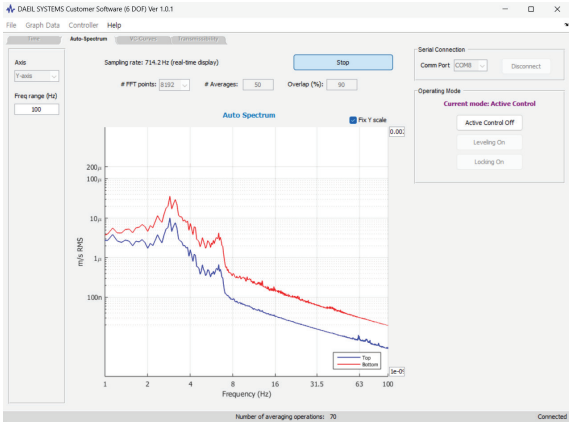
The DVIA-ULF features an intuitive user interface that enables real-time monitoring of vibration data, vibration isolation performance, and the activity of sensors and actuators. DAEIL SYSTEMS is confident that our active vibration isolation system significantly enhances imaging quality and overall equipment performance.



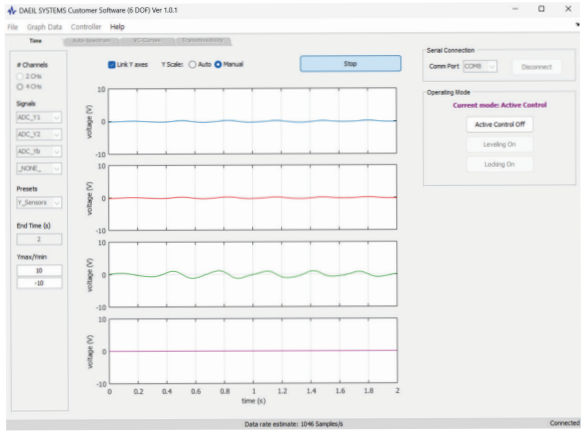
Transmissibility curves



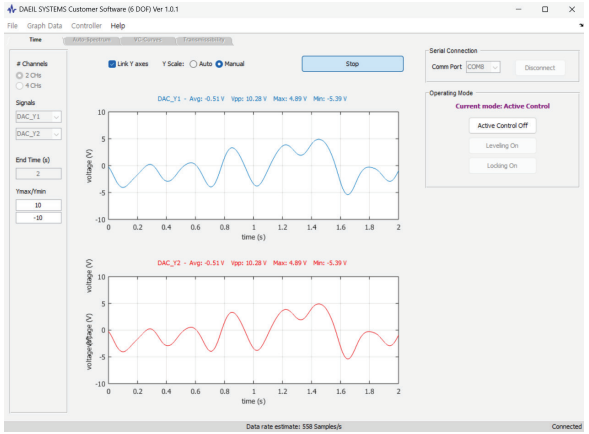
Vibration Criterion (VC) Curves



Auto-spectrum



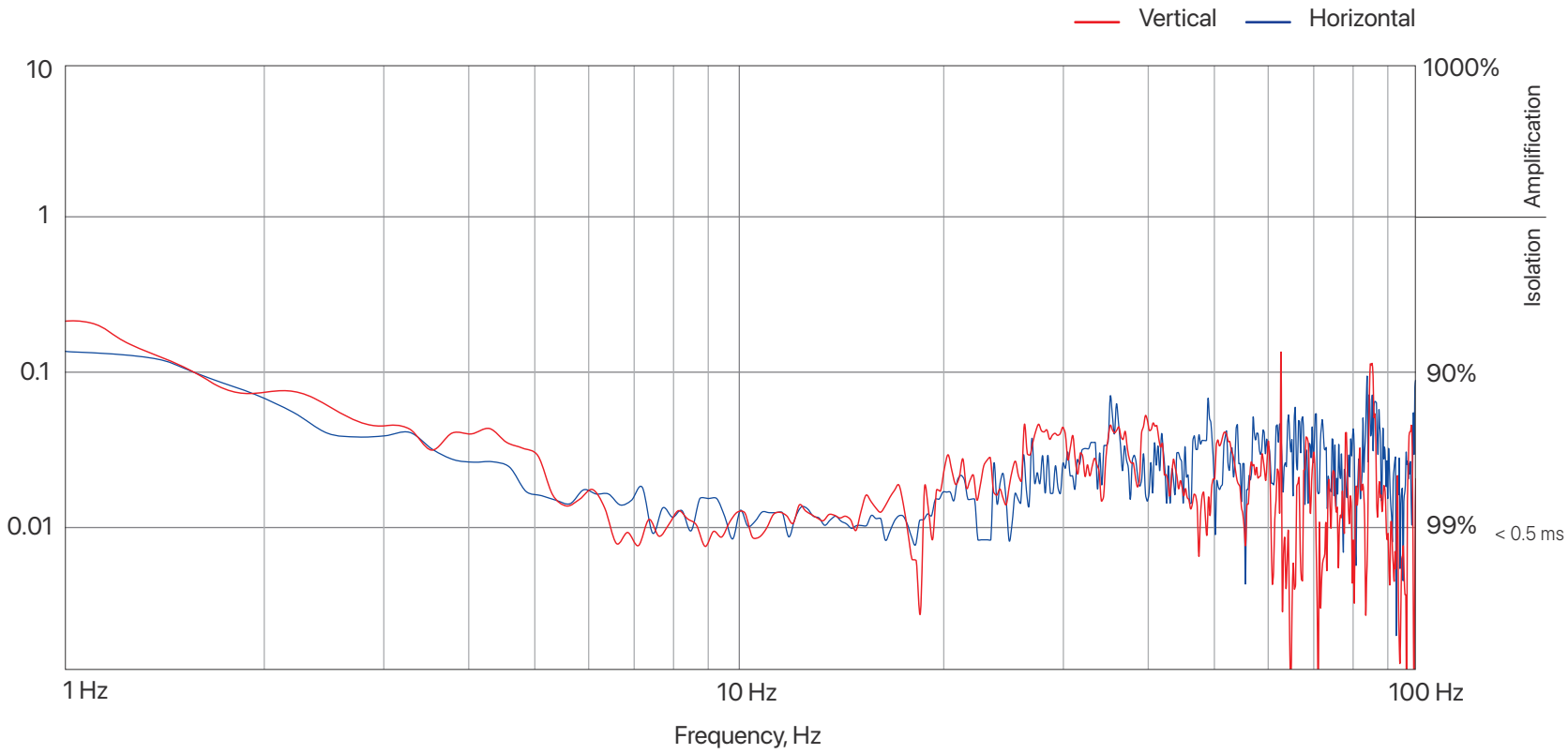
Sensor Signal



Actuator Force

Performance

The DVIA-ULF delivers 70 – 90% vibration isolation at 1 Hz and 90 – 99% vibration isolation at 2 Hz.



*Vibration isolation was measured on a floor that satisfied the VC-C criterion, using a vibration generator to apply controlled excitation.

Specifications

Model	DVIA-ULF350	DVIA-ULF700	DVIA-ULF1000	DVIA-ULF1500
Isolator Quantity	2 EA			
Dimensions (W* x D* x H)	Custom x Custom x 91 mm	Custom x Custom x 91 mm	Custom x Custom x 91 mm	Custom x Custom x 91 mm
Maximum Load Capacity*	350 kg	700 kg	1200 kg	1500 kg
Vibration Isolation Technology	Feedback and Feedforward Control			
Degrees of Freedom	6 DOF			
Active Isolation Bandwidth	0.1 – 200 Hz			
Vibration Isolation	70 – 90% at 1 Hz, 90 – 99% at 2 Hz			
Actuator	Electromagnetic Actuator			
Maximum Actuator Force	Vertical: 40 N Horizontal: 40 N	Vertical: 80 N Horizontal: 80 N	Vertical: 80 N Horizontal: 114 N	Vertical: 80 N Horizontal: 114 N
Vibration Sensor	Velocity, Sensitivity: 100.4 V/m/s ± 10%			
Response Time	< 0.5 ms			
Magnetic Field	< 0.05 µT			
Controller	External			
Compliance / Certifications	CE, TÜV			
Power Requirements	100–240 V AC, 50/60 Hz			
Environmental Requirements	Temperature: 5–50 °C, Humidity: 20–90 %			

*Width and depth can be customized based on SEM model or equipment specifications.

*Maximum load capacity can be increased as adding the isolators.

DAEIL SYSTEMS

We enable nanoscale imaging to make the world a better place.

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