Dielectric Elastomer Solution

Dielectric elastomers act as "artificial muscles": a high-voltage electric field redistributes surface charges and the film changes shape.

The power amplifier is the indispensable driver—it boosts a low-level control signal to hundreds or even tens of kilovolts while precisely tuning waveform, frequency and phase, enabling soft grippers for biomimetic robots, flapping-wing micro-air vehicles, wearable medical sensors, etc.

Present bottlenecks are the wide bandwidth many materials demand and the risk of dielectric breakdown at high fields. Amplifiers must therefore combine robust over-voltage protection with high slew-rate capability.

Future advances—wider-bandgap semiconductors, new elastomer chemistries and AI-driven adaptive control—will push soft robots and implantable medical devices from laboratory curiosities to everyday reality.

Recommended Products

ATA-7000 Series High Voltage Amplifier

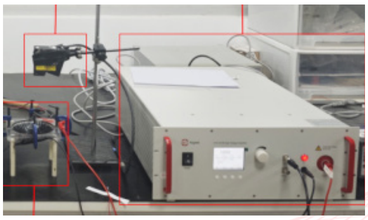
- *Bandwidth (-3dB) DC~100kHz*
- *Maximum Output Voltage 40kVpp*
- *Four-quadrant operation*
- *Arbitrary waveform amplification*
- *Adjustable voltage gain*
- *Built-in voltage/current monitoring*

Test Solution

- *High-voltage output covering the vast majority of high-voltage applications*
- *Real-time feedback regulation + AI noise-separation algorithm, holding THD ≤ 0.1 %*
- *Fully programmable and remotely controllable for seamless integration with automated test platforms*
- *Broadband amplification preserving waveform fidelity at high voltage*
- *High-resolution multi-step voltage-gain adjustment for ultra-fine output accuracy*

Solution Advantages

- *Four-quadrant operation drives any capacitive, inductive or resistive load*
- *High-voltage output delivers the excitation energy demanded by dielectric-elastomer actuators*
- *Wide selection of frequency, voltage and current ranges*
- *Numerically-controlled gain for fine, step-wise adjustment of drive voltage*
- *Comprehensive instrument protection: over-current trip and current-limited output*



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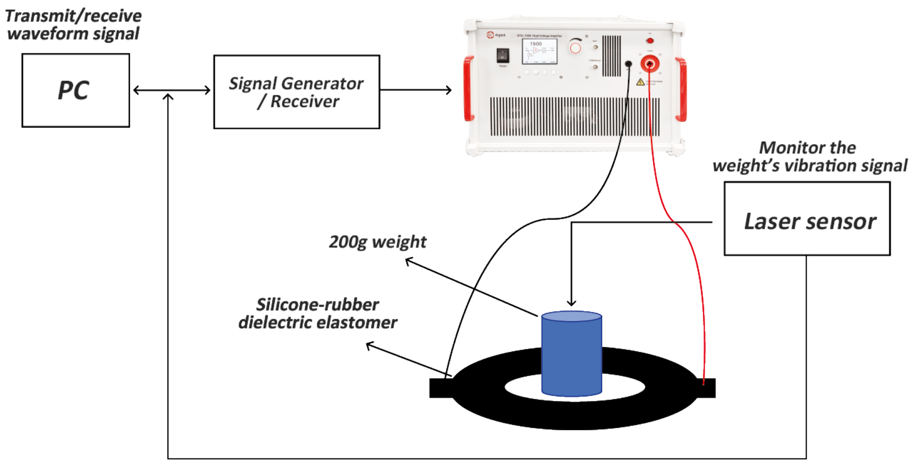
Case 1: Electromechanical Performance Study of Silicone-Rubber Dielectric-Elastomer Composites

As human productivity continues to advance, conventional mechanical materials often prove unsuitable for specialized applications—their excessive stiffness can hinder performance or even cause damage. There is therefore an urgent demand for new materials that can complement metals and upgrade overall system capability. Dielectric elastomers, a class of smart soft materials that directly convert electrical energy into mechanical work, have become the focus of intense research. To date, dielectric-elastomer actuators have demonstrated formidable potential and broad prospects in aerospace, precision machinery, and biomedical engineering.

The Aigtek ATA-7050 high-voltage amplifier is widely adopted in this field. Delivering up to 20 kV, it covers the drive requirements of most dielectric-elastomer test protocols.



Case 2: Dielectric-Elastomer Actuation Experiment

In dielectric-elastomer experiments, the power amplifier is the indispensable "muscle engine." A low-level control signal is first boosted to a power level sufficient to drive the elastomer; the amplifier's high-voltage output then creates the intense electric field across the film that redistributes internal charges and triggers deformation. The magnitude of the resulting strain and the speed of the mechanical response are governed directly by the amplifier's gain efficiency and output stability—making the power stage the critical link between a fragile command waveform and macroscopic "artificial-muscle" motion.