

Title:

Dynamic Mechanical Analyzer (DMA)

Sub-title:

Discovery DMA 850: for the determination of mechanical and viscoelastic parameters, glass transition temperatures (T_g) and secondary transitions.

General description:

DMA measures the mechanical (stiffness or Young's Modulus) and viscoelastic (storage and loss modulus) properties of materials as a function of temperature and time, allowing precise control either in force or displacement in both static and oscillatory modes. The gas cooling accessory and the furnace allow temperature control from -150°C to 600°C and three test geometries (single/double cantilever, tensile-film and three-point bending, as well as submersion tensile-film) provide different deformation types for different applications.

Features:

- Suitable for testing materials from soft to stiff.
- Non-contact, low-mass motor delivering continuous forces from 0.1 mN to 18 N.
- Exceptional force sensitivity and accuracy due to the frictionless, low-compliance air bearing design.
- The optical encoder technology offers 0.1 nm resolution across a 25 mm continuous travel range.
- Purpose-designed, high-stiffness, low-mass clamps are user-friendly and ensure repeatable data.
- "App-style" touchscreen interface enhances usability.
- TRIOS software simplifies test setup and execution with dedicated interfaces for both novice and expert users.
- Standard furnace with Gas Cooling Accessory controlling a Temperature range from -150°C to 600°C with $20^{\circ}\text{C}/\text{min}$ Heating and $10^{\circ}\text{C}/\text{min}$ Cooling rates.
- Force Resolution: 0.00001 N
- Frequency Range: from 0.001 to 200 Hz
- Dynamic Deformation Range: ± 0.005 to 10,000 μm
- Strain Resolution: 0.1 nm
- Modulus Range: 10^3 to 3×10^{12} Pa
- Modulus Precision: $\pm 1\%$

Applications:

- Stress - Strain curves
- Small-amplitude oscillation protocols for measuring viscoelastic properties (Storage and Loss Moduli (E' , E'' , $\tan \delta$)).
- Measurements of:
 - Glass transition
 - Secondary Transitions
 - Melting and crystallization
 - Curing
 - Aging
 - Effects of fillers
 - Relaxation behavior
 - Frequency Effects
 - Creep and Recovery
 - Stress Relaxation
 - Time-Temperature Superposition (TTS)