TMA 800

Thermomechanical Analyzer

INTRODUCTION

"Reliable, Robust, Cost-Effective Thermal Analysis."

The **TMA 800** is built on a proven vertical design that incorporates an advanced Oil Float Suspension System, delivering the stability and precision required for accurate measurement of thermal expansion, glass transition, and other thermomechanical properties across a wide range of materials.

Engineered for both performance and ease of use, the **TMA 800** provides exceptional data quality for analyzing coefficients of thermal expansion (CTE), stress relaxation, and dimensional change. It is ideally suited for high-reliability applications in electronics, composites, advanced polymers, and more. With a wide operating temperature range from -80 °C to 800 °C and multiple test modes available, the **TMA 800** offers outstanding versatility to meet a broad range of application needs.

Thermal expansion is a primary cause of mechanical stress and failure in electronic components, PCB assemblies, and multilayer structures. Accurately determining the glass transition temperature—the point at which softening and stress relief begin—or the onset of delamination is critical to product development, performance, and reliability in thermal environments.

The **TMA 800** is a rugged, easy-to-use system designed for both routine testing and advanced research. It features a motorized furnace lift for smooth, safe repositioning after loading, with integrated position sensors to ensure operator protection. Its all-metal furnace is built to deliver thousands of hours of failure-free performance, while its vertical geometry supports samples ranging from a few microns to over a centimeter tall—ideal for measuring both small components and low-expansion materials such as circuit boards.

Whether you're characterizing high-performance materials or qualifying components for harsh service environments, the **TMA 800** offers the accuracy, reliability, and usability demanded by today's materials labs.

Figure 1. ***TMA 800***

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KEY FEATURES

- **True Vertical Alignment for Accuracy**

  Unlike most TMA units that use U-shaped geometry for convenience, the **TMA 800** features a direct, vertical in-line design. This configuration minimizes friction, ensures uniform force application, and reduces noise and sample deformation—delivering superior measurement precision.

- **Oil Float Suspension System** *(Exclusive to the TMA 800)*

  During softening or transition, even slight mechanical noise or unintentional force can distort results. The Oil Float Suspension System supports the full weight of the probe and force coil, ensuring that only the intended force is applied. This system also dampens external vibrations, ensuring greater accuracy and protection of delicate materials.

- **Interchangeable Probes & Sample Holders**

  Easily switch between expansion, flexure, and penetration probes to meet a wide range of testing requirements. A specialized accessory allows for convenient mounting of films, fibers, and other delicate specimens, supporting industry-standard testing methods.

- **Advanced, Computerized Operation**

  The **TMA 800** is fully computerized, with most functions controlled via an intuitive software interface. The pre-calibrated temperature sensor provides precise temperature readings, and calibration routines are straightforward—even for fast-scanning or complex samples. Software capabilities include:

  - Real-time data display
  - Automatic zeroing and sample height reading
  - Curve optimization and overlay
  - Program archiving, comparison, and automated calculations

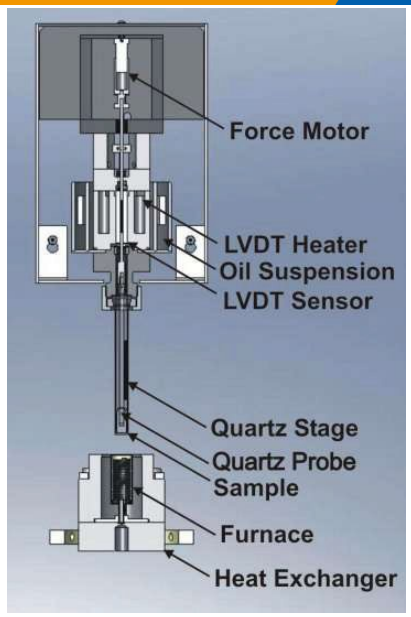


Figure 2. Cross-section of the TMA

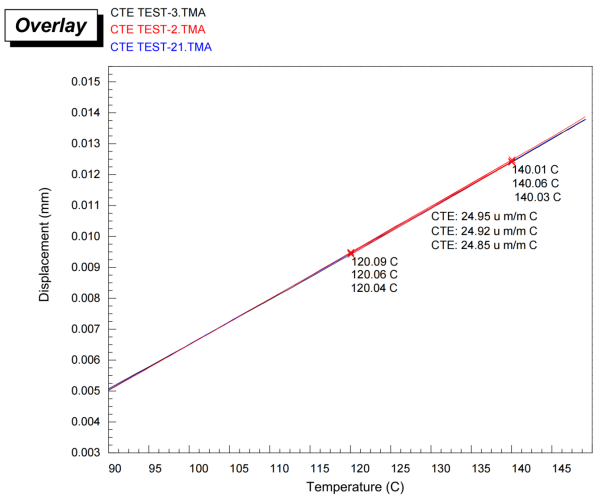
The **TMA 800** is an outstanding solution for laboratories seeking a cost-effective yet high-performance instrument to meet regulatory requirements for thermal expansion—especially in electronics, aerospace, composites, and other sensitive industries where dimensional stability is critical. Here are a few ways the **TMA 800** is engineered for precision thermal analysis:

- The cold sink surface is cooled by a heat exchanger that easily connects to an external chiller using a single-bolt attachment, simplifying low-temperature operation.
- The 40 mm furnace height provides an exceptionally wide and uniform temperature zone, ensuring consistent heating across the full sample length.
- A high-resolution Linear Variable Differential Transformer (LVDT) sensor offers both the sensitivity to detect micron-level changes and the range to track large dimensional shifts.
- The submerged float supports the full weight of the sample probe and core rod while dampening external vibrations and protecting sensitive quartz components.
- The core rod and probe are fully supported by AMI's unique Oil Float Suspension System, delivering friction-free motion and unmatched force control during softening transitions.

Whether you're focused on glass transition detection, CTE measurement, or structural deformation, the **TMA 800** is optimized to deliver the accuracy, repeatability, and confidence your lab demands.

SPECIFICATIONS

Model	**TMA 800**
Isothermal Stability	± 0.4 °C
Probe control	Oil Float System and Electronic Force
Thermocouple Type	Type K Nickel-Chromel
Temperature Range	Ambient °C to 800 °C (-80 °C to 800 °C with RCS System)
Temperature Program	0.1 °C/min to 60 °C/min
Temperature Accuracy	1°C
Temperature Precision	1°C
Maximum Sample Size	Up to 10 mm in length
Maximum Load	2N
Cooling System	Water Cooling (Standard); RCS Cooling (Option)
Testing Geometries	Expansion, Tensile, Penetration, 3 Point Bending, Compression, Dilatometer
Power Requirements	100-120/220-240V, 60 / 50Hz
Options	Multi-channel Gas Inlet Controller (Gas switching for up to four gases)



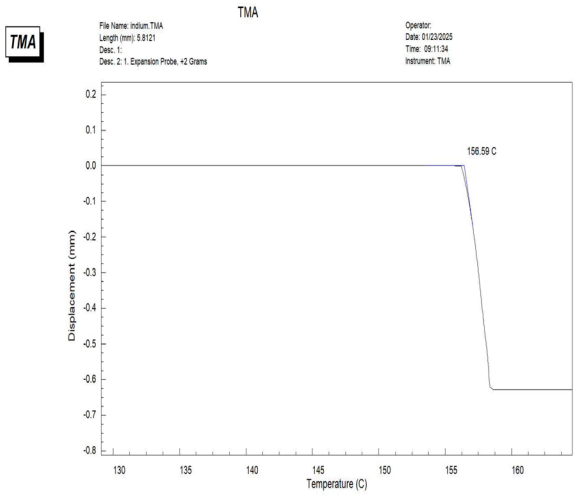


Figure 3 and 4: TMA Data

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