

Thermomechanical Analyzer

# TMA-60 Series

This instrument varies the sample temperature in accordance with a program, and the changes in the sample dimensions are measured while applying a constant pressure to the sample during this process.

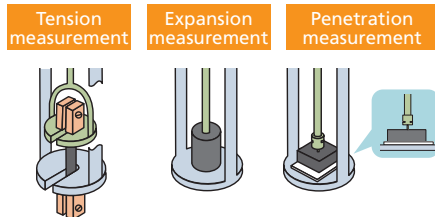


## Two Available Analyzers — Select in Accordance with the Measurement

**TMA-60** Simple to use for a variety of measurements  
Total expansion

With the TMA-60, three types of measurement can be performed: tension measurement, expansion measurement, and penetration measurement.

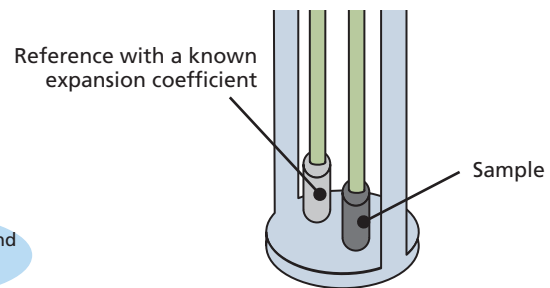
The sample support tube and the detection probe can be attached and removed with one touch, so the instrument can be used for diverse forms of measurement, and it can be maintained with ease.



Can be attached and removed by the customer

**TMA-60H** Can be used for low expansion measurements  
Differential expansion

With the TMA-60H, differential expansion measurement can be carried out using a reference with a known expansion coefficient, enabling higher accuracy measurement.



● Loading programs that can be selected Four different loading programs can be selected

Constant loading rate mode

Load is varied at a constant rate

Constant extension rate mode

Extension is varied at a constant rate

Cyclic loading mode

Load is varied at constant frequency and amplitude

Shrinkage stress mode

Load is generated while maintaining a constant displacement

Measurement of expansion coefficient

Measurement of hardening reactions

Measurement of shrinkage stress

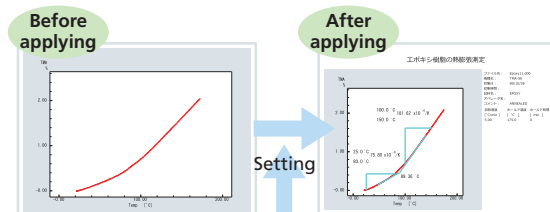
## For More Comfortable Day-to-Day Measurement Work

● Automatic analysis using the "Template Function"

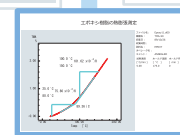
Corrections, analysis, and layout setting of reports can be carried out automatically using the unique "Template Function." This can be used not only during analysis, but also prior to measurement. It will be automatically applied when measurement is completed, and saved.

● Fusion bonding prevention mechanism

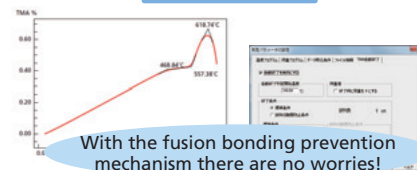
A safety mechanism is provided to prevent fusion bonding between the measurement rod and the sample when materials such as glass are heated. When the displacement exceeds a set range due to melting of the sample, the analysis is immediately stopped, and the load is removed from the sample.



Setting



Template file



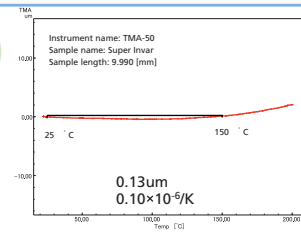
With the fusion bonding prevention mechanism there are no worries!

## Can be Used for a Wide Range of Measurements

### ● High accuracy measurement of low expansion materials

A new high-accuracy low-drift displacement sensor has been adopted, dramatically improving measurement accuracy. Even the low expansion metal Super Invar can be measured.

Supports this measurement

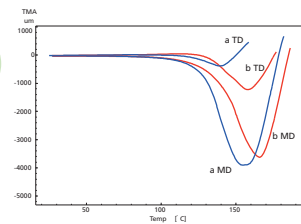


Measurement of thermal expansion of low expansion metals

### ● Large changes can be measured over a wide dynamic range

Measurement can be carried out over a wide span of  $\pm 5$  mm, with high-accuracy measurement from very small to large deformation. Samples with large deformation, such as separators in lithium ion batteries, can be measured.

Supports this measurement

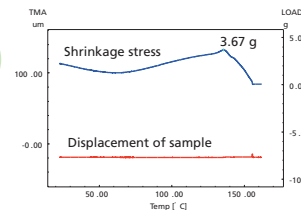


Measurement of Li ion battery separators

### ● Film shrinkage stress can be measured

Shrinkage stresses can be measured with high sensitivity and high controllability.

Supports this measurement



Measurement of film shrinkage stress

## Compact Design

We have achieved a compact design with a small footprint (W367 mm, D624 mm).

### Example of System Configuration

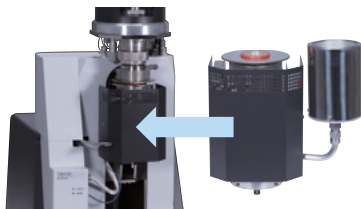


For measurement below room temperature

### Cooling Options

#### Cooling furnace LTB-60

- Enables TMA measurement over the temperature range of -150 to 500 °C
- Uses liquid nitrogen
- Use after manually pouring liquid nitrogen

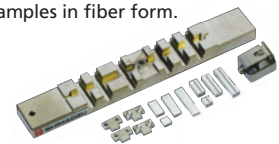


The cooling furnace LTB-60 can be used in place of the normal heating furnace

### Optional Accessories

#### Tension chuck for fiber

Used for tension measurement of samples in fiber form.



#### Cutout punch for film \* Special order item

Used for cutting out samples in film form.



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