

## Thermoelectric measurement equipments

### 1. ZEM-3

This instrument is designed for simultaneous measurement of Seebeck coefficient and electric conductivity for the evaluation of thermoelectric characteristics of a wide range of materials, including semiconductor, metal and ceramics.



### Features

- One unit can be used for simultaneous measurement of both Seebeck coefficient and electric resistance (resistivity).
- The instrument permits measurement of both 6-to-22mm long
- The sample holder uses a unique balance contact mechanism, permitting measurement of high reproducibility.
- V-I plot measurement can be made to judge if the lead is in intimate contact with a set sample.
- Measurement is controlled by a computer, permitting automatic measurement with each temperature difference at a specified temperature and elimination of dark electromotive force.
- Employment of an infrared gold image heating furnace that excels in temperature controllability and a micrometer for controlling temperature difference.

### Specification

Temperature range	- 80 to 100°C (L type) Room temperature to 800°C (M8 type)
Temperature setting range	Number of measurement temperature steps and number of temperature sample measurement difference steps: Maximum 125
Measurement method	Seebeck coefficient : Static dc method Electric resistance : Four-terminal method
Atmosphere	Low pressure helium gas
Sample size	2 to 4 mm square or diameter x 6 to 22mm long (maximum)
Lead interval	8 mm
Power requirements	200 VAC, single phase, 40 A (M8 type & M10 type) 100 VAC, 20 A (L type & M8 type & M10 type) Transformer for European use available
Cooling water requirements	Water pressure 1.5 kgf/cm <sup>2</sup> or more Flow rate 7 L/min or more

## 2. TC-9000

This instrument is designed for measurement of thermal diffusivity and specific heat capacity so as to obtain thermal conductivity by using laser flash technique.

### Features

- Completely automated measurement with PC.
- Applicable to high thermal conductivity materials using high speed transient memory.
- Laser beam is shut off by a completely sealed basic unit



### Specification

Item \ Model	TC-9000L	TC-9000H
<b>Measurement temperature</b>	-150°C ~ 200°C	Room temperature to 1500°C
<b>Sample Size</b>	10mm dia. X 1mm to 3mm thick	
<b>Sample irradiating light</b>	Glass laser output 10 J/pulse FWHM 0.1 msec/0.3 msec or less	
<b>Sensor</b>	Thermocouple	Thermocouple, IR detector
<b>Measurement</b>	Thermal diffusivity, specific heat capacity, thermal conductivity	
<b>Data analysis method</b>	t ½ (half time) method, logarithmic method, curve fitting method*	
<b>Power requirements</b>	200 VAC single phase, 10A 100 VAC, 15 A each one	200 VAC single phase, 30A 100 VAC, 15 A each one
<b>Cooling water requirements</b>	City water 5L/min or more	
<b>Measurement atmosphere</b>	Low pressure helium gas	Vacuum or air down to 150°C