

Bethel Co., Ltd. Hudson Laboratory

TIM Master SS-M10

Steady-state thermal conductivity
measuring device

Specifications

Ver.1.0.1

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1. OVERVIEW

This device measures “thermal conductivity and thermal resistance” using the “steady-state method”.

The thermal conductivity is measured by applying a steady temperature gradient to the sample.

2. FEATURES

- (1) Thermal conductivity measurement system conforming to ASTM D5470.
- (2) Measurement can be selected from two patterns: constant load mode and constant thickness mode.
- (3) A mechanism to apply a constant pressure is provided in the measurement section, and the pressure is measured by a load cell. (The key point is that both sample thickness and pressure can be set.)

3. USAGE ENVIRONMENT

- (1) Power supply: Single-phase 200 V max. 10 A 50/60 Hz 3-terminal grounding outlet
Single-phase 120 V max. 10 A 50/60 Hz 3-terminal grounding two outlets
- (2) Installation location: No vibration, clean location, out of direct sunlight, and out of the wind.
- (3) Device surroundings: Temperature: 20 to 30°C, humidity: 20 to 80%

4. DEVICE SPECIFICATIONS

Item	Contents	
Measurement direction	Out of plane direction	
Measurement properties	Thermal conductivity 0.05 ~ 40 [W/ mK] *1 * 2	
Accuracy	For the reference sample (zirconia, thickness 3mm), the literature value is $\pm 10\%$ *3.	
Sample	Size	10 × 10 [mm]
	Thickness	0.05 to 10 [mm] *2
Temperature range (sample piece)	RT ~ 130 [°C] *2	
Measurement atmosphere	In the air	
Load Range	20 to 500 [N] (0.2 to 5.0 [MPa])	
Thickness Accuracy	± 0.01 [mm]	
Data Output	Thermal conductivity, thermal resistance, temperature at each measuring point, sample thickness, pressure	
	File format	CSV file (comma separated values)
Device	Size	W630 D 580 H 860 [mm]
	Weight	90 [kg]

*1 When using devices with different thermal property measurement principles, measurement errors due to the principles may increase.

*2 Varies depending on sample and measurement conditions.

*3 Measurement conditions: Load 100N, heater temperature 80 °C , chiller temperature 20°C

5. SYSTEM CONFIGURATION

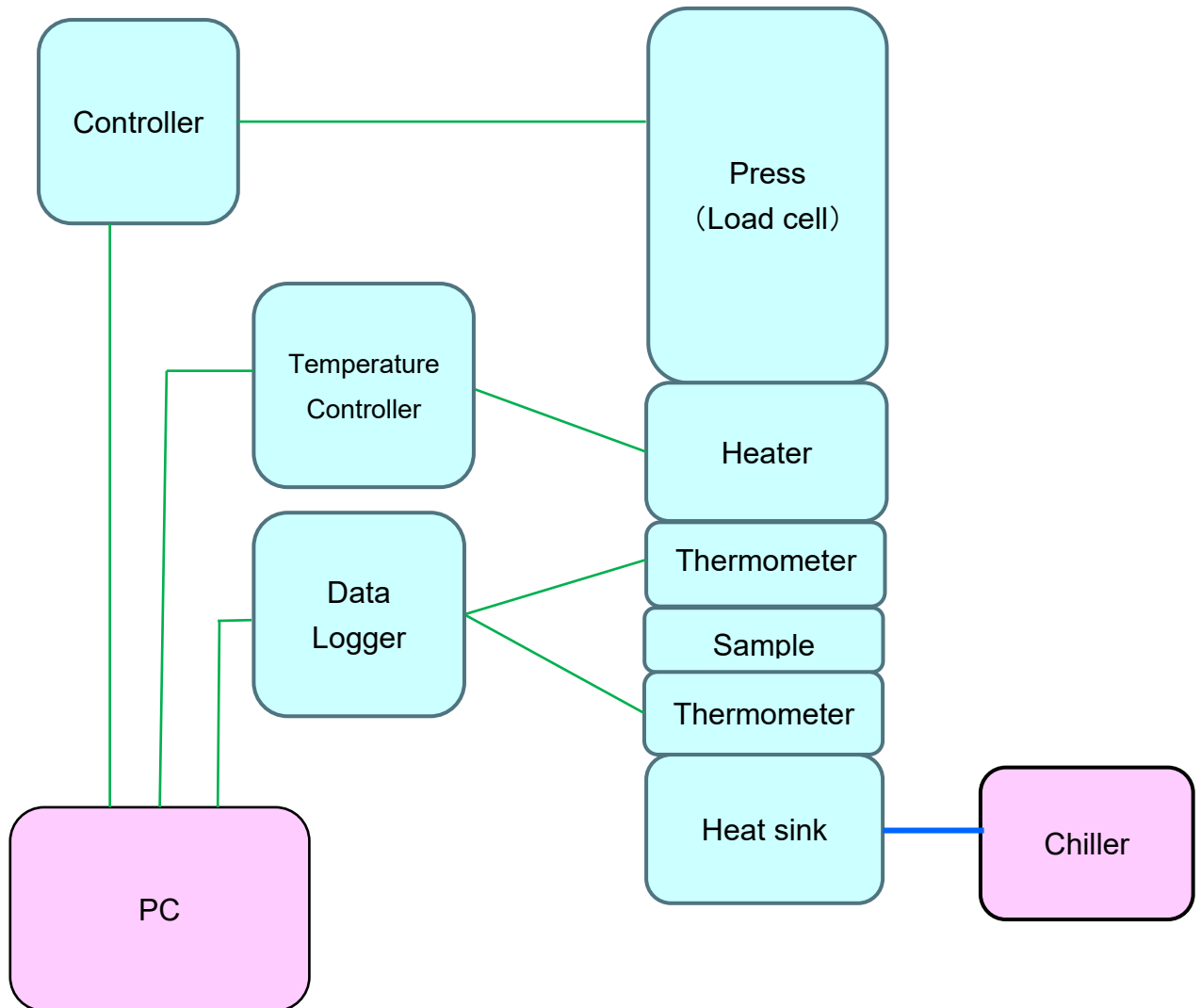


Figure 1. System block diagram

6. SAFETY DEVICE OPERATION

Item	Operating conditions	Actions taken after activation
Emergency stop button	Emergency stop button pressed	The device is powered off.
Safety Door Switch	Close the door	The door will be locked and will not open.

* Release conditions: Press stops, heater temperature drops below 50°C, and unlock command is sent from PC

7. NOTES

- There is a risk of electric shock.
 - This device must be grounded using the ground terminal on the power cable.
 - Do not use any cables other than the one provided.
 - Use 120V and 200V power supplies. Be careful not to connect them incorrectly.

- There is a risk of burns.
 - Immediately after measurement, the area around the heater will be hot. Do not touch it as you may get burned. Make sure the stage temperature has dropped sufficiently before working on it.
 - Do not open the door when the heater block temperature is high (above 50°C). (Japan Society for the Promotion of Machine Industry*)

- There is a risk of injury.
 - Be careful not to pinch your fingers or hands when opening or closing the door.
 - Please make sure there are no objects around the door before opening or closing it.
 - Do not open the door while the cylinder is operating or during measurement.
 - Always keep the door closed when not in use.
 - When carrying the device, three or more people should hold the frames on the bottom left and right sides of the device firmly, and be careful not to drop it, as dropping it may injure your feet.
 - Do not place this device on an unstable surface as it may fall and cause injury.
 - Immediately after measurement, gas may be generated from the sample. Do not place your face or hands near the door.

- There is a risk of malfunction.
 - Do not touch the metal rods with bare hands as this may cause rust.
 - If an uneven load is applied, the device may be damaged. Make sure the sample is flat.
 - Use a sample that will not deform at the set temperature.
 - Sample and metal rods to be placed in such a way that they do not shift.
 - If you install any software or tools other than those provided by us (pre-installed products, accessories, or our exclusive products) on the computer of this device, this device may not operate properly.
 - Do not place any objects near the breaker.
 - The chiller temperature should be between 23°C and 50°C.
 - Use antifreeze/Nybrine as coolant. Concentration 20%.
Replacement cycle: Once a year

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