
THB – TRANSIENT HOT BRIDGE

Instrument for rapid measurement of thermal conductivity, thermal diffusivity and specific heat

Two flat surfaces of the specimens are put in contact with both sensor sides in order to assure a good thermal contact without air inclusions. Either the delivered sample holder or a weight can be used. The shapes of the faces which are not in contact with the sensor are of no importance so that sample preparation is reduced to a minimum. Minimum sample thicknesses depend on their thermal diffusivity. In most cases some mms are sufficient. After adjusting the heating power and heating time the measurement and the evaluation run automatically. Results can be post-processed if needed. Measurements take only some seconds up to

a few minutes. The sensors are automatically identified by the software (THB-100/THB-500). Multiple measurements with automatic calculation of the mean values are possible as well as the storage of measurement programs.

Measurement can be done either at room temperature (no further equipment required) or at high or low temperatures. The set-up including the sensor can be placed in a normal lab oven or climatic chamber often available in laboratories. LINSEIS offers specially adapted furnaces covering temperatures from -150 up to 700°C.



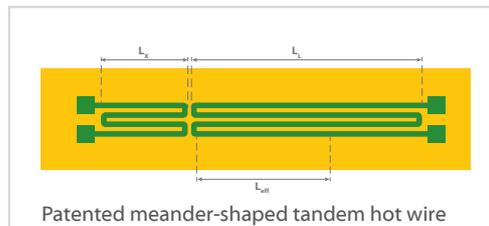
THE MEASUREMENT SET-UP

Advantages

- Short measurement times (seconds to few minutes)
- High accuracy due to patented sensor design
- Easy set-up and sample preparation
- Nondestructive measurement
- Absolute method - no calibration required
- Suitable for solids, liquids, powders, pastes etc.
- Temperature range -150 to 700 °C
- Measurements at different atmospheres, vacuum and pressures up to 150 bar
- Broad thermal conductivity range from 0.01 to 500 W/m·K
- Modular design

Transient Hot Bridge Method

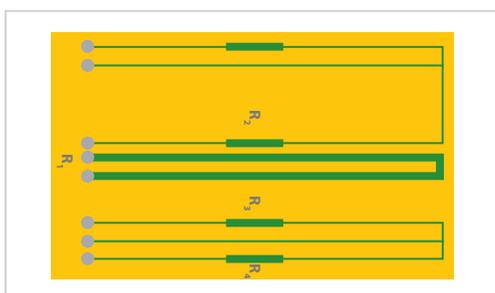
The THB measurement method initially developed by the National Metrology Institute of Germany is an optimized hot wire technique to measure all relevant thermal transport properties (thermal conductivity, thermal diffusivity and volumetric specific heat) with the highest possible accuracy.



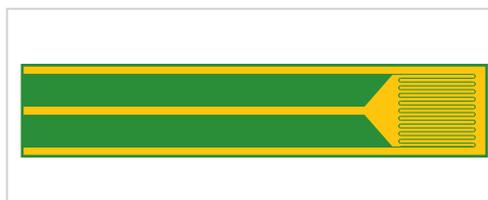
SENSORS

For the THB-100 and THB-500 additional hot wire measurement techniques are available based on innovative and patented new sensors:

The Quasi-Steady-State (QSS) sensors have been developed for the measurement of high thermal conductivities. It combines the advantages of steady-state and transient measurement techniques and enables measurements in the range between 1 and 500 W/m·K



The LINSEIS Hot Point Sensors (HPS) work according to the transient plane method. They are suitable to measure small samples with dimensions down to 3x3x1 mm and to measure anisotropic samples. Due to the small amount of heat which is produced by the hot point sensors, they are a good choice to measure liquids with negligible convection.



SPECIFICATIONS

All sensor types are available as Kapton-foil-sensors and resist to temperatures from -150 up to +200°C. Ceramic sensors are available covering

a temperature range up to +700°C (THB-100 and THB-500).

| | THB-1 | THB 100 | THB 500 |
|-----------------------------------|-------------|---------------|---------------|
| thermal conductivity range | 0 to 5 W/mK | 0 to 100 W/mK | 0 to 500 W/mK |
| THB/SENSOR/A | ✓ | ✓ | ✓ |
| THB/SENSOR/B | ✓ | ✓ | ✓ |
| THB/SENSOR/C | ✗ | ✓ | ✓ |
| QSS-Sensors | ✗ | ✓ | ✓ |
| Hotpoint-Sensors | ✗ | ✓ | ✓ |

SENSOR TYPES

| Sensor type | Sensor size | Min. sample size | Temperature range | Measuring range | suitable for... |
|--|---------------------------|----------------------------------|-------------------|------------------------------------|---------------------------------|
|  THB/Sensor/A/B | 82 x 42 mm 42 x 22 mm | 20 x 40 x 5 mm 10 x 20 x 3 mm | -150 up to 200°C | 0.01 – 1 W/m·K | solids, powders, gases |
|  THB/Sensor/A/B/Metal | 105 x 42 mm 54 x 22 mm | 20 x 40 x 5 mm 10 x 20 x 3 mm | -150 up to 200°C | 0.01 – 1 W/m·K | solids, powders, gases |
|  THB/Sensor/C | 300 x 3 mm | 10 x 10 x 10 mm | -150 up to 700°C | 0.01 – 1 W/m·K | liquids, powders |
|  THB/Sensor/D/E/QSS | 42 x 22 mm | 22 x 42 x 3 mm | -150 up to 200°C | 0.2 – 100 W/m·K 0.2 – 500 W/m·K | solids, powders, gases |
|  THB/Sensor/G/HOTPOINT/ Kapton | 65 x 5 mm | 3 x 3 x 2 mm | -150 up to 200°C | 0.01 – 1 W/m·K | solids, liquids, powders, gases |

more sensors on request