

Hot Disk[®] Instruments

Thermal Constants Analyser



TPS 2500 S



TPS 2500 S

The popular Hot Disk® TPS 2500 S is the core instrument in our portfolio. This multi-purpose, high-performance R&D thermal conductivity meter is designed for precise analysis of the thermal transport properties of virtually all types of materials, including bulk solids, pellets, grains, powders, pastes, gels, foams, liquids, insulation materials and textiles. It is also frequently used for automated quality control (QC) testing in production lines.

The TPS 2500 S handles bulk samples less than one millimetre thick, covers a thermal conductivity range of 0.005 to 1800 W/m/K, and supports measurements from cryogenic temperatures up to 1000°C. It can also analyse the anisotropic thermal transport properties of uniaxial materials.

Designed as an advanced research instrument, the TPS 2500 S complies with ISO 22007-2, ISO 22007-7 and ASTM E3088-25.

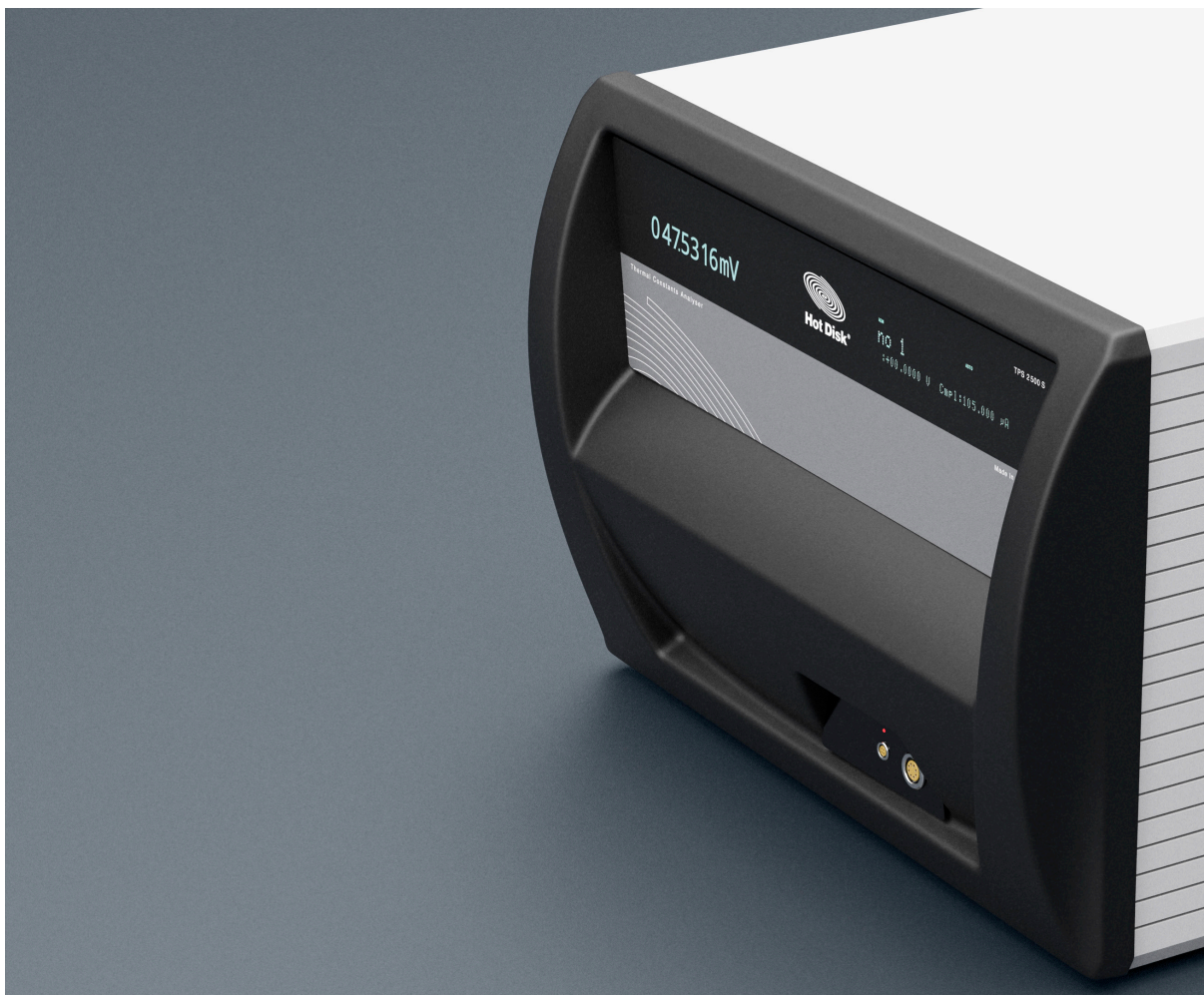


The benchmark instrument

TPS 2500 S is the flagship instrument in our portfolio. This general-purpose R&D instrument is designed for precise analysis of thermal conductivity, thermal diffusivity, thermal effusivity and specific heat capacity. The TPS 2500 S accommodates an extensive range of materials with varying geometries and dimensions and complies with ISO Standard 22007-2, ISO 22007-7 and ASTM E3088-25.

Our ISO- and ASTM-standardized TPS technique – used today in more than 2,000 laboratories – is highly valued for its ability to simultaneously determine thermal conductivity, thermal diffusivity, thermal effusivity and specific heat capacity from a single measurement, with minimal sample preparation. The operational simplicity of the TPS 2500 S, combined with the performance achieved using optimally designed Hot Disk® sensors, makes the instrument a reliable and versatile tool for testing bulks, pellets, grains, powders, pastes, gels, liquids, insulators, foams and textiles. Its characteristic high accuracy and precision also make the instrument well suited for QC testing.

The selection of measurement modules allows the TPS 2500 S to be used in a wide range of specialized applications, from basic testing of isotropic materials (Isotropic module) to measurements of rod-shaped specimens (One-dimensional module); thin films, coatings or adhesive layers (Thin Film module); high-conducting sheets or slabs (Slab module); extreme-



ly light and low-conducting materials (Low-density/Highly-insulating module); textile samples (Thermal Effusivity Module); and anisotropic samples or layered structures (Anisotropic module) – all important applications in the electronics, battery, automotive, aerospace, nuclear, chemical, construction and textile industries.

Furthermore, with its unique ability to probe thermal conductivity as a function of sample depth (Structural Probe module), the TPS 2500 S can, for example, be used to determine whether a sample is homogeneous or contains defects, cracks or voids. This makes it a powerful and versatile tool for QC testing.

In addition to these applications, the TPS 2500 S can also be used with our Hot Cell[®] sensors for dedicated specific heat capacity testing of samples or objects that are large compared with those used in conventional methods such as DSC, including complex composites and batteries.

The Hot Disk[®] Desktop App for the TPS 2500 S instrument incorporates tools for automated measurements and automatic temperature control. It also includes tools for exporting results to third-party software such as Microsoft Excel for further processing or statistical analysis. For precise and automatic temperature readings, an optional PT100 temperature sensor is available.



TPS 2500 S Specifications¹

Measurement

Sample Types	Bulks, rods, slabs, wafers, sheets, foils, films, laminates, composites, minerals, batteries, textiles, pellets, granules, beads, grains, powders, pastes, creams, gels, liquids, foams and insulators.
Evaluation	
Anisotropy	Yes, 2D anisotropic (uniaxial) materials can be characterised, using optional Anisotropic Measurement Module.
One-Dimensional	Yes, axial estimations possible for a complex sample configuration.
Sample Dimensions	
Smallest	Bulk sample: 0.5 mm thick x 2 mm wide (circle or square). Rod sample: 5 mm long x 2.5 mm wide (circle or square). Slab sample: 42 µm thick x 8 mm wide (circle or square). Thin film sample: 10 µm thick x 22 mm wide (circle or square).
Largest	Bulk sample: unlimited. Rod sample: unlimited length x 60 mm wide (circle or square). Slab sample: 20 mm thick x unlimited wide (circle or square). Thin Film sample: 500 µm thick x unlimited wide (circle or square).
Sample Temperature Range	-253°C (20 K) to 1000°C.
Core Instrument	RT.
With Optional TCU	Cryostat: -195°C (78 K) to RT. Low-to-High Temperature Chamber: -60°C to 300°C Bath Circulator: -40°C to 200°C. Convection Oven: RT to 600°C. Muffle Furnace: RT to 800°C. Tubular Furnace: RT to 1000°C (gas purging for >400°C, and inert gas flow for >800°C is recommended).
Measurement Time²	1 to 2560 seconds (depending on sample material and sensor dimensions).

Measurement Range	
Thermal Conductivity	Bulk sample: 0.005 to 500 W/m/K. Rod sample: 1 to 1800 W/m/K. Slab sample: 5 to 1500 W/m/K. Thin Film sample: 0.01 to 5 W/m/K.
Thermal Diffusivity	Bulk sample: 0.01 to 400 mm ² /s. Rod sample: 1 to 1400 mm ² /s. Slab sample: 5 to 1000 mm ² /s. Thin Film sample: 0.02 to 2 mm ² /s.
Thermal Effusivity	20 to 55000 W ¹ /s/m ² /K.
Specific Heat Capacity	Up to 5 MJ/m ³ /K.
Measurement Accuracy	
Thermal Conductivity	Better than 5%.
Thermal Diffusivity	Better than 10%.
Measurement Reproducibility³	
Thermal Conductivity	Typically better than 2%.
Thermal Diffusivity	Typically better than 5%.
Measurement Repeatability⁴	
Thermal Conductivity	Typically 0.055% (Stainless Steel bulk sample, Kapton-insulated Hot Disk [®] sensor model 5501, and 22°C sample temperature).
Thermal Diffusivity	Typically 0.22% (Stainless Steel bulk sample, Kapton-insulated Hot Disk [®] sensor model 5501, and 22°C sample temperature).
Measurement Sensitivity⁵	
Temperature	Typically 17 µK (Stainless Steel sample, Kapton-insulated Hot Disk [®] sensor model 5501, and 22°C sample temperature).

Notes:

1. Hot Disk[®] Instruments reserves the right to make changes without prior notice, whether due to misprints, improved hardware, or extended software capabilities.
2. Time of transient temperature reading. An additional temperature settling time that depends on the sample material and TCU (if applied) is required to ensure isothermal condition before the reading.
3. Comparing measurements performed by different instrument set-ups.
4. Variation in consecutive measurements performed by a single instrument set-up. Note that this value depends on sample material, sensor model, and sample temperature.
5. Standard deviation in fitting $\Delta T(\tau)$ -function to the transient temperature reading. Note that this value depends on sample material, sensor model, sample temperature, and can vary considerably.

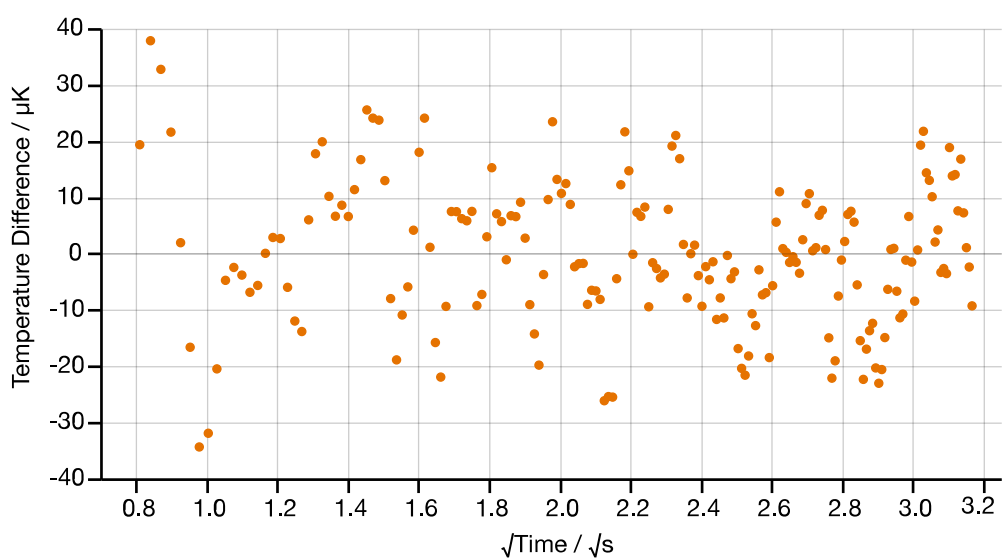
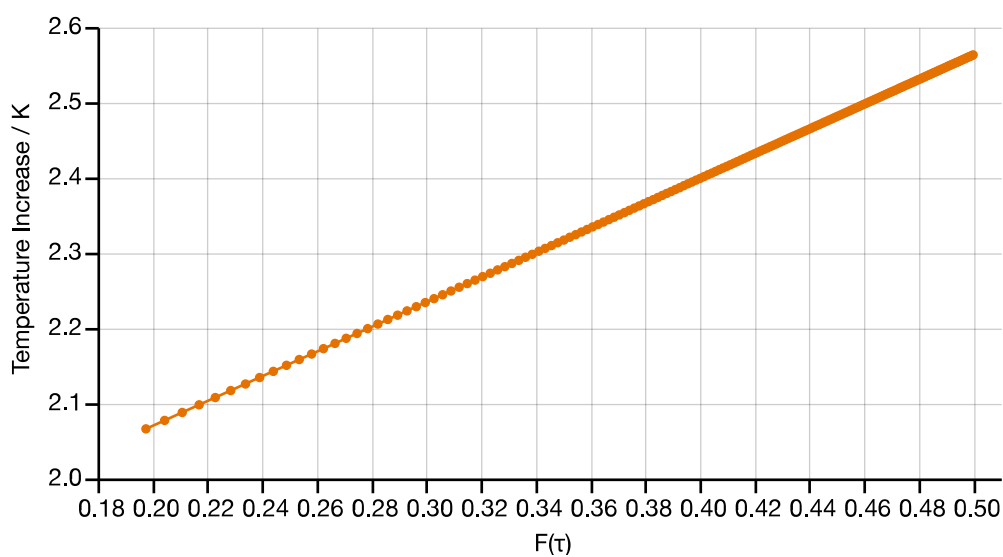
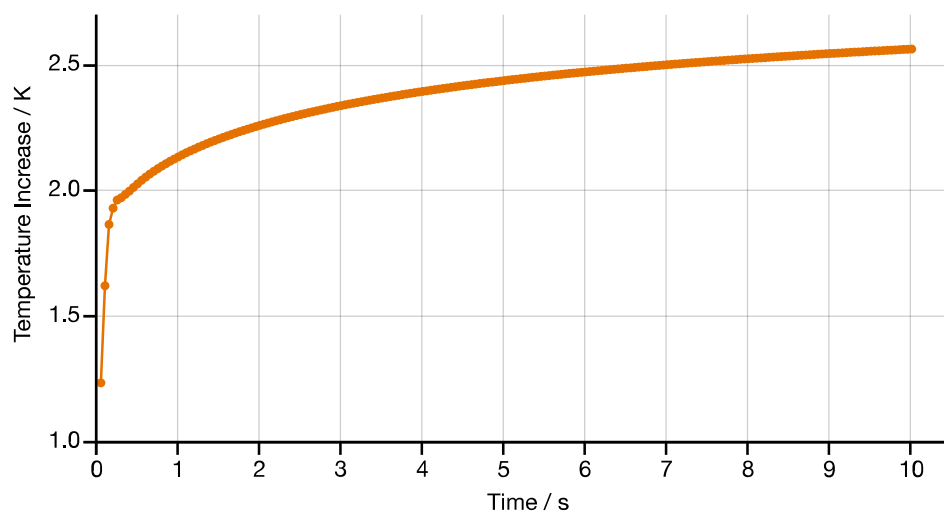
General

Meets ISO Standard 22007-2	Yes.
Meets ISO Standard 22007-7	Yes.
Meets ASTM Standard E3088-25	Yes.
Measurement Modules	
Included	Isotropic, Single-Sided Testing, One-Dimensional, Thermal Effusivity, Structural Probe, and Automation.
Optional	Anisotropic, Slab, Thin Film, Low-Density/Highly Insulating and Specific Heat Capacity.
Sensor Models	
Hot Disk® sensor – Kapton-insulated	All models.
Hot Disk® sensor – Teflon-insulated	All models.
Hot Disk® sensor – Mica-insulated	All models.
Hot Strip® sensor – Kapton-insulated	All models.
Hot Cell® sensor – Cell size <250 mm	All models.
Hot Cell® sensor – Cell size >250 mm	Please inquire.
Instrument Environment	
Operating	15°C to 30°C.
Storage	-20°C to 45°C.
Instrument Line Power	
Supply Voltage	100 – 240 VAC, 50 – 60 Hz.
Power Consumption	45 W typical, 255 W maximum.
Instrument Warm-Up	2 hours to rated measurement performance.
Instrument Input and Output	
Rear Panel	USB type B connector (female) for connectivity.
Front Panel	LEMO 8 pin connector (female) for Hot Disk®, Hot Strip® or Hot Cell® sensor.
	LEMO 4 pin connector (female) for optional PT100 temperature sensor.
Instrument Dimensions	325 mm high x 455 mm wide x 490 mm deep.
Instrument Weight	25 kg.
Instrument CE Marking	Yes.

TPS 2500 S Measurement Demonstration

Stainless Steel

Sample	
Material	Stainless Steel, AISI 316/316L.
Type	Bulk.
Temperature	23°C
Measurement Parameters	
Measurement Module	Isotropic.
Sensor Model	Kapton-insulated Hot Disk® sensor 5501 (radius 6.4 mm).
Measurement Time	10 s.
Heating Power	800 mW.
Measurement Results	
Data Points	13-200.
Thermal Conductivity	13.69 W/m/K.
Thermal Diffusivity	3.705 mm²/s.
Specific Heat Capacity	3.695 MJ/m³/K.
Probing Depth	12.2 mm.
Temperature Increase	0.5089 K.
Standard Deviation in Fitting $\Delta T(\tau)$	31 µK.



Included with the TPS 2500 S Instrument

Basic Option:

- 6 x Measurement Modules: Isotropic, Single-Sided Testing, One-Dimensional, Thermal Effusivity, Structural Probe, and Automation.
- 1 x Kapton-insulated Hot Disk® or Hot Strip® sensor: Model free of choice, with cable.

Regular Complete Option:

- 10 x Measurement Modules: Isotropic, Anisotropic, Slab, Thin Film, Single-Sided Testing, One-Dimensional, Thermal Effusivity, Specific Heat Capacity, Structural Probe, and Automation.
- 10 x Kapton-insulated Hot Disk® or Hot Strip® sensors: Models free of choice, with cable.

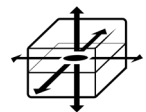
Extended Complete Option:

- 11 x Measurement Modules: Isotropic, Anisotropic, Slab, Thin Film, Low-Density/Highly Insulating, Single-Sided Testing, One-Dimensional, Thermal Effusivity, Specific Heat Capacity, Structural Probe, and Automation.
- 10 x Kapton-insulated Hot Disk® or Hot Strip® sensors: Models free of choice, with cable.

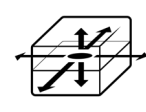
Always included:

- Hot Disk® Desktop App software (latest version)
- 1 x Stainless Steel verification bulk sample.
- 1 x Single-sided background insulation (single-sided testing).
- 1 x Room temperature sample holder (protective hood included).
- Instructions manual.
- Instrument test protocol.
- Power supply cord and USB cable.

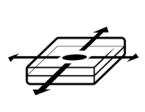
Available measurement modules for the TPS 2500 S



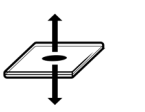
Isotropic
(Standard)



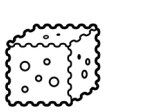
Anisotropic



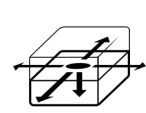
Slab



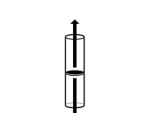
Thin Film



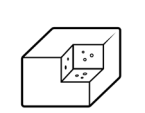
Low-Density /
Highly-Insulating



Single-Sided
Testing



One-Dimensional



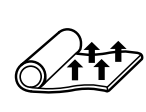
Structural
Probe



Automation



Specific Heat
Capacity



Thermal
Effusivity

Available sensors for the TPS 2500 S



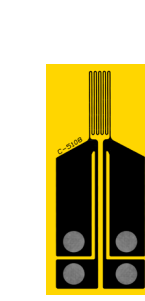
Kapton-insulated
Hot Disk® sensor
All models.



Teflon-insulated
Hot Disk® sensor
All models.



Mica-insulated
Hot Disk® sensor
All models.



Kapton-insulated
Hot Strip® sensor
All models.
(Works only with the
One-Dimensional
Measurement Module.)



Aluminium & Gold
Hot Cell® sensor
All models.

Hot Disk[®] Instruments

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