



Thermal Conductivity Apparatus (SMT-HT-141)

Thermal conductivity is defined as the ability of a material to transfer heat. It is measured in watts per square meter of surface area for a temperature gradient of 1 K per unit thickness of 1 m. The main factors that affect thermal conductivity are the density of the material, moisture of the material and room temperature. With increasing density, moisture and temperature, the thermal conductivity increases too.

Energy efficiency is a priority for many areas of industry. One aspect of energy efficiency is the improved insulation of buildings by using materials of a low thermal conductivity.

There are a number of possibilities to measure thermal conductivity and they differ in technique, sample size, testing time, capability and methodologies of measurement. A heat flow meter (HFM) test is a steady-state measurement process in which a specimen is placed in contact with an upper and a lower plate, which are then stabilized at two different temperatures. Due to the temperature gradient thus imposed, heat flows vertically through the specimen, from the hot face to the cold face. Under steady-state conditions, the specimen thermal conductivity can be calculated.

The Computer Controlled Thermal Conductivity of Building and Insulating Material Unit is designed to determinate the thermal conductivity of a wide range of materials used in buildings and other insulating materials.

The unit has Touch LCD display for visualization of process and the measurements. The Unit is also connected to Software for computer connectivity and data analysis. The Touch screen and computer software is included in the package.



TECHNICAL SPECIFICATIONS

Specifications:

- Touch LCD with GUI Interface for better monitoring and accurate measurement of Plant variables.
- Unit employed to measure thermal conductivity of low-conductivity materials, such as insulating materials.
- With the unit, samples measuring 30.5 cm x 30.5 cm and of variable thicknesses, ranging from a few millimeters to 10 cm, are tested between two heat flux sensors in fixed or adjustable temperature gradients. After a few minutes for the system to reach equilibrium, the unit determines the thermal conductivity and thermal resistance of the sample.
- ESOLS DAQ Software for monitoring and control.

Technical Data:

- Bench-top unit.

Thermally insulated unit.

Plate temperature ranges: 0 to 40°C. Cooling system: Forced Air.

Plate temperature control: Peltier system. Specimens:

- LxW:300x300mm. Thickness: 5-100 mm.
- It is recommended to use fibrous, granular and cellular materials and
- soft, rigid and semi-rigid materials.

Thermal resistance range: 0.1 to 8.0 m²·K/W.

Thermal conductivity range: 0.002 to 1.0 W/m·K.

A loading system ensures that the same force is applied to the specimens. Value: 21KPa.

Two heat flux sensors, situated in the cold and hot plate.

Six temperature sensors, located in different points of the unit: 3 sensors situated in the hot plate and 3 sensors situated in the cold plate. Repeatability: 0.5%.

Accuracy: ± 1 to 3%.

Set of specimens:

- Materials: black nitrile rubber, polyacetal, expanded polystyrene, PTFE, PMMA, PVC, glass fiber and glass
- fiber with resin.

The unit is connected with the computer via USB connection cable.

- Touch LCD with GUI Interface for better monitoring and accurate measurement of Plant variables.
- ESOLS DAQ Software for monitoring and control.
 - Graphical visualization.
 - Security mechanism for login.
 - USB Connected
 - Compatible with Windows 7,8.1,10.
- Digital Instrumentation
- Capability to modify according to end user.
- Can be used in Research Purposes.

Experiments:

- Study of the thermal conductivity of calibrated materials.
- Determination of the density of different materials.
- Determination of the thermal conductivity of different materials.
- Determination of the thermal resistance.
- Additional practical possibilities: Sensors calibration.