

WL 372

Radial and linear heat conduction



Description

- investigation of heat conduction in solid bodies
- linear and radial heat conduction
- GUNT software for displaying temperature profiles

Heat conduction is one of the three basic forms of heat transfer. Kinetic energy is transferred between neighbouring atoms or molecules. The heat transport is material-bound. This type of heat transfer is an irreversible process and transports heat from the higher energy level, i.e. higher absolute temperature, to the lower level with lower temperature. If the heat transport is maintained permanently by means of the supply of heat, this is called steady heat conduction. The most common application of heat conduction in engineering is in heat exchangers.

The WL 372 experimental unit can be used to determine basic laws and characteristic variables of heat conduction in solid bodies by way of experiment. The experimental unit comprises a linear and a radial experimental setup, each equipped with a heating and cooling element. Different measuring objects with different heat transfer properties can be installed in the experimental setup for linear heat conduction. The experimental unit includes with a display and control unit.

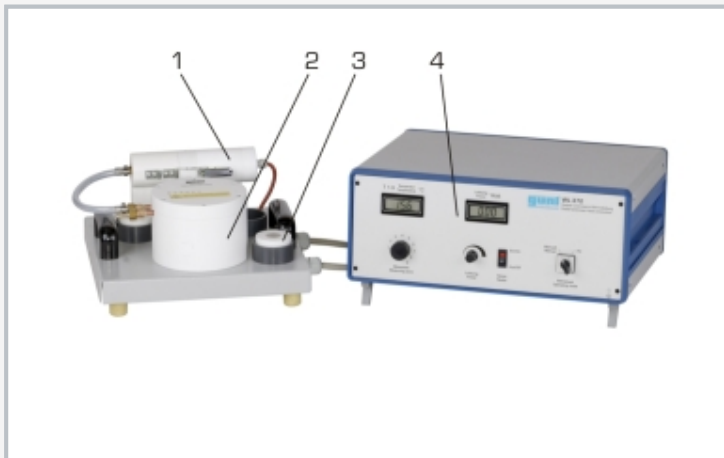
Sensors record the temperatures at all relevant points. The measured values are read from digital displays and can be transmitted simultaneously via USB directly to a PC, where they can be analysed using the software included.

Learning objectives/experiments

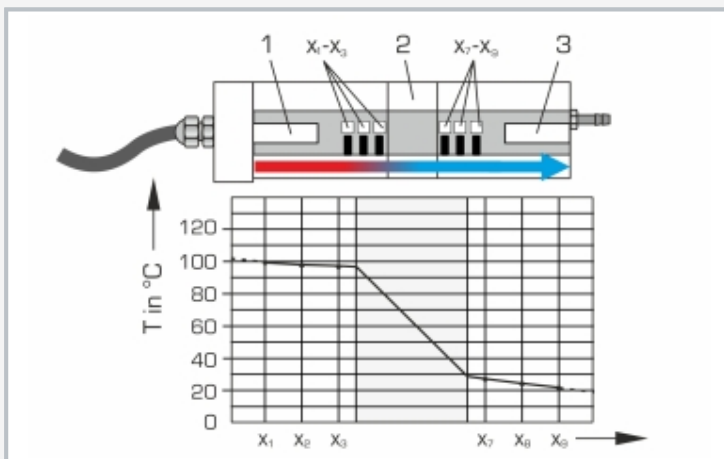
- linear heat conduction (plane wall)
 - ▶ determination of temperature profiles for different materials
 - ▶ determination of the temperature profile in case of a disturbance
 - ▶ determination of the thermal conductivity λ
- radial heat conduction
 - ▶ determination of the temperature profile
 - ▶ determination of the thermal conductivity λ

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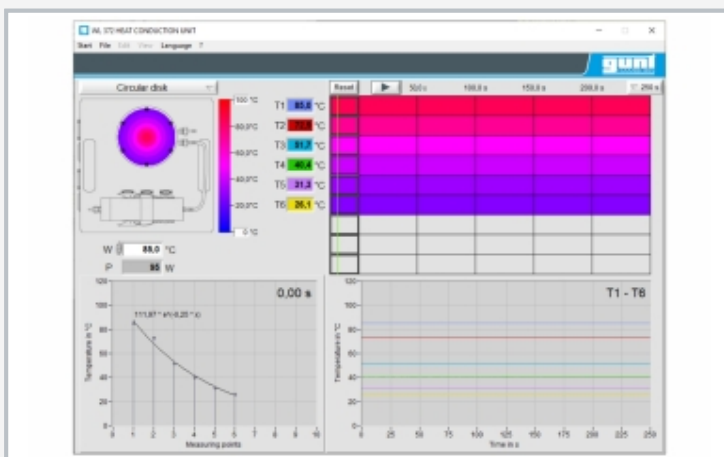
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1 experimental setup for linear heat conduction, 2 experimental setup for radial heat conduction, 3 measuring object, 4 display and control unit



Experimental setup for linear heat conduction with graphic representation of the temperature profile: 1 heater, 2 measuring object, 3 cooling element; x_1-x_3 and x_7-x_9 : measuring points



Software screenshot: temperature profile for radial heat conduction

Specification

- [1] investigation of heat conduction in solid bodies
- [2] experimental setup consisting of experimental unit and display and control unit
- [3] linear heat conduction: 3 measuring objects, heating and cooling element, 9 temperature measuring points
- [4] radial heat conduction: brass disc with heating and cooling element, 6 temperature measuring points
- [5] cooling by means of tap water
- [6] electrical heating element
- [7] representation of the temperature profiles with GUNT software
- [8] GUNT software for data acquisition via USB under Windows 10

Technical data

Linear heat conduction

- 3 measuring objects, insulated
- 1x DxD: 25x30mm, steel
- 1x DxD: 15x30mm, brass
- 1x DxD: 25x30mm, brass
- heater: 140W

Radial heat conduction

- disc DxD: 110x4mm
- heater in the centre of the disc: 125W
- cooling coil on the outer edge of the disc

Measuring ranges

- temperature: 0...100°C
- power: 0...200W

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 400x360x210mm (experimental unit)

LxWxH: 470x380x210mm (display and control unit)

Total weight: approx. 22kg

Required for operation

water connection, drain

PC with Windows recommended

Scope of delivery

- 1 experimental unit
- 1 display and control unit
- 1 set of measuring objects
- 1 set of hoses
- 1 GUNT software + USB cable
- 1 set of instructional material

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Optional accessories

WP 300.09

Laboratory trolley