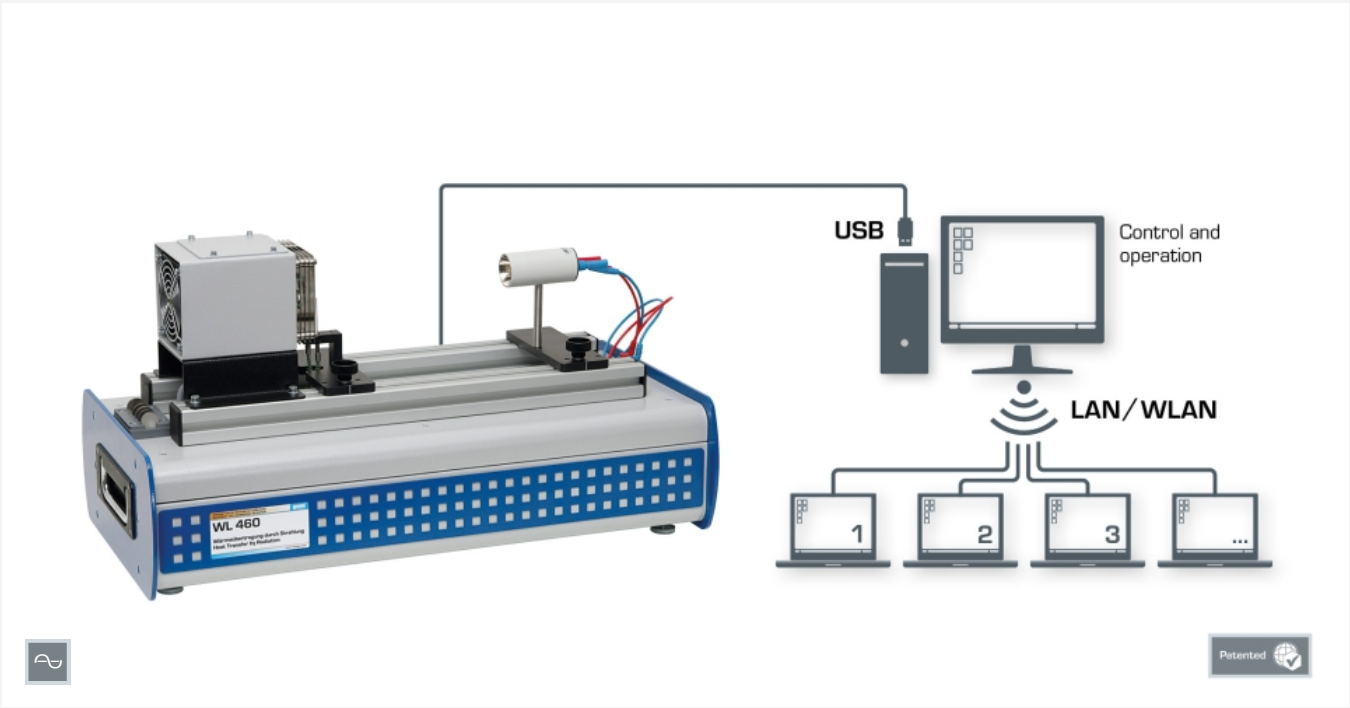
WL 460

Heat transfer by radiation



Complete experimental setup with one PC for control and operation and any number of workstations with GUNT software for observation and evaluation of the experiments.

Description

- **effect of different surfaces on heat transfer by radiation**
- **network capability: network access to ongoing experiments by any number of external workstations**
- **GUNT software: operation and control of the experimental unit, data acquisition and educational software**
- **E-Learning: multi-media didactic materials accessible online**

Heat radiation is one of the three basic forms of heat transfer. In radiation the heat transfer takes place via electromagnetic waves. Unlike heat conduction and convection, heat radiation can also propagate in a vacuum. Heat radiation is not bound to a material.

WL 460 offers basic experiments for targeted teaching on the topic of heat transfer by radiation. At the heart of the experimental unit is a metallic specimen heated by a concentrated light beam. The light beam is generated by a continuously adjustable halogen lamp and a parabolic reflector. The reflector concentrates the radiation to a focal point. A specimen is placed on a thermocouple located at the focal point. The thermal radiation emitted by the specimen is measured by a thermopile. In order to be able to measure the radiation at different distances, the thermopile is mounted on a moveable carriage.

Specimens with different surfaces are available to be selected. Perfectly matched components ensure rapid heating and trouble-free measurements.

The microprocessor-based instrumentation is well protected in the housing. The GUNT software consists of a software for system operation and for data acquisition and an educational software. With explanatory texts and illustrations the educational software significantly aids the understanding of the theoretical principles. The operation and control of the experimental unit is carried out via a PC (not included in the scope of delivery) connected via a USB interface. Any number of workstations with the GUNT software can be used for observation and evaluation of the experiments via LAN/WLAN connection using only one licence.

Learning objectives/experiments

- verify Lambert's inverse-square law
- verify Stefan-Boltzmann law
- verify Kirchhoff's law
- study transient behaviour
- create power balances
- produce logarithmic diagrams for evaluations

- GUNT E-Learning
  - multi-media online course, which enables learning independent of time and place
  - access via Internet browser
  - educational software including different learning modules
  - course in the fundamentals
  - detailed thematic courses
  - check through targeted review of the learning objectives
  - authoring system with editor that enables you to integrate your own, local content into the educational software

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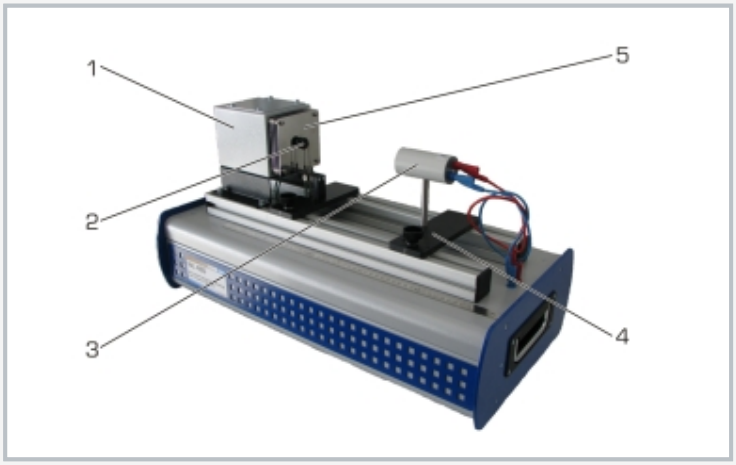
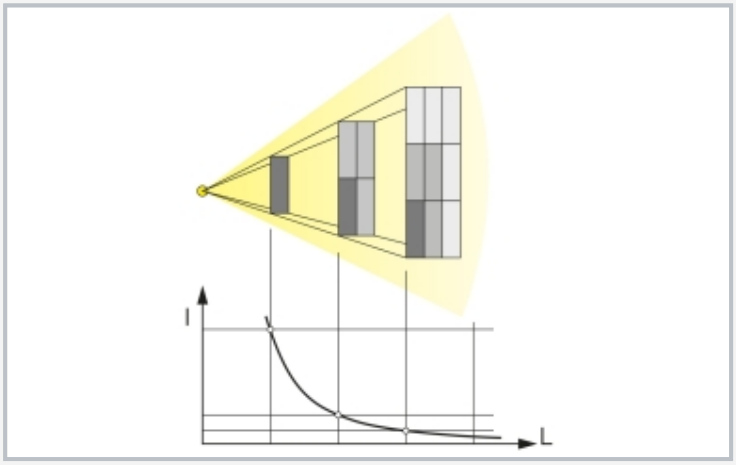
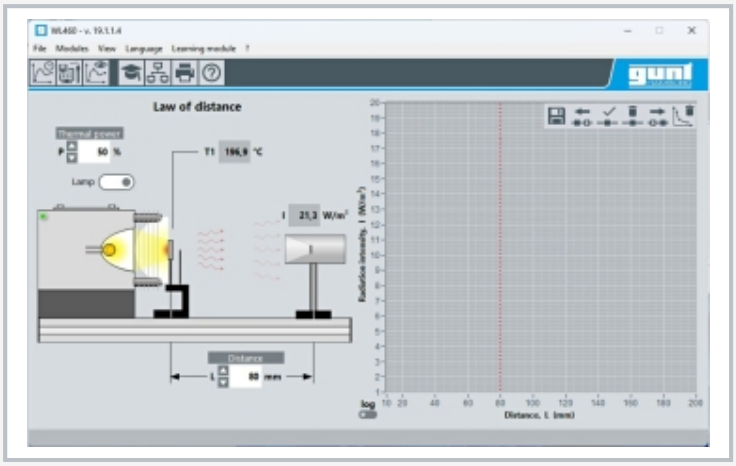


1 lamp housing, 2 specimen placed on thermocouple, 3 thermopile, 4 movable carriage, 5 orifice plate



radiation intensity with point-based radiation source: I intensity of the radiation, L distance to the radiation source (Lambert's inverse-square law)



user interface of the powerful GUNT software, experiment Lambert's inverse-square law

Specification

[1] part of the GUNT-Thermoline: Fundamentals of heat transfer
[2] investigation of heat radiation on different surfaces heated by a concentrated beam of light
[3] generation of the concentrated beam of light with a continuously adjustable halogen lamp and a parabolic reflector
[4] different metallic specimens
[5] thermopile on a movable carriage for measuring the heat radiation
[6] display of temperature and radiation intensity in the software
[7] due to integrated microprocessor-based instrumentation no additional devices with error-prone wiring are required
[8] functions of the GUNT software: system operation, data acquisition, educational software
[9] network capability: LAN/WLAN connection of any number of external workstations with GUNT software for observation and evaluation of the experiments
[10] E-Learning: multi-media didactic materials accessible online
[11] GUNT software for data acquisition via USB under Windows 10

Technical data

Halogen lamp
- electrical power 150W
- max. temperature: approx. 460°C

Aluminium specimens, Ø 20mm
- 1x matt anodized on both sides
- 1x painted on both sides (high-temperature paint)
- 1x matt anodized with one painted side

Copper specimens, Ø 20mm
- 1x nickel-plated
- 1x bright, oxidizes over time

Stainless steel specimens, Ø 20mm
- 1x bright, oxidizes over time due to high temperature

Measuring ranges
- temperature: 0...780°C
- radiation intensity: 0...1250W/m^2

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 670x350x370mm
Weight: approx. 18kg

Required for operation

PC with Windows

Scope of delivery

1 experimental unit
1 set of specimens
1 authoring system for GUNT educational software
1 GUNT software + USB cable
1 set of instructional material