

LHP 106

THERMODYNAMICS

The LHP-106 Thermodynamics laboratory covers all areas, theoretical and practical, concerning the **fundamentals of thermodynamics and the principles of heat transfer**.

The laboratory consists of a set of simulators, trainers and equipment listed on the right of this page (any PCs required are not included - provided locally by reseller).

In general, thermodynamics describes the general theory of energy and substance conversion. The fundamentals of thermodynamics deal with the behavior of systems during temperature changes. Also, this lab deals with the heat transfer that takes place in two fundamentally different ways by the use of simulators/trainers. A distinction is made thereby between material-bound (convection and heat conduction) and non-material bound (radiation).

- **Convective heat transfer**, often referred to simply as convection, is the transfer of heat from one place to another by the movement of fluids.
- **Heat conduction** (or thermal conduction) is the movement of heat from one object to another one that has different temperature when they are contacting each other.
- **Thermal radiation** is electromagnetic radiation generated by the thermal motion of particles in matter. All matter with a temperature greater than absolute zero emits thermal radiation. Particle motion results in charge-acceleration or dipole oscillation which produces electromagnetic radiation.

Heat exchange study for the essential principle of a heat exchanger which transfers the heat without transferring the fluid that carries the heat.

Additionally the lab includes experimental apparatus for studying the **condensation process**.

Condensation is the process through which gas changes into a liquid when it touches a cooler surface. Condensation is an important part of the water transformation cycle.



THT-135

Heat Conduction And Convection Lab Unit

THT-223

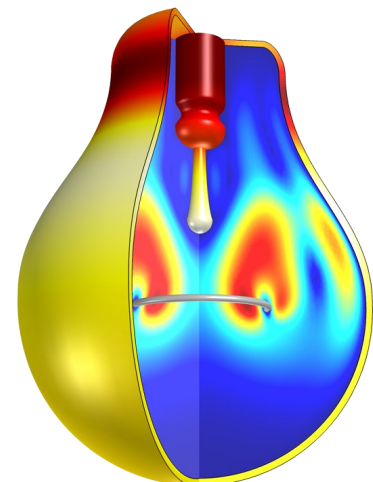
Condensation Process

THT-137

Heat Transfer By Radiation Lab Unit

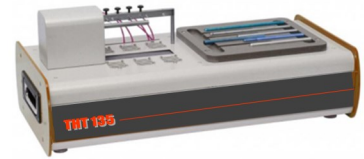
THT-X02

Tubular Heat Exchanger Lab Unit



THT-135

Heat Conduction And Convection Lab Unit



AIM: to conduct basic experiments on both forms of heat transfer: heat conduction and convection. To investigate the effects of heat conduction and convection on heat transfer in free and forced convection, calculate the convective heat transfer, investigate the effect of different type of materials on heat conduction and the effect of the length of the test sample on heat transfer.

THT-223

Condensation Process



AIM: to demonstrate the different condensation processes using two tubular shaped water-cooled condensers made of different materials. Drop-wise condensation can be demonstrated by means of the condenser with a polished gold-plated surface. Film condensation forms on the matt copper surface of the second condenser, thus making it possible to examine film condensation.

THT-137

Heat Transfer By Radiation Lab Unit



AIM: Investigate the effects in the process of heat transfer by radiation. The radiation of heat is applied by using a concentrated light beam to heat the metallic sample, The light beam is generated by an adjustable halogen lamp and a parabolic reflector which concentrates the light radiation to a focal point. The unit allows the temperature measurements on the sample, by placing the sample on a thermocouple located at the focal point of the light beam. The thermal radiation emitted by the sample is measured by a thermopile, an array of thermocouples which is movable to different distances.

THT-X02

Tubular Heat Exchanger Lab Unit



AIM: to investigate heat exchangers by using a Tubular heat exchanger, the transfer of thermal energy from the flow of one medium to another. The two flows do not come into direct contact with one another. Efficient heat transfer is a prerequisite for economical processes. Therefore, different heat exchanger types are used in practice depending on the requirements. The apparatus produces hot water and drives it through the heat exchange system. The cold water comes from connecting to the laboratory water supply. The hot water flows through the heat exchanger. Part of the thermal energy of the hot water is transferred to the cold water. Reversing the water connections changes the direction of flow and thus allows parallel flow or counter flow operation.