

**Product Name :**  
Free and Force Convection Apparatus**Product Code :**  
HEMT0009**Description :**

Free and Force Convection Apparatus

**Technical Specification :**

The Apparatus offers basic experiments for targeted teaching on the topic of free and forced convection on various heating elements.

At the heart of the experimental unit is a vertical air duct into which various heating elements are inserted. An axial fan is located on top of the air duct.

The fan draws in ambient air and guides it through the air duct.

The air flows past a heating element and absorbs heat.

Four heating elements with different geometries are available to be selected.

In order to investigate free convection, two of the four heating elements can be operated outside of the air duct.

The heating elements are designed in such a way to release heat only at their surface.

The compact design ensures rapid heating and a short time for experiments.

The experimental unit is equipped with temperature sensors at the inlet and outlet of the air duct.

The air velocity is measured to determine the airflow rate.

The microprocessor-based instrumentation is well protected in the housing.

The software consists of a software for system operation and for data acquisition and an educational software is connected to the PC via USB.

Heating power and flow rate are adjusted and displayed via the software.

**FEATURES:**

- Experimental determination of the Nusselt number
- Free and forced convection
- Investigation of the relationship between flow formation and heat transfer during experiments

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Description of transient heating process

Functions of the software: educational software, data acquisition, system operation

Calculation of convective heat transfer at different geometries :

Flat plate

Cylinder

Tube bundle

Calculation of typical characteristic variables of heat transfer :

Nusselt number

Reynolds number

SPECIFICATION:

Air duct :

Flow cross-section: 120x120mm

Height: approx. 0,6m

Heating elements, temperature limitation: 90°C

Tube bundle :

Number of tubes: 23

One tube in variable position is heated

Heating power: 20W

Heat transfer area: 0,001m<sup>2</sup>

Cylinder with an even temperature at the surface :

Heating power: 20W

Heat transfer area: 0,0112m<sup>2</sup>

Plate :

Heating power: 40W

Heat transfer area: 2x 0,01m<sup>2</sup>

Cylinder with heating foil to investigate the local heat transfer :

Heating power: 40W

Heat transfer area: 0,0112m<sup>2</sup>

Axial fan :

Max. Flow rate: 500m<sup>3</sup>/h

Max. Pressure difference: approx. 950Pa

Power consumption: 90W

Measuring ranges :

Air velocity: 0...10m/s

Temperature: 4x 0...325°C

Heating power: 0...50W

Required for Operation :

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase

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