

**Specification:**

- Free and forced convection unit illustrates free and forced convection on various heating elements.
- Free and forced convection unit offers basic experiments for targeted teaching on the topic of free and forced convection on various heating elements.
- The unit consists of an air duct fitted in the heart of the unit and various heating elements are inserted on it.
- The apparatus includes axial fan (variable speed) that located on top of the air duct and the fan draws in ambient air and guides it through 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.
- Each surface has its own built-in electric heater (variable output).
- Four heating elements with different geometries are available to be selected and in order to investigate free convection, two of the four heating elements can be operated outside of the air duct.
- The air flows past a heating element and absorbs heat.
- The apparatus includes thermocouples installed at the inlet and outlet of the air duct to measure the air temperature upstream and downstream of the surface and the temperature at the heat transfer surface.
- The apparatus includes manometer that uses in determining the air velocity to determine the air flow rate.
- Heating power and flow rate are adjusted and displayed via the software.
- Photon software is included.
- The trainer is connected to the PC via USB.

Experiments:-**Comparing free and forced convection for different surfaces.**

- Comparison of free convection from vertical and horizontal surfaces.
- Calculation of convective heat transfer at different geometries
 - Flat plate
 - Cylinder

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.



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IT-2013, Ramchandrapura Industrial Area,
Sitapura Extension, Jaipur-302022, India.



info@tesca.in
www.tescaglobal.com

- Tube bundle
- Experimental determination of the Nusselt number.
- Comparing the coefficient of heat transfer and Nusselt Number for forced and free convection.
- Calculation of typical characteristic variables of heat transfer
- Nusselt number
- Reynolds number
- Investigate the relationship between flow formation and heat transfer during experiments.
- Describe the transient heating process.

Technical Data:-

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: 31,41cm²

Cylinder with an even temperature at the surface

- Heating power: 20W
- Heat transfer area: 111cm²

Plate

- Heating power: 40W
- Heat transfer area: 2x 100cm²
- Cylinder with heating foil to investigate the local heat transfer
- Heating power: 40W
- Heat transfer area: 111cm²

Axial fan

- Max. flow rate: 500m³/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

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Supply voltage

- 1 phase, 220V, 50Hz

Scope of Delivery:-

- Free and forced convection unit
- Hard copy of the user manual.
- Photon software + USB cable.

Required for Operation:-

- Laboratory PC.

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