

**Product Name :**  
Astra Scientific Computerized Stefan Boltzman Apparatus

**Product Code :**  
HeatMassLab0007



#### **Description :**

Astra Scientific Computerized Stefan Boltzman Apparatus

#### **Technical Specification :**

The heat transfer trainer enables users to match the individual heat quantities to the corresponding type of transfer. The core element is a heated metal cylinder located at the center of the pressure vessel. The surface temperature of the heated metal cylinder is controlled. Temperature sensors measure the surface temperature of the metal cylinder and the wall temperature of the pressure vessel. In addition to the heating power of the metal cylinder, it is possible to study the heat transport from the metal cylinder to the wall of the pressure vessel.

The pressure vessel can be put under vacuum or positive gauge pressure. In the vacuum, heat is transported primarily by radiation. If the vessel is filled with gas and is under positive gauge pressure, heat is also transferred by convection. It is possible to compare the heat transfer in different gases. In addition to air, nitrogen, helium, carbon dioxide or other gases are also suitable.

A rotary vane pump generates negative pressures down to approx. 0,02mbar. Positive gauge pressures up to approx. 1bar can be realized with compressed air. Two pressure sensors with suitable measuring ranges

are available for the pressure measurement: a Pirani sensor measures the negative pressure while a piezo-resistive sensor measures the positive pressure.

The measured values can be read on digital displays. At the same time, the measured values can also be transmitted directly to a PC via USB, where they can be analyzed with the software.

#### FEATURES:

- Experiments in vacuum
  - o Heat transfer by radiation
  - o Determination of the radiation coefficient
- Experiments at ambient pressure or positive gauge pressure
  - o Heat transfer by convection and radiation
  - o Determination of the heat quantity transferred by convection
  - o Determination of the heat transfer coefficient based on measured values
  - o Theoretical determination of the heat transfer coefficient based on the Nusselt number
  - o Comparison of the heat transfer in different gases
  - o Heat transport between heating element and vessel wall by convection and radiation

#### SPECIFICATION:

- Heating element

Output: 20W

Radiation surface area: approx. 61cm<sup>2</sup>

- Pressure vessel

Pressure: -1...1,5bar

Volume: 11L

- Pump for vacuum generation
- Power consumption: 250W
- Nominal suction capacity: 5m<sup>3</sup>/h
- Final pressure with gas ballast: 3\*10<sup>-3</sup>mbar
- Final pressure without gas ballast: 3\*10<sup>-3</sup>mbar

- Measuring ranges

negative pressure:  $0,5 \cdot 10^{-3} \dots 1000 \text{ mbar}$

Pressure:  $-1 \dots 1,5 \text{ bar rel.}$

Temperature:  $0 \dots 250^\circ \text{C}$

Power:  $0 \dots 23 \text{ W}$

- Required for Operation

230V, 50Hz, 1 phase

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



## Astra Scientific

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