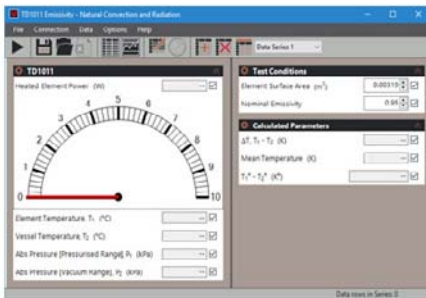




VDAS® TD1011

## EMISSIVITY - CONVECTION AND RADIATION

Trolley-mounted, mobile apparatus that demonstrates how different types of heat can transfer over a range of pressures; helps the understanding of the Stefan Boltzman constant.



SCREENSHOT OF THE VDAS® SOFTWARE



### KEY FEATURES

- Includes TecQuipment's Versatile Data Acquisition System (VDAS®)
- A self-contained, mobile, compact unit for ease of use and storage
- Helps students to understand natural 'free' convection, radiation, emissivity and the Stefan-Boltzman equation
- Includes a pressure vessel to allow tests above and below atmospheric pressure
- All instruments and vacuum pump included
- Test results are accurate enough to allow extrapolation down to a complete vacuum

### LEARNING OUTCOMES

- Determination of emissivity
- Verification of the Stefan-Boltzmann constant

### KEY SPECIFICATIONS

- Digital display of element power, temperatures and pressures

# EMISSIVITY – CONVECTION AND RADIATION

## DESCRIPTION

The Natural Convection and Radiation equipment allows the study of heat transfer at different pressures and vacuum. It shows the differences between radiation and natural 'free' convection. It allows students to find the emissivity of a surface and verify the Stefan-Boltzman equation. It also gives students an understanding of the non-dimensional characteristics using Nusselt, Grashof, Prandtl and Knudsen numbers.

A small heated element hangs in the centre of a pressure vessel. The heater has a matt black surface. Attached to its surface is a thermocouple to measure the temperature. The vessel's inside is also black, and it has a thermocouple fitted to its wall to measure the temperature in the vessel. The vessel may be charged with compressed air up to 1 bar (gauge) or evacuated down to approximately 5 Pa (absolute). Students can extrapolate the results down to a total vacuum (no convection). This allows them to isolate the heat transfer by radiation.

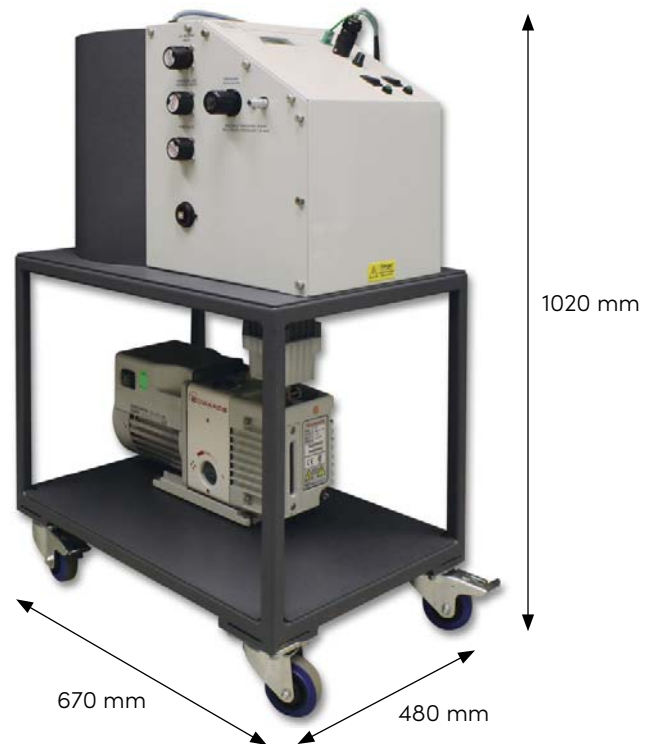
Instruments and a digital display measure and display the temperatures, pressures and power to the element. To give accurate measurements of pressure and vacuum, the equipment has two different pressure transducers - one for pressures above atmospheric and one for pressures below atmospheric.

Included is a vacuum pump, and a regulator for an external compressed air supply (up to 10 bar). The system includes a pressure relief valve to protect the equipment and the user.

Students can do tests with or without a computer connected. However, for quicker tests with easier recording of results, TecEquipment supply their Versatile Data Acquisition System (VDAS®) with this product. This gives accurate real-time data capture, monitoring and display, calculation and charting of all the important readings on a computer (computer not included).

## STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer



# EMISSIVITY – CONVECTION AND RADIATION

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory

### STORAGE TEMPERATURE RANGE:

-25°C to +55°C (when packed for transport)

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### OPERATING RELATIVE HUMIDITY RANGE:

80% at temperatures < 31°C decreasing linearly to 50% at 40°C

## ESSENTIAL SERVICES

### ELECTRICAL SUPPLY:

- 110 VAC to 120 VAC 50 Hz/60 Hz 6 A

OR

- 220 VAC to 240 VAC 50 Hz/60 Hz 3 A

(Please state when ordering)

**NOTE:** For tests with pressures above atmospheric, you also need an external supply of clean, dry compressed air at between 1.5 bar and 10 bar (not supplied).

## DETAILED SPECIFICATION

TecEquipment is committed to a programme of continuous improvement; hence we reserve the right to alter the design and product specification without prior notice.

### NETT DIMENSIONS AND WEIGHT:

1020 mm high x 480 mm x 670 mm and 105 kg

### APPROXIMATE PACKED DIMENSIONS AND WEIGHT:

0.5 m<sup>3</sup> and 135 kg

### INSTRUMENTS:

Digital display of element power, temperatures and pressures

### MAXIMUM WORKING PRESSURE:

1.25 bar

### MAXIMUM ELEMENT SURFACE TEMPERATURE:

200°C