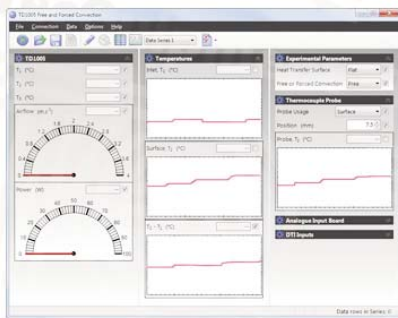


TD1005

Free and Forced Convection

Shows free and forced convection from different heat transfer surfaces

Works with
VDAS®



Typical screenshot of the VDAS® software



- Self-contained, bench-top mounting
- Includes three of the most common heat transfer surfaces – flat plate, pinned and finned
- Simple and safe to use
- Thermocouples and a sensitive anemometer measure temperatures and air velocity – shown on a digital display
- Additional hand-held thermocouple probe included – to measure temperatures along the length of the pins and fins of two heat transfer surfaces
- Variable speed fan and variable power heat source for a range of tests
- Can connect to TecEquipment's Versatile Data Acquisition System (VDAS®)

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- An ISO 9001 certified company
- VDAS is a registered trademark of TecEquipment Ltd

TD1005

Free and Forced Convection

Description

The bench-mounting equipment includes a vertical duct that holds the chosen heat transfer surface and all instruments needed.

TecEquipment include three different common heat transfer surfaces with the equipment:

- A Flat Plate
- A Pinned Surface – similar to a tubular heat exchanger
- A Finned Surface – similar to the fins on air-cooled engines or electrical heat sinks

Each surface has its own built-in variable-power electric heater. Students choose which surface they need to test and fit it to the duct using simple fixings.

For free convection tests, the heated air rises from the surface and up the duct. For forced convection tests, a variable-speed fan draws air up through the duct and across the surface. Thermocouples measure the air temperature upstream and downstream of the surface and the temperature at the heat transfer surface. The downstream probe moves in a traverse mechanism to measure the temperature distribution across the duct, allowing calculation of the bulk outlet temperature. An additional probe allows students to measure the temperature distribution along the extended surfaces of the pinned and finned heater transfer surfaces. A sensitive anemometer measures the air velocity.

Two controls allow students to set different air velocities and heater power for a full range of tests.

A digital display shows the heater power, air velocity and the temperatures measured by the thermocouples.

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

Recommended Ancillaries

- VDAS-B (bench-top version of the Versatile Data Acquisition System)

Standard Features

- Supplied with comprehensive user guide
- Five-year warranty
- Made in accordance with the latest European Union directives

Experiments

- Comparing free and forced convection for different surfaces
- Comparison of free convection from vertical and horizontal (finned) surfaces
- Comparison of heat transfer surface efficiency
- Comparing the coefficient of heat transfer and Nusselt Number for forced and free convection
- Temperature distribution along finned and pinned surfaces

Operating Conditions

Operating environment:
Laboratory

Note: This equipment accurately measures temperatures and low speed convection air flow, so you must use it in a laboratory with stable temperature and airflow conditions, away from direct heat sources and sunlight.

Storage temperature range:
–25°C to +55°C (when packed for transport)

Operating temperature range:
+15°C to +30°C

Operating relative humidity range:
80% at temperatures < 31°C decreasing linearly to 50% at 40°C

Sound Levels

Less than 70 dB(A)

Essential Services

Bench space needed:
850 mm x 550 mm, plus space for a suitable computer if you need to use the optional VDAS

Electrical supply (determined by order):
220 to 240 VAC 50 Hz to 60 Hz at 0.6 A

or

110 to 120 VAC 50 Hz to 60 Hz at 1.2 A

Technical Details

Nett dimensions and weight (when assembled with anemometer on duct):

850 mm wide x 550 mm front to back x 1200 mm high and approximately 30 kg (including the three heat transfer surfaces)

Approximate packed volume and weight:
0.6 m³ and 40 kg

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