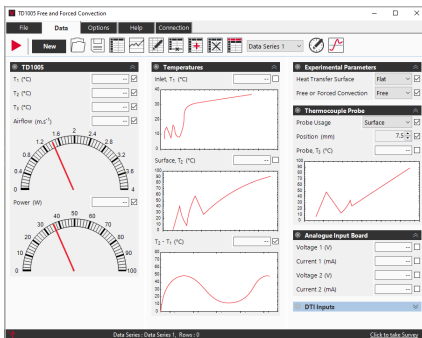


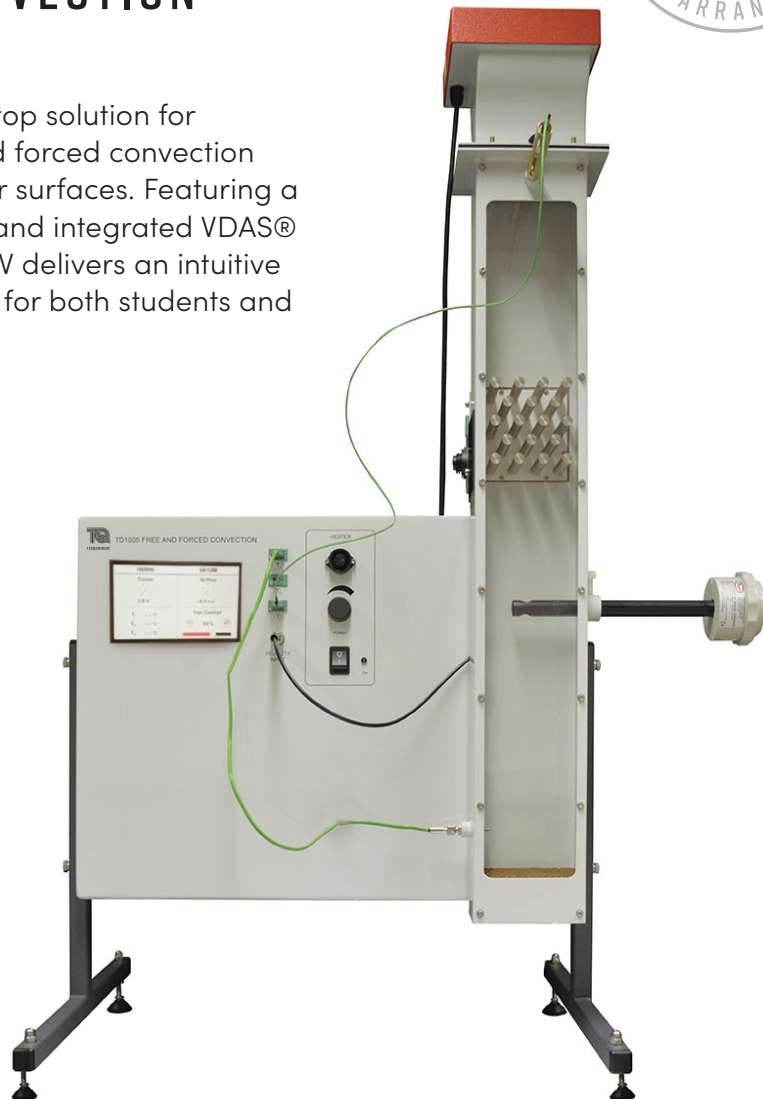
## FREE AND FORCED CONVECTION

**VDAS<sup>®</sup> ONBOARD** TD1005V

A compact, fully self-contained benchtop solution for demonstrating and analysing free and forced convection from a range of common heat transfer surfaces. Featuring a modern colour touchscreen interface and integrated VDAS<sup>®</sup> Onboard data acquisition, the TD1005V delivers an intuitive and efficient experimental experience for both students and instructors.



SCREENSHOT OF THE VDAS<sup>®</sup> SOFTWARE



### KEY FEATURES

- The self-contained, free-standing unit includes three interchangeable heat transfer surfaces: flat plate, pinned and finned
- Full-colour touchscreen display for clear, intuitive control and real-time viewing of heater power, air velocity, and temperature readings
- Integrated VDAS<sup>®</sup> OnBoard system for seamless data acquisition, real time monitoring and USB connectivity to a computer
- Touchscreen-controlled variable speed fan for precise forced convection experiments
- Variable power heater for flexible test conditions
- Built-in thermocouples and sensitive anemometer for accurate measurement of temperatures and airflow
- Handheld thermocouple probe for detailed temperature profiling along fins and pins

# FREE AND FORCED CONVECTION



## DESCRIPTION

The TD1005V is a self-contained benchtop apparatus designed to simplify the study of convection heat transfer. At its core is a vertical duct that houses the selected heat transfer surface along with all required instrumentation.

Three interchangeable test surfaces are included:

- Flat plate
- Pinned surfaces (representative of tubular heat exchangers)
- Finned surface (typical of air-cooled engines, heat sinks and domestic radiators)

Each surface incorporates an individual electric heater with adjustable power. Students can quickly install the desired surface using simple fixings, enabling fast transition between experiments.

For free convection, heated air naturally rises through the duct. For forced convection, the integrated variable-speed fan draws air through the system and is controlled directly via the touchscreen interface.

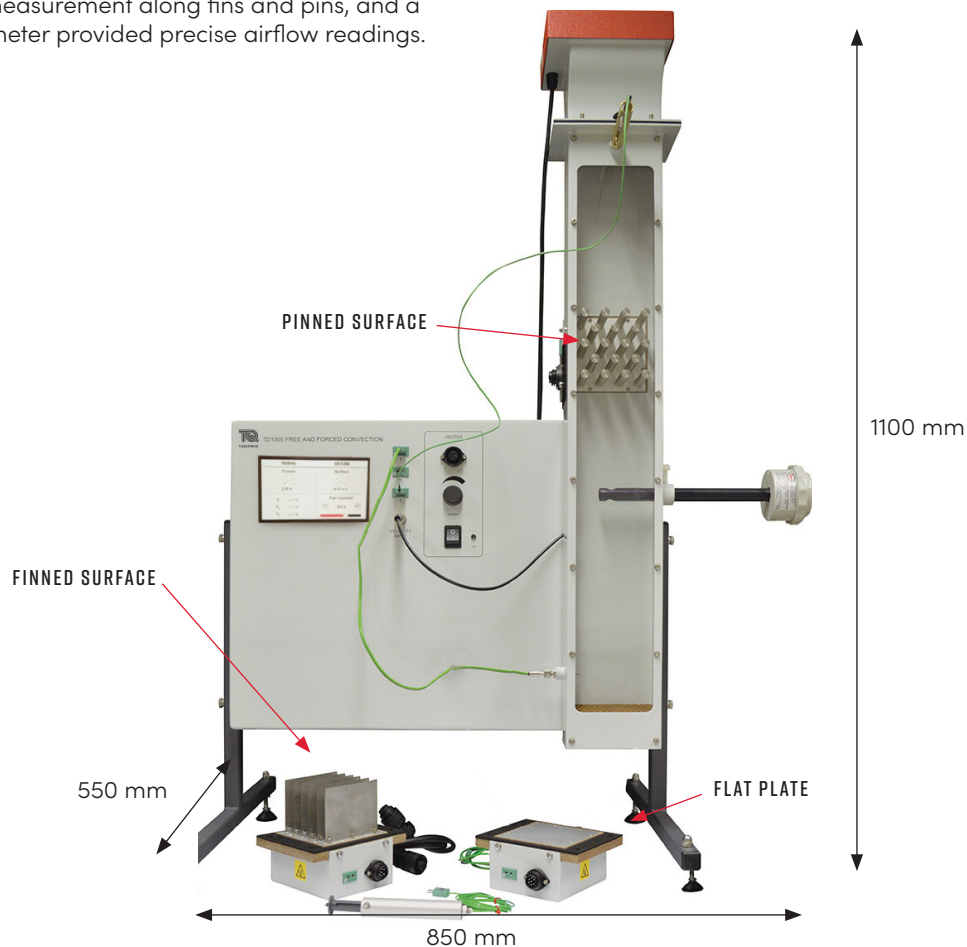
Thermocouples measure air and surface temperatures at key points, while a traversing downstream probe enables temperature distribution mapping across the duct for accurate bulk temperature calculations. A handheld probe allows detailed measurement along fins and pins, and a sensitive anemometer provided precise airflow readings.

The integrated colour touchscreen displays all key parameters in real time, enhancing usability and reducing setup time.

For enhanced data handling, the built-in VDAS® OnBoard system enables direct connection to a computer via USB, proving real-time data capture, monitoring, calculation, and graphing (computer not included).

## LEARNING OUTCOMES

- Compare free and forced convection across different surface geometries
- Investigate heat transfer efficiency of flat, pinned, and finned surfaces
- Analyse vertical vs horizontal finned surface performance
- Determine heat transfer coefficient and Nusselt number under varying conditions
- Measure and understand temperature distribution along extended surfaces



# FREE AND FORCED CONVECTION



## STANDARD FEATURES

- Integrated colour touchscreen display for control and data visibility
- VDAS® OnBoard included as standard for data acquisition and analysis
- Comprehensive user guide supplied
- Five-Year warranty
- Manufactured in accordance with the latest European Union directives
- ISO9001 certified manufacturer

## OPERATING CONDITIONS

### OPERATING ENVIRONMENT:

Laboratory use

Designed for accurate measurement of temperature and low-speed airflow, the TD1005V should be used in a stable laboratory environment, away from direct heat sources and sunlight.

### STORAGE TEMPERATURE RANGE:

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

### OPERATING TEMPERATURE RANGE:

+5°C to +40°C

### RELATIVE HUMIDITY:

Up to 80% at temperatures below 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):

- Single Phase 50 Hz to 60 Hz 90 VAC to 250 VAC at 5 A

## SPECIFICATIONS

TecQuipment follows a continuous improvement programme and reserves the right to modify specifications without prior notice.

### ASSEMBLED DIMENSIONS:

850 mm (W) x 550 mm (D) x 1100 (H)

### WEIGHT:

Approximately 30 kg (including all three heat transfer surfaces)

### PACKED:

Volume: 0.6 m<sup>3</sup>

Weight: 40 kg