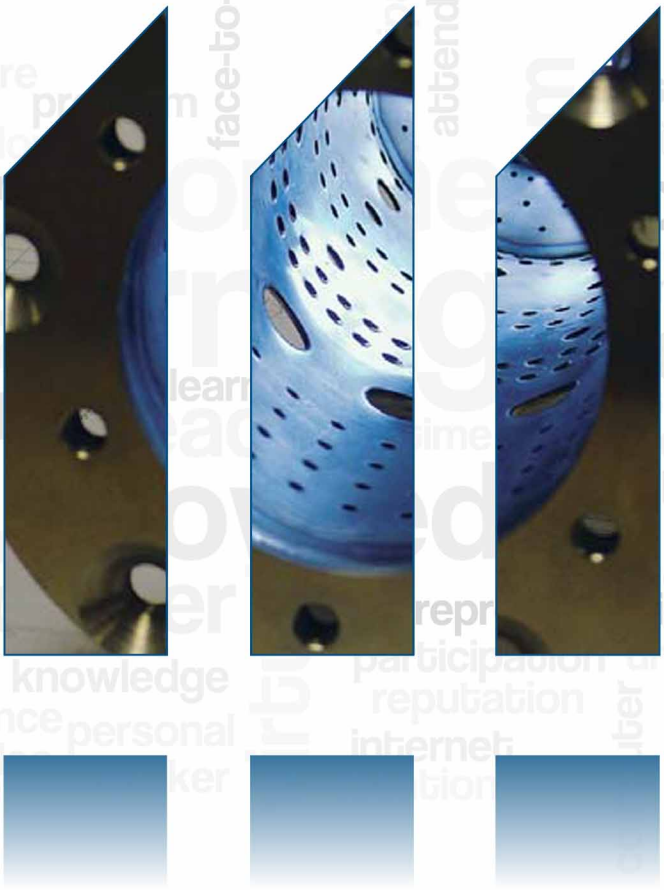

Thermodynamics

infoWERK
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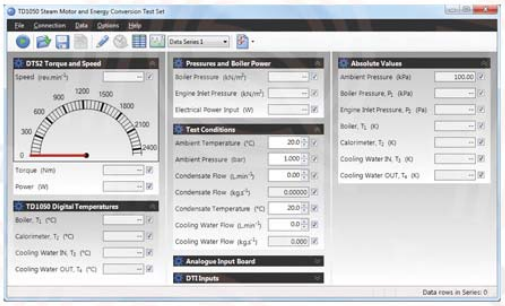
TD1050 Steam Motor and Energy Conversion Test Set

A laboratory-scale steam plant that shows fundamental thermodynamic principles of energy conversion and mechanical power measurement

Works with VDAS®



Screenshot of the optional VDAS® software

- Ideal for students to gain insight into the first and second laws of thermodynamics
- Introduces students to industry-standard methods of analysing steam plant performance, including Rankine Cycle Analysis and using the Willans Line
- Uses a simple two-cylinder steam motor and an electrically-heated boiler for easy understanding of the main parts of a steam plant
- Self-contained in a mobile frame that includes all instruments needed for experiments
- Allows students to copy the Marcet Boiler Experiment to prove the pressure-temperature relationship for saturated steam
- Connects to TecQuipment's optional Versatile Data Acquisition System (VDAS®)

TecQuipment Ltd, Bonsall Street, Long Eaton, Nottingham NG10 2AN, UK

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TecQuipment

TD1050 Steam Motor and Energy Conversion Test Set

Description

A mobile laboratory-scale steam plant for experiments in thermodynamic principles. It helps students to understand:

- Thermodynamic laws of energy conservation
- Steady flow energy equation
- Thermal efficiency and the control surface
- Rankine Cycle Analysis
- The Willans line

A mobile frame contains all the parts of the test set. An electric pump draws from a reservoir (included) to deliver water to an electrically-heated boiler. The boiler includes a safety valve, water level gauge and 'blow-down cock'. The boiler produces steam to turn a two-cylinder steam motor. The used steam from the motor outlet passes through a mains water-cooled condenser, then down to a waste tank or to a measuring vessel (supplied). TecQuipment supply a stopwatch and thermometer to allow accurate measurement of the flow and temperature of the condensate (steam flow).

The equipment includes all instruments needed for the experiments. These include a band-brake dynamometer with a digital torque and speed display, to measure and display motor speed, torque and power. Thermocouples connect to a digital temperature display to measure and display temperatures at key points in the test set. A throttling calorimeter allows students to measure the dryness fraction of the steam.

Two mechanical gauges show the boiler and engine inlet pressures. A meter shows the electrical power supplied to the heaters in the boiler.

For quicker tests with easier recording of results, TecQuipment 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-F (frame-mounted 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

- Steam plant performance, including the Rankine cycle analysis and the Willans line
- Marcet boiler experiment on saturated steam (pressure temperature relationship)

Essential Services

Cool, clean mains water supply and drain:
Maximum 150 litres/hour (2.5 Litres/minute) and with low mineral content

Electrical supply:

- 220 to 240 VAC single phase, 50/60 Hz 32 A **or**
- 220 to 240 VAC two phase, 50/60 Hz 32 A

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

Specification

Dimensions: Nett: 1700 mm high (assembled) x 1000 mm wide x 800 mm front to back. Packed volume : 1.6 m^3

Weight: Nett: 190 kg (without water)

Motor power: Approximately 90 W at 2000 $rev.min^{-1}$

Boiler:
Electrically heated by two independently-switched immersion heaters. Maximum experiment pressure approximately 350 kPa (set by 400 kPa pressure relief safety valve)

Instrumentation and measurement:

- Throttling calorimeter and thermocouple to measure the dryness fraction of the steam
- Dynamometer and display unit for motor speed and power measurement
- Pressure gauges for boiler and engine (motor) inlet pressures, including electronic transducers for connection to VDAS®
- Thermocouples and display for steam and cooling water temperatures
- Power meter for heater power input, including an output for VDAS®
- Calibrated vessel with stopwatch and thermometer for condensate (steam flow) measurement.

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TecQuipment

infoWERK is a leading expert in the development of eLearning courseware, learning system solutions, teaching and AV equipment.

Furthermore infoWERK is the representative and system integrator of "TecQuipment".

TecQuipment is one of the global leaders in technical teaching equipment for engineering. If you are interested in one of TecQuipment's products feel free to contact us at:

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