

≡ THERMAL POWER PLANT WITH STEAM TURBINE

VDAS[®] TD1060V

Mobile laboratory-scale steam turbine that demonstrates fundamental thermodynamic principles of energy conversion and mechanical power measurement.



SCREENSHOT OF THE VDAS[®] SOFTWARE

TD1060V (LAPTOP NOT INCLUDED)

KEY FEATURES

- Flash boiler design goes from cold to experiment-ready within seven minutes, with thermostatic control
- Variable-flow water feed control to vary steam production
- Mechanical power display and electrical power generation with power out, with variable load
- Rankine cycle analysis, with one to four steam jets, user settable
- Self-contained in a mobile frame that includes all instruments needed for experiments
- Comes with TecEquipment's optional Versatile Data Acquisition System (VDAS[®]) Onboard (no further hardware required)

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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
- Rankine cycle analysis

A mobile frame contains all the parts of the test set.

A variable-speed, low-voltage piston pump takes water from the reservoir and feeds it into a flash boiler. The thermostatically controlled flash boiler, which is electrically powered (no gas required), has a pressure-relief and thermal trip (200°C) fitted. Steam from the boiler moves up to and expands through the single stage, Ø127 mm axial turbine powering the electric dynamometer. The load applied by the dynamometer can be varied via the control panel. Optionally, the power generated may be used to power a 12 V device (e.g. laptop).

The used steam is condensed through the steam-to-air heat exchanger. Cooling fans can be activated to control the temperature of the return water to reservoir closing the cycle. Preheated feedwater increases the machine's efficiency.

For quicker tests with easier recording of results, the steam turbine comes with TecQuipment's Versatile Data Acquisition System (VDAS®) Onboard. The software is free to download from TecQuipment's website. This system provides accurate real-time data capture, monitoring and display, calculation and charting of all the important readings on a computer.

STANDARD FEATURES

- Supplied with comprehensive user guide
- Five-year warranty
- UK conformity assessed
- Made in accordance with the latest European Union directives
- ISO9001 certified manufacturer

ESSENTIAL SERVICES

COOL, CLEAN MAINS WATER SUPPLY AND DRAIN:

- Clean, low-mineral content water
- Between 1.5°C and 15°C
- Maximum 2.5 l.m⁻¹
- Pressure between 0.2 bar and 3 bar

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

SPECIFICATIONS

TecQuipment is committed to a programme of continuous improvement; hence we reserve the right to alter the



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design and product specification without prior notice.

DIMENSIONS:

Nett: 1700 mm high (assembled) x 1000 mm wide x 800 mm front to back.

Packed volume : 1.6 m³

WEIGHT:

Nett: 190 kg (without water)

MOTOR POWER:

Approximately 50 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

