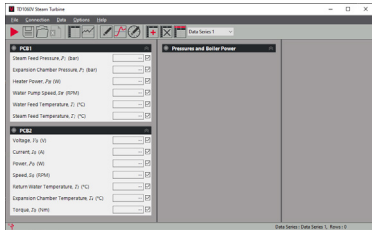


# THERMAL POWER PLANT WITH STEAM TURBINE

**VDAS<sup>®</sup> ONBOARD** TDI060V

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



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



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
- Includes TecQuipment's Versatile Data Acquisition System (VDAS<sup>®</sup>) Onboard (no further hardware required)

# ≡ THERMAL POWER PLANT WITH STEAM TURBINE



## 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.

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 the 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

## LEARNING OUTCOMES

- Demonstration of a steam power plant and its working cycle with electric power generation.
- Study about specific steam consumption and impact of steam flow rate on power generation.
- Examine the impact of loading and varying heater temperature on steam plant performance.
- Investigation of turbine speed, torque and power characteristics.
- Analysis of the steam plant performance to determine losses using energy balance equation.
- Comparison of the system with ideal Rankine cycle and determining Rankine, relative efficiencies.

## ESSENTIAL SERVICES

### WATER:

- 7 litres clean low mineral content water

### 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 design and product specification without prior notice.

### DIMENSIONS:

Nett: 1100 mm high (assembled) x 1020 mm wide x 680 mm front to back.

Packed volume : 1.6 m<sup>3</sup>

### WEIGHT:

Nett: 105 kg (with water)

### MOTOR POWER:

Approximately 10 W at 4500 rev.min<sup>-1</sup>

### BOILER:

Electrically heated by 5 kW of cartridge heaters. Maximum experiment pressure approximately 2.6 bar (260 Kpa). It comes with PID Controller, thermocouple and thermal trip with pressure relief valve rated at 3.8 bar (380 Kpa).

