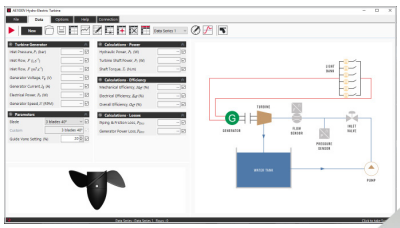
# HYDRO-ELECTRIC TURBINE

VDAS® ONBOARD AE1000V

The TecQuipment Hydro-Electric Turbine is a versatile, floor-standing, self-contained apparatus for the demonstration of hydro-electricity. It is supplied with five different propellers. The product focuses on exploring the best efficiency point of different propellers and performs energy audits to analyse system performance.



SCREENSHOT OF THE VDAS® SOFTWARE



## KEY FEATURES AND BENEFITS

- Self-contained system with built-in water tank
- 5 standard 3D-printed Kaplan propellers supplied: compatible with user-designed 3D-printed propellers
- Propellers act as prime movers to extract kinetic energy from water flow
- Lamp bank simulates domestic load over power generation
- Standalone operation: no PC required
- Large, high-resolution colour display for clear real-time visualisation
- VDAS® Onboard for data acquisition via USB
- Compatible with TecQuipment's VDAS® e-lab software for remote learning
- Supplied with comprehensive user guide
- Five-year warranty
- ISO9001 certified manufacturer; compliant with EU directives

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
TECQUIPMENT.COM +44 115 972 2611 SALES@TECQUIPMENT.COM

TECQUIPMENT

# HYDRO-ELECTRIC TURBINE

VDAS® ONBOARD AE1000V

## DESCRIPTION

The AE1000V Hydro-Electric Turbine is a versatile, floor-standing, self-contained apparatus for the demonstration and study of hydro-electric energy conversion. The system integrates a water tank, pump, propeller turbine, generator, sensors, control panel, and VDAS® Onboard for data acquisition and analysis.

Water flow is controlled via a diaphragm valve and passes through a pressure sensor and flow meter. These, along with generator output, provide real-time data for calculation of power, speed and efficiency. The turbine propeller is mounted on a shaft within a transparent enclosure, directly coupled to the generator. 5 standard 3D-printed Kaplan propellers are supplied, and users can design additional custom propellers for experimentation.

A system mimic is displayed on the backplate.

The control panel features a large high-resolution colour display to show experiment inputs and outputs, including current, voltage, power, and speed. A bank of lamps simulates domestic load for energy audits. VDAS® output allows USB connection to a PC and compatibility with TecQuipment's VDAS® e-lab remote learning software.

## CONTROLS AND INSTRUMENTATION

- Large colour display for visualisation of experimental parameters and results
- Control panel for pump on/off and light bank switches
- Real-time measurement of current, voltage, power, speed
- VDAS® USB output for connection to PC
- Optional integration with VDAS® e-lab for remote learning

## STANDARD FEATURES

- Supplied with detailed user guide
- Five-year warranty
- Compliant with latest EU directives
- ISO9001 certified manufacturer
- VDAS® software for data acquisition and analysis

## LEARNING OUTCOMES

Comprehensive demonstration and investigation into the foundations of hydro-electric energy conversion including:

- Simulate hydro-electricity and determine power curves by varying pump discharge and variable load
- Investigate the impact of blade number on system efficiency and determine the best efficiency point (BEP)
- Investigate the impact of blade angle on efficiency and determine BEP
- Study mechanical, electrical, and overall system efficiencies
- Understand the effects of domestic load on power consumption and perform energy audits using Sankey diagrams

## 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:

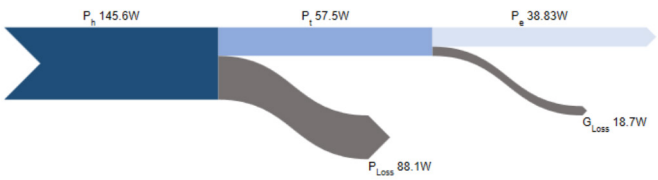
80% at temperatures < 31°C decreasing linearly to 50% at 40°C

## DETAILED 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 AND WEIGHT:

- 1255 mm (height), 1455 mm (width), 790 mm (depth), 60 kg (weight without water)




ENERGY FLOW MEASURED ACROSS THE AE1000V SYSTEM USING A SANKEY DIAGRAM



ONE OF THE FIVE PROPELLERS INCLUDED WITH THE HYDRO-ELECTRIC TURBINE

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
TECQUIPMENT.COM +44 115 972 2611 SALES@TECQUIPMENT.COM

TECQUIPMENT

# HYDRO-ELECTRIC TURBINE

VDAS® ONBOARD AE1000V

**SERVICES RECOMMENDED:**

- Suitable computer (not supplied)

**ELECTRICAL SUPPLY (SPECIFIED ON ORDER):**

- 1 Phase, 220-240 VAC, 50 Hz, 10 A

**OR**

- 2 Phase, 208V-220 VAC, 60 Hz, 10 A

**WATER:**

Requires 200 litres of clean water

**TURBINE:**

- Type: propeller
- Material: photopolymer resin
- Number of blades: 3, 4 and 5
- 3, 4 and 5 bladed pitched at 40°
- 4 bladed further pitched at 25° and 55°

**GENERATOR:**

- 220 W DC generator
- Rated speed: 3500 rpm

**SPACE REQUIRED:**

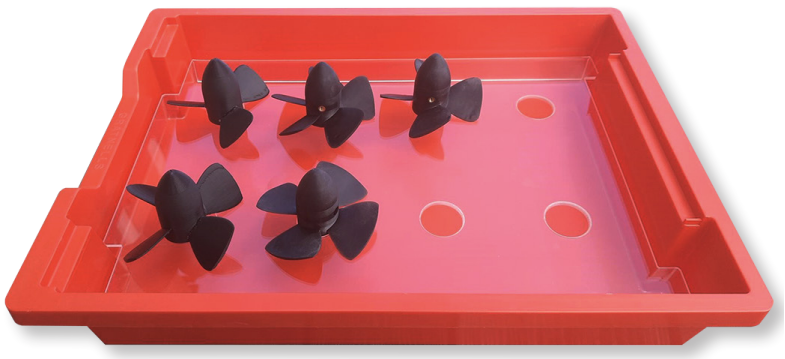
- 1500 mm x 800 mm floor space with 1 m access around the front and sides
- Additional space required for a PC (not supplied) if using VDAS®

**ITEMS INCLUDED:**

- Five different propellers in storage box
- User guide
- Software (VDAS®) – free download from TecQuipment's website
- All tools needed to conduct experiments

**OPTIONAL COMPUTER (NOT SUPPLIED):**

See the VDAS® datasheet for the computer specification



PROPELLERS, SUPPLIED IN BOX WITH SPACE FOR FURTHER BESPOKE PROPELLERS

TECQUIPMENT LTD, BONSALL STREET, LONG EATON, NOTTINGHAM NG10 2AN, UK
TECQUIPMENT.COM +44 115 972 2611 SALES@TECQUIPMENT.COM

TECQUIPMENT