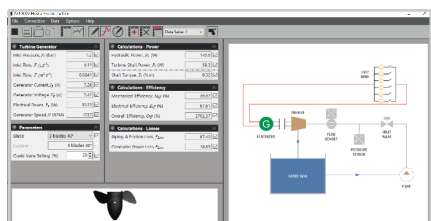




HYDRO-ELECTRIC TURBINE

VDAS[®] ONBOARD AE1000V

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



SCREENSHOT OF THE VDAS[®] SOFTWARE



KEY FEATURES

- Self-contained with built-in water tank
- Compatible with custom-designed 3D-printed propellers
- 3D-printed Kaplan propeller acts as the prime mover to extract kinetic energy from water flow
- Lamps to simulate the domestic load over the power generation
- Includes five different propellers, with varying number of blades and blade angles
- Standalone operation (no PC required)
- Includes TecQuipment’s Versatile Data Acquisition System (VDAS[®] Onboard) for data acquisition via USB
- Compatible with TecQuipment’s VDAS[®] e-lab remote learning software



HYDRO-ELECTRIC TURBINE



DESCRIPTION

The AE1000V Hydro-Electric Turbine is a self-contained, floor-standing system consisting of a water tank, propeller turbine and pump mounted below the pump controls, sensors, generator, control panel and turbine.

Water flows around the system controlled by a diaphragm valve on the system bench. The water passes through a pressure sensor and flow meter which are connected, along with the generator output, to VDAS® Onboard for analysis and the calculation of power and speed. From the generator constants, power and efficiency can be calculated.

The turbine is fitted to the left-hand end of the bench. The propeller is fixed on a shaft within a see-through enclosure and connects directly to the generator which is located between the turbine and the back plate. The turbine is supplied with five standard propellers. Information is provided for the user to design and 3D-print their own propellers for further experimentation.

A system mimic is displayed on the backplate.

The control box features a display screen for reading experiment inputs as well as output measurements, such as current, voltage, power and speed. A VDAS® output allows connection to a computer via USB. The control box also contains a light bank for visualisation of the power generated.

Controls for the operation of the product are on the control panel for:

- Pump on/off
- Light bank switches

STANDARD FEATURES

- Supplied with user guide
- Five-year warranty
- Made in accordance with the latest European Union directives
- ISO9001 certified manufacturer
- VDAS® software

LEARNING OUTCOMES

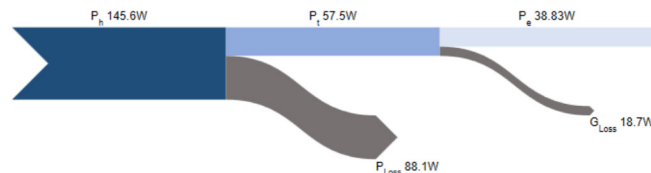
Comprehensive demonstration and investigation into the foundations of hydro electric energy conversion including:

- Simulate the concept of Hydroelectricity and determine power curves by varying the pump discharge and variable load light bank, as domestic load.
- Impact of number of blades on the system efficiency. Compare efficiencies of different blade variants and determine best efficiency point (BEP).
- Impact of blade angles on the system efficiency. Compare efficiencies of different angle variants and determine best efficiency point (BEP).
- Study about mechanical efficiency, electrical efficiency, and overall efficiencies.
- Impact of domestic load acting as power consumption and formulate energy audit of system using Sankey diagram.

OPERATING CONDITIONS



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



ENERGY FLOW MEASURED ACROSS THE AE1000V SYSTEM USING A SANKEY DIAGRAM



HYDRO-ELECTRIC TURBINE



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)

SERVICES RECOMMENDED:

- Suitable computer (not supplied)

ELECTRICAL SUPPLY (SPECIFIED ON ORDER):

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

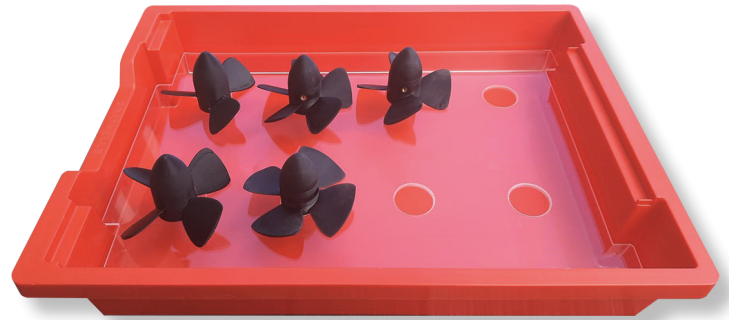
OR

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

WATER:

Requires 200 litres of clean water

TURBINE:



PROPELLERS, SUPPLIED IN BOX WITH SPACE FOR FURTHER BESPOKE PROPELLERS

- 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:

- 220W DC generator
- Rated speed 3500 RPM

SPACE REQUIRED:

- Solid, level floor: allow at least 2 m of free space around the inlet and 3 m at the outlet

ITEMS INCLUDED:

- Five different propellers in storage box
- User guide
- Software (VDAS®) free download from TecQuipment's website
- M2 and M4 Allen keys

OPTIONAL COMPUTER (NOT SUPPLIED):

See the VDAS® datasheet for the computer specification

