WIND ENERGY TRAINER WITH WIND TUNNEL

Product Overview

The Wind Energy Trainer with Wind Tunnel is a comprehensive laboratory-scale setup designed to study the principles of wind energy conversion and turbine performance under controlled conditions. The system simulates real-world wind conditions through a built-in wind tunnel, enabling practical demonstration of wind energy generation, storage, and utilization.

Features

- Laboratory-scale wind tunnel simulator for studying wind energy.
- Converts kinetic wind energy into electrical energy.
- Stand-alone wind power plant (not connected to the main grid).
- Axial fan with adjustable speed to vary wind velocity.
- Flow straightener for smooth and low-turbulence airflow.
- Generator transforms kinetic energy into electrical energy.
- Accumulator (battery) for energy storage (not included, must be provided by end user).
- Electrical loads via incandescent bulbs (consumers).
- Capability to connect external loads (e.g., heater, fan).
- Digital measurement of wind speed, rotor speed, current, and voltage.
- Safety feature: emergency push button.
- Blades can be changed for testing different configurations or replaced with 3D-printed blades.

Experiments

- Understanding wind tunnel simulator.
- Characterization of a horizontal axis wind turbine.
  - o Varying blade number.
  - o Varying blade orientation.

Note: Specifications are subject to change, Photos shown above are Indicative, Actual Product can Vary.

- Measuring wind speed using an anemometer.
- Studying turbine start-up and inertia effects.
- Interaction of turbine with wind tunnel airflow.

Technical Specifications

Wind Tunnel

- Material: Rust-free painted steel
- Diameter: 600–650 mm
- Length: 300–400 mm

Axial Fan

- Max volumetric flow rate: 3.5 m^3/s
- Max power: 1.1 kW
- Rotor diameter: 600 mm
- Speed: 1400 rpm

Generator (Wind Turbine)

- Max output: 60 W (higher output available on demand)
- Voltage: 12 VDC
- Max charging current: 5 A
- Replaceable blades for orientation/efficiency tests

Battery (Not Included due to Export Regulations)

- Voltage: 12 VDC
- Capacity: 8 Ah

Electrical Load (Bulbs)

- Voltage: 12 VDC
- Quantity: 5 pcs
- Power: 15 W each

Measuring Ranges

- Wind velocity: 0.3–50 m/s
- Speed: 0–3000 rpm
- Voltage: 0–20 VDC
- Current: 0–35 A

Software

- DAQ system includes Software and set of electronic sensors for data acquisition.

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