

# AEROGENERATOR WITH WIND TUNNEL TRAINER

Mod. WIND-TU/EV

Mod. WIND-TU2/EV (computerized version)



## INTRODUCTION

Energy saving and environmental pollution reduction are crucial global issues. Using renewable energies as alternative sources to fossil fuels can address both issues, with great benefits especially in countries where traditional energy sources are scarce.

Considering the above, this system enables experimental investigation on the conversion of wind energy into electricity by means of a wind power generator. The equipment is manufactured using real components available on the market and includes a wind source (variable speed axial fan).

## DESCRIPTION

**System configuration:** stand-alone (isolated from the grid)

**The system consists of:**

- A)** Axial fan with frequency converter
- B)** Horizontal axis wind power generator including a microprocessor-based controller
- C)** Sinewave inverter
- D)** Electric instrumentation for detecting the energy flow from the aerogenerator
- E)** Buffer battery
- F)** Data acquisition board with USB interface for PC connection (WIND-TU2/EV only)
- G)** Air speed sensor (WIND-TU2/EV) or portable anemometer (WIND-TU/EV)

**Relevant features:**

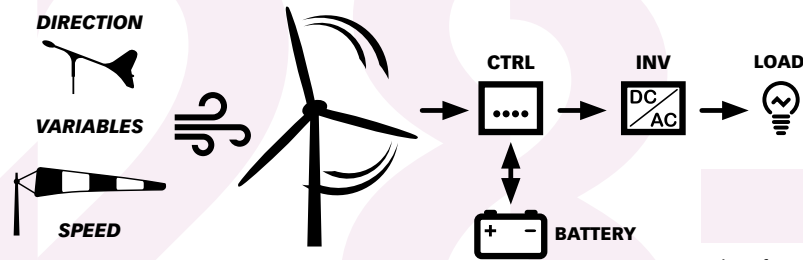
- The wind speed is adjustable
- The aerogenerator orientation is adjustable depending to the wind direction

A video demonstration is available on Elettronica Veneta YouTube channel



Scan code to watch



**Operating principle:**

- In case no load is connected to the system, all the produced energy charges the battery.
- In case some electric loads are connected to the system, the produced energy partially charges the battery and partially powers the loads.
- When the consumption is higher than the power available from the wind, the power surplus is given by the battery.

**Inverter**

- Continuous output power: 600 W
- Peak output power: 1200 W
- Input voltage: 12 Vdc
- Output voltage: 230 Vac - 50 Hz
- Output waveform: modified sine wave
- Stop for low battery charge
- Protection against overload, short circuit, overtemperature

- Socket for connection to the spotlight ACL220V (optional item - refer to the end of this data sheet)

**Switch board**

- E.L.C.B. and T.M.C.B.
- Emergency pushbutton
- Instrumentation:
  - analog voltmeter, range 0 ÷ 20 Vdc, for measuring the aerogenerator voltage output
  - analog ammeter, range 0 ÷ 20 A, for measuring the aerogenerator dc current output

**Buffer battery**

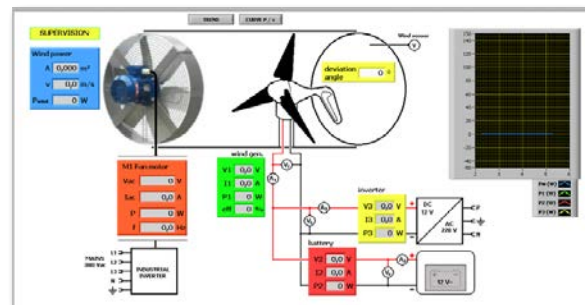
- Rated voltage: 12 Vdc
- Capacity: 27 Ah

**Air speed sensor (WIND-TU2/EV) or portable anemometer (WIND-TU/EV) for measuring the air speed inside the tunnel**

- Transducer type: thin film
- Range: 0 ÷ 15 m/s

**PC data acquisition (WIND-TU2/EV only)**

- The trainer includes a data acquisition board with USB interface for connection to PC and voltage and current converters.
- A specific software (developed with LabView) is supplied to monitor the system parameters.

**TRAINING PROGRAM**

- Physical principles whereby wind power is transformed into electrical power
- Study of brushless generators
- Understanding and use of the Country Statistics related to the specific place where the wind generator is installed
- Calculation of average generated power
- Distinctive features
- Installation
- Energy balance and efficiency
- Battery charge control
- Study of energy flows and related measurement devices

**TECHNICAL SPECIFICATIONS****Wheeled steel structure with:**

- A wind tunnel with two transparent observation windows to prevent contact with the moving parts
- A comprehensive colored diagram of the system

**Wind source consisting of:**

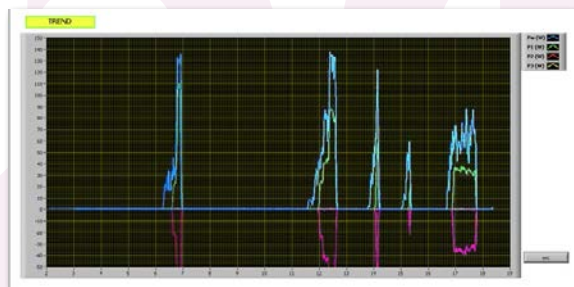
- Axial fan with three phase electric motor, rated power: 2,2 kW
- Frequency converter, applicable motor: 2,2 kW

**Horizontal axis wind power generator:**

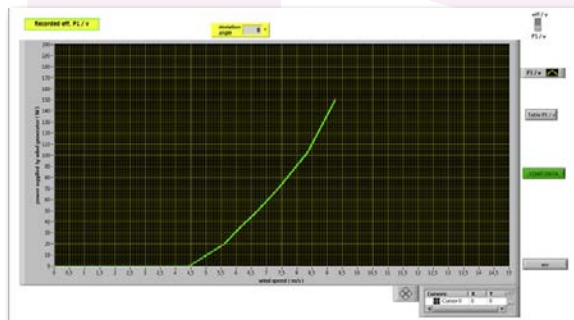
- Aluminium generator body, with internal parts partially exposed
- 3 composite material blades (rotor diameter approx. 0,70 m)
  - Startup wind speed: 3,6 m/s (8 mph)
  - Survival wind speed: 49,2 m/s (110 mph)
- Permanent magnet brushless alternator
- Microprocessor-based controller
  - Output voltage: 12 Vdc
  - Overspeed protection: electronic torque control
- Aerogenerator axial orientation manual adjusting device

- Parameters displayed:
  - All DC and AC parameters powering the electric motor
  - Wind speed and direction

- The software enables to:



- Calculate wind energy conversion efficiency
- Visualize the trend of the energy flows to and from buffer battery, inverter and wind power generator



- Draw the wind power generator characteristic curve output power vs wind speed
- Draw the wind power generator characteristic curve efficiency vs wind speed
- Save the exercises data for future analysis or project work

**Power supply:** 400 Vac 50 Hz three-phase - 2000 VA  
(Other voltage and frequency on request)

**Dimensions:** 170 x 85 x 165 cm

**Weight:** 230 kg



Wind tunnel detail

## REQUIRED

### PERSONAL COMPUTER

- NOT INCLUDED -  
(WIND-TU2/EV only)



## SUPPLIED WITH

### THEORETICAL-EXPERIMENTAL HANDBOOK



## OPTIONAL (REF. ACCESS. AND INSTRUMENTS)



### ELECTRIC BATTERY CHARGER Mod. EBCH

To recharge the buffer battery after a prolonged period of inactivity of the system

### SPOTLIGHT Mod. ACL220V

To be used as 230 Vac electric load

