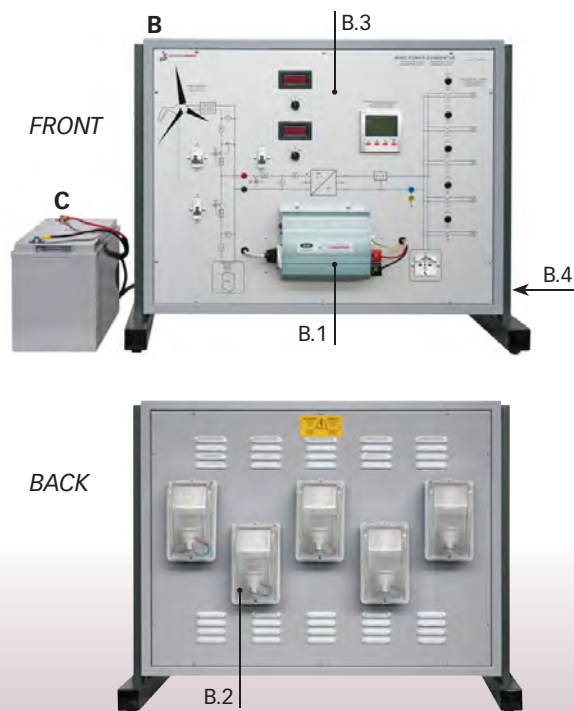# WIND POWER GENERATOR TRAINER

Mod. WG-C/EV
Mod. WG/EV (computerized version)

FRONT

BACK

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 system configuration is stand-alone (isolated from the grid). The equipment is manufactured using real components available on the market.

A video demonstration is available on Elettronica Veneta YouTube channel

Aerogenerator operated by the wind

Scan code to watch

DESCRIPTION

The system consists of:

A) Horizontal axis wind power generator including a microprocessor-based controller

B) Table top control panel including:

   B.1) Sinewave inverter

   B.2) Electric loads

   B.3) Electric instrumentation for detecting the energy flows in the different branches of the circuit

   B.4) Data acquisition board with USB interface for PC connection (mod. WG/EV)

C) Buffer battery

D) Wind speed and direction sensor (mod. WG/EV only)

Relevant features:

- The unit can operate with or without the wind.
- The wind generator can be used both outdoors and indoors. In case of indoor use, an optional indoor operation device is required (refer to mod. WG-I/EV at the end of this data sheet).
- In case of outdoors operation, the wind generator follows the wind direction being able to rotate around its vertical axis.

Operating principle:

Wind is blowing

CTRL → INV → LOAD

BATTERY

No wind is blowing

CTRL → INV → LOAD
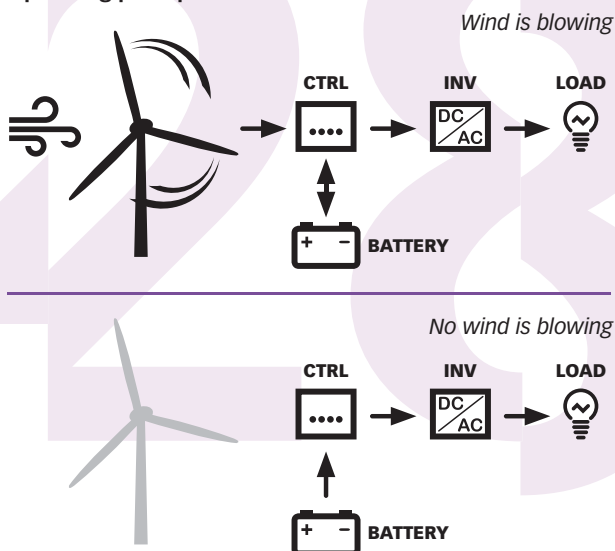
BATTERY

- In case there is no wind blowing, all the energy consumed by the user (loads) is taken from the battery.
- In case there is wind blowing but no load is connected, all the energy produced by the system charges the battery.
- In case there are both wind blowing and loads, the energy produced by the system 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.

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 (for mod. WG-C/EV an optional instrument is required, refer to mod. THAC at the end of this data sheet)
- Battery charge control
- Study of energy flows and related measurement devices

TECHNICAL SPECIFICATIONS:

Horizontal axis wind power generator
- Aluminium generator body
- 3 composite material blades (rotor diameter 1,17 m):
  - Energy output: approx. 30 kWh/month at 5.8 m/s (13 mph) average wind speed
  - 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

- Stainless steel supporting pole:
  - Length 1.5 m
  - Outer diameter: 48,1 mm
  - Mounting kit

Table top control panel
- Steel structure with:
  - Front side: comprehensive colored diagram of the system
  - back side: AC loading system consisting of 5 30 W switchable lamps
- 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
- Instrumentation:
  - digital voltmeter for DC parameters
  - digital ammeter for DC parameters
  - multifunction instrument, microprocessor-based, for AC parameters
- Socket for connection to an external optional AC load (refer to mod. ACL220V at the end of this data sheet)
- Ø 4 mm safety holes for connection to an external optional DC load (refer to mod. DCL12V at the end of this data sheet)

Buffer battery
- Rated voltage: 12 Vdc
- Capacity: 100 Ah

Wind speed and direction sensor (mod. WG/EV only) for measuring and transmitting wind speed and direction to the control panel.
- Wind speed transducer type: Hall effect sensor
- Wind direction transducer type: 20 Kohm potentiometer
- Wind speed range: 0.5÷40 m/s
- Wind direction range: 0÷360°

PC data acquisition (mod. WG/EV only)
- The unit 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 different parameters of the system.
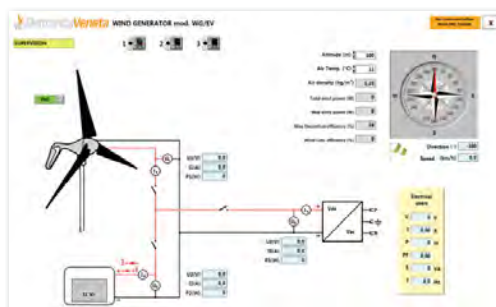

- Parameters displayed:
  - All DC (V-I-P) and AC (V-I-P-S-Freq-Power Factor) parameters
  - Wind speed and direction

- The software enables to:
  - Calculate wind energy conversion efficiency
  - Visualize the trend of the wind speed and 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 to find out the point of wind power generator maximum performance
- Save the exercises data for future analysis or project work

The aerogenerator installed outdoors at a school facility
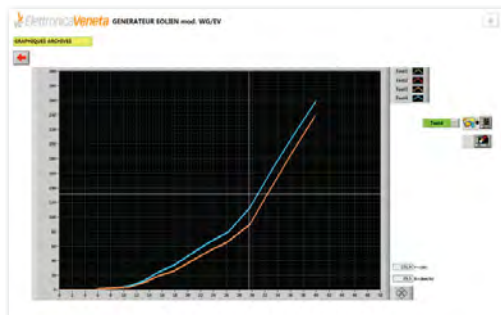
Power supply: 230 Vac 50 Hz single-phase - 100 VA
(Other voltage and frequency on request)

Dimensions:

Control panel:	92 x 46 x 72 cm
Wind generator rotor diameter:	117 cm
Net weight:	110 kg

The aerogenerator coupled to the optional indoor device mod. WG-I/EV

REQUIRED

PERSONAL COMPUTER
- NOT INCLUDED -
(mod. WG/EV only)

SUPPLIED WITH

THEORETICAL-EXPERIMENTAL HANDBOOK

OPTIONAL (REF. ACCESS. AND INSTRUMENTS)

WIND POWER GENERATOR INDOOR OPERATION DEVICE Mod. WG-I/EV
To operate the aerogenerator indoor

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 220 Vac electric load

LAMP Mod. DCL12V
To be used as 12 Vdc electric load

CUP VANE AIR VELOCITY METER Mod. THAC (mod. WG-C/EV only)
For the calculation of the wind energy into electric energy conversion efficiency