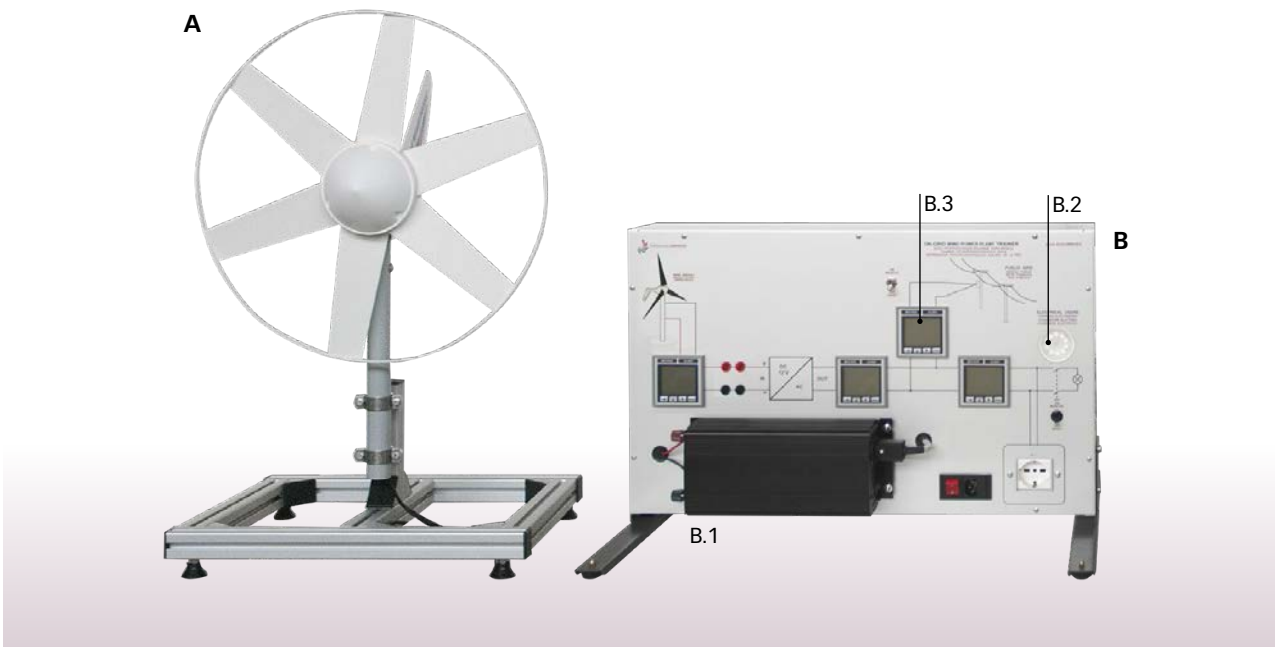
ON-GRID WIND POWER PLANT TRAINER

Mod. WG-EGRID/EV
Mod. WG-GRID/EV (computerized vers.)



INTRODUCTION

Energy saving and environmental pollution reduction are crucial global issues. Using wind power generators can address both issues.

This system enables experimental investigation on the operation of a wind power generator. The equipment is manufactured using real components available on the market.

DESCRIPTION

System configuration: grid-connected

The system consists of:

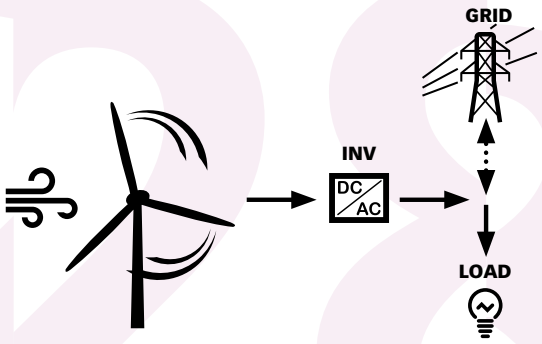
A) Horizontal axis wind power generator
B) Table top control panel including:
- **B.1)** Grid-Tie Inverter
- **B.2)** Electric load
- **B.3)** Electric instrumentation for detecting the energy flows in the different branches of the circuit
- **B.4)** PC data acquisition system (*WG-GRID/EV* only)

C) Wind speed sensor (*WG-GRID/EV* only)
D) Wind direction sensor (*WG-GRID/EV* only)

Relevant features:

- To operate the wind generator the indoor operation device *WG-IE* is **required** (refer to the end of this data sheet)

Operating principle:



- In case the user consumption is lower than the available energy from the wind generator, the excess power is fed to the grid
- On the contrary, when consumption is higher than the available energy, the additionally required energy is supplied by the grid

TRAINING PROGRAM

- Components of a grid connected wind power system for electricity production
- Effect of the wind speed on the generator output voltage (*)
- Wind generator energy conversion efficiency (*)
- Interconnection of wind energy to the public grid
- Operation and efficiency of a DC/AC inverter
- Use of wind power generator indoor operation device *WG-IE* (**required** - refer to the end of this data sheet) for wind generator characteristic curve construction

(*) For *WG-EGRID/EV* the cup vane air velocity meter *THAC* (**optional item** - refer to the end of this data sheet) is required

TECHNICAL SPECIFICATIONS

Horizontal axis wind power generator

- 6 blades with outer ring (turbine diameter 510 mm):
  - Cut in Wind Speed: 3 m/s
  - Nominal power output: 49 W at 15 m/s
- Low friction 3 phase, brushless alternator
  - Output nominal voltage: 12 Vdc
- Metal supporting frame with protecting grid

Table top control panel

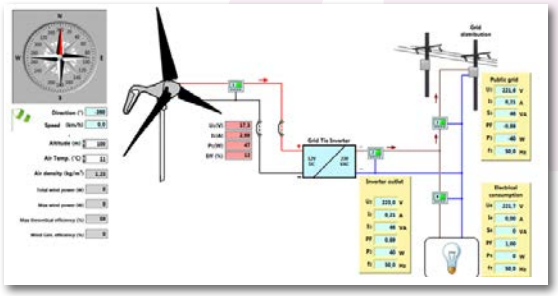
- Metal structure with complete color synoptic diagram
- Grid tie power inverter:
  - Rated AC Output Power: 450 W
  - AC Output Voltage: 230 V
  - AC Output Frequency: 50 Hz
  - DC Input Voltage Range: 11 ÷ 28 V
  - Output Current Waveform: Pure Sine-wave
  - MPPT Function
  - Protection vs: Over Current, Over Temperature, Reverse Polarity, Anti-Island
- Electric load: 230 V lamp
- Socket for connection to the spotlight *ACL220V* (**optional item** - refer to the end of this data sheet)
- Microprocessor-based instruments for DC/AC parameters

Sensors (*WG-GRID/EV* only)

- 1 wind speed and direction sensor for measuring and transmitting the wind speed and direction to the control panel
  - Speed range: 0 ÷ 40 m/s
  - Direction range: 0 ÷ 360°

PC data acquisition (*WG-GRID/EV* only)

- All instruments and sensors, as described above, are connected in Modbus network. This network is connected to a PC via an adapter RS485/USB
- A specific software (developed with LabView) is supplied to monitor the system parameters
- Parameters displayed:
  - All DC / AC parameters



  - Wind speed and direction
- The software enables to:
  - Calculate energy conversion efficiency
  - Visualize the trend of the wind speed and direction and the energy flows to and from wind power generator, grid and load
  - Save the exercises data for future analysis or project work

Power supply: 230 Vac 50 Hz single-phase - 50 VA
(Other voltage and frequency on request)

Dimensions: Control panel: 65 x 40 x 10 cm
Wind gen. rotor diameter: 51 cm

Tot weight: 35 kg

REQUIRED

WIND POWER GENERATOR INDOOR OPERATION DEVICE Mod. *WG-IE*
To operate the aerogenerator

PERSONAL COMPUTER
- NOT INCLUDED -
(*WG-GRID/EV* only)

SUPPLIED WITH

THEORETICAL-EXPERIMENTAL HANDBOOK

OPTIONAL (REF. ACCESS. AND INSTRUMENTS)

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

SPOTLIGHT Mod. ACL220V
To be used as 230 Vac electric load