

STUDY OF A WIND TURBINE - SIMULATION WITH A MOTOR



Experimental capabilities

- Identification of the components of a power generating installation by wind turbine
- Electrical connection of the different production chain elements (wind turbine, controller, battery, inverter, production ...)
- Commissioning and use of a wind turbine installation
- Understanding of the operation of an wind turbine
- Study of the relation between rotational speed and electrical power produced
- Implementation of the system and use the engine speed variation coupled with the turbine.
- System operation analysis (calculations of electrical power, component efficiencies)

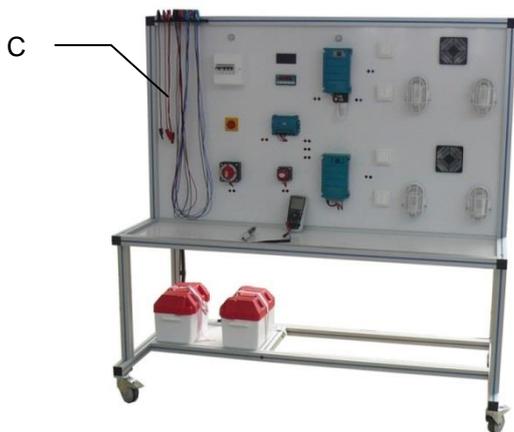
Operating principle

The ERL150 bench allows the complete study of a production chain of electrical energy by wind turbine.

The unit includes a standard wind turbine linked to an AC motor. The unit is set up on a movable frame protected with transparent guard. The connection to the main unit uses a quick connection plug. The control and production system is an independent module. It includes the general electrical panel, batteries, the production chain components (controller, inverter) and the dissipation elements (lamps, fan). Students will initially be familiar with the different elements of the installation and electrically connect all the components. After validation by the teacher, they can activate the system and measure the operating parameters with the instrumentation in place. They will then have to vary the conditions (rotational speed of the wind turbine) and calculate the power generated and the different efficiencies.

The bench is autonomous and requires a power supply 230VAC single phase + neutral. The modules are mounted on screwed chassis of anodized aluminum profile (dimensions 45x45mm) equipped with directional castors with brake (diameter 100mm). The robust design of this equipment makes it perfectly suited for use in schools

Illustrations



Technical specifications

The bench includes at least the following:

A wind turbine module including a motor (B) with variable speed with control by a potentiometer and a wind turbine (A) of brand Silentwind (24VDC-400W).

The motor and the wind turbine are coupled directly to simulate rotation. The frame is equipped with 4 directional casters with brakes.

A the production and storage module of energy (C) including:

-the supply electrical box of the machine comprising standard safety devices (lockable disconnect switch, differential circuit breaker, magneto thermal circuit breaker, emergency stop ...)

-a quick connector Harting type for electrical connection between the wind turbine and this module

-Two Batteries in series to store energy (24VDC / 55Ah) with protective bins

-a charge controller

-a inverter (24VDC / 230VAC-500W)

-a emergency charger for the battery

-a charge area 24VDC comprising two lamps and a fan

-a charge area 230VAC comprising two lamps and a fan

So that the system is electrically connected by the students in complete safety, each electrical terminal of each component is reduced on the front panel on a dual socket sink.

The dual sink cords needed to connect are provided.

The bench is supplied with the following instrumentation:

-a rotational speed sensor for the motor (speed of the wind turbine)

-a mobile multimeter with AC/DC clamp ammeter to measure the voltages and currents at the terminals of various elements

Services required

- Power supply: 230Vac – 50 Hz – 20 A
- Power supply type: 1 phase(s) + Neutral + Earth.
- Dimensions: (LxWxH mm): 1200 x 545 x 1650
- Dimensions main unit :1150 x 800 x 1850
- weight (Kg): 140

Note : if the equipment installation is operated by our staff, all supplies and exhaust connections required must stand at less than 2m from the machine

Documentation

- User's manual
- Technical documentation of the components
- Lab exercises
- Software : Acquisition software (free license) and connection cords of USB type
- Certificate of conformity CE