edibon

Engineering and Technical Teaching Equipment

# Practices in Installations, Wiring and Commissioning of Wind Power System

WCWP

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↳PRODUCTS
↳40.- ELECTRICITY

## INTRODUCTION

The students who begin their professional career as electrical installers, assemblers or electrical maintenance technicians require a hands-on learning with equipments that reflect faithfully the electrical installations in which they will work in the future. Currently, renewable energies are the electric sources with greater growth so that the labour market requires qualified installers with knowledge in this discipline.

The renewable energies are clean and inexhaustible sources which reduce the energetic dependence. One of most important renewables energies is the wind power energy, which transforms wind kinetic energy in electrical energy.

**ISO 9001: Quality Management** (for Design, Manufacturing, Commercialization and After-sales service)

**European Union Certificate** (total safety)

**Certificates ISO 14001 and ECO-Management and Audit Scheme** (environmental management)

**"Worlddidac Quality Charter" and Platinum Member of Worlddidac**

## GENERAL DESCRIPTION

The "Practices in Installations, Wirings and Commissioning of Wind Power Systems" application, WCWP, has been designed by Edibon for the formation at professional-practical level in the field of the installations, wiring and commissioning of wind power energy systems.

This application provides the future professionals with knowledge and essential skills on the assembly, installation, wiring and commissioning of a wind power installation focused for residential and commercial applications. This application offers different kits to provide experience in the installation of stand-alone and connected to grid wind power systems.

To acquire a complete knowledge, the application includes a specific manual in which is explained, at theoretical-practical level, the aspects concerning to the installation procedures, wiring and commissioning of these installations.

The WCWP includes the following elements:

- FP-STR. Assembly frame with safe electrical power supply.
- FP-KIT-4. Wiring Installation Kit.
- FP-KIT-2. DC Motor Controller Installation Kit.
- FP-KIT-10. Tubes and Fittings for Channelling Wiring Kit.
- FP-KIT-19. Lighting Consumption Kit.
- FP-KIT-23. Wind Turbine Installation for Hybrid Systems Kit.
- FP-KIT-52. Meters, Switches and Distribution Bus Bar Installation Kit.

Elements additionals:

- CHER. Tool Box.
- MED65. Digital Multimeter.
- FP-MEG. Megohmmeter.
- FP-KIT-5. Measuring Kit.
- FP-KIT-21. On-Grid Wind Power Installation Kit.
- FP-KIT-22. Hybrid Installation Kit.

Expansion learning software:

In addition, Edibon provides expansion learning software (WCWP/ICAI) to reinforce knowledge about this field.

This software is formed by:

- ECM-SOF. EDIBON Classroom Manager (Instructor Software).
- ESL-SOF. EDIBON Student Labsoft (Student Software).

## SPECIFICATIONS

The applications includes the following elements:

- FP-STR. **Assembly frame with safe electrical power supply.**
  - Aluminium structure:
    - Two aluminium struts.
    - Easy assembly of components via hammer head screws.
    - Possibility of simultaneous work of several students.
    - Four swivelling casters to facilitate the movement.
    - Dimensions:
      - Structure heigh: 1800 mm.
      - Width: 1500 mm.
  - Three-Phase connection plug.
  - Safe electric box:
    - Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.
    - Emergency stop mushroom (230/400V AC).
    - 5-wire hose for connection to frame.
    - Signal lamp of voltage presence.Armature voltage: 200V DC.

- FP-KIT-2. **DC Motor Controller Installation Kit.**
  - DC Motor Controller:
    - Supply voltage: 230V AC (PH+N+G).
    - Three ON-OFF switches:
      - ON-OFF power switch.
      - Star-Stop control activation switch.
      - Internal tacho dynamo feedback switch.
    - Two potentiometers:
      - Speed control.
      - Torque control.
    - Terminals:
      - Rotor terminals.
      - Excitation terminals.
      - Tacho dynamo terminals.
    - Three driver status leds: (red, yellow and green).
    - Variable output voltage: 0-300V CC.
  - A control cabinet with door:
    - Dimensions:
      - Height: 500 mm.
      - Width: 400 mm.
      - Depth: 200 mm.
  - Cut rail, 2 m.
  - Grey cable duct for wiring, 2 m.
  - 200 W, DC Motor with Wound Rotor.

- FP-KIT-4. **Wiring Installation Kit.**
  - 100 meters of grey wire of 1.5 $mm^2$.
  - 100 meters of brown wire of 1.5 $mm^2$.
  - 100 meters of black wire of 1.5 $mm^2$.
  - 100 meters of green/yellow wire of de 1.5 $mm^2$.
  - 25 meters of screened wire.

- FP-KIT-10. **Tubes and fittings for channeling wiring kit.**
  - PVC electrical conduit for wiring installation, 5 m.
  - 3 electrical boxes.
  - Cable guide.

- FP-KIT-19. **Lighting Consumption Kit.**
  - Two 12V DC lamps.
  - Two 230V AC (PH+N) halogen bulb.
  - Four switches.
  - Four Electrical Plugs.

- FP-KIT-23. **Wind Turbine Installation for Hybrid Systems Kit.**
  - Wind Turbine:
    - Power output: 400 W.
    - Start-up wind speed: 3,13 m/s.
    - Shut Down wind speed: 49,2 m/s.
  - Charge regulator 12 A:
    - Output voltage: 12V DC.
  - High current insulation switch: 30A switch to isolate de wind turbine.
  - Ammeter: 30A ammeter.

- FP-KIT-52. **Meters, Switches and Distribution Bus Bar Installation Kit.**
  - 2 x energy power meters:
    - One of them can be used to measure the consumed or injected energy to the grid.
    - One of them can be used to measure the supplied energy from the power source.
  - Distribution bus bar:
    - It consists of two rails:
      - One for the connection of positive poles.
      - One for the connection of negative poles.
  - DC Protection Box:
    - Dimensions:
      - Height: 400 mm.
      - Width: 300 mm.
      - Depth: 150 mm.
  - 3x Fuse holder 32 A, 22x58 mm, 1 pole.
    - Fuse 32 A, 22x 58 mm.
  - 3x 10 A fuse holder, 6.3x32 mm, 1 pole.
    - Fuse 10 A, 6.3x32 mm.
  - AC Protection Box:
    - Dimensions:
      - Height: 188 mm.
      - Width: 111 mm.
      - Depth: 55 mm.
  - Magnetothermic differential 2-pole, 16 A, 30 mA AC 6KA.

Elements additionals:

- CHER. **Tool Box.**
  - Crimper.
  - Tin.
  - Meter.
  - Insulation tape.
  - Heat shrink.
  - Voltage tester screwdriver.
  - Cross-head screwdriver and flat-head screwdriver.
  - Allen keys.
  - Soldering iron.
  - Rubber hammer.
  - Wire terminals and Connection terminals.
  - Flanges.
  - Wire cutter.
  - Screw Clamp Terminals.

- MED65. **Digital Multimeter.**

  This module has a digital multimeter of about 3 ½ digits, with double-jack ending cables of about 4 mm to facilitate interconnections.

  With this digital multimeter we will be able to measure:

  Voltage.

  Current.

  Resistance.

  Capacitors capacity.

  Temperature.

- FP-MEG. **Megohmmeter.**

  Measurement of insulation resistance.

  Maximun resistance: 400 MΩ.

  Continuity tester.

- FP-KIT-5. **Measuring Kit.**

  Clamp Meter:

  Clamp for alternating current measurements contactless.

  The clamp can measure:

  Current.

  Voltage.

  Resistance.

  A voltage and continuity tester:

  Voltage range: 12-690V AC.

  Phases rotating detection in three-phase systems.

  Polarity tester.

- FP-KIT-21. **On-Grid Wind Power Installation Kit.**

  Grid-Tie inverter DC to AC:

  Nominal power: 350 W.

  Input voltage range: 18-60V DC.

  Output voltage range: 184-264V AC.

- FP-KIT-22. **Hybrid Installation Kit.**

  Sine-Wave inverter:

  Nominal power: 1000 VA.

  Input voltage: 12V DC.

  Output voltage: 230V AC.

  Battery charger of 10 A and 12 V.

  Battery:

  Battery voltage: 12V DC.

  Battery capacity: 90 Ah.

  Ammeter of 30A.

  High current insulation switch of 30A.

- **All necessary cables to realize the practical exercises are included.**

**Cables and Accessories**, for normal operation.

**Manuals**:

This unit is **supplied with the following manuals**: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

## EXERCISES AND PRACTICAL POSSIBILITIES

1.- Wiring of the wind turbine to voltage regulator.

2.- Wiring of the permanent magnets synchronous three-phase generator to voltage regulator.

3.- Wiring of the battery to voltage regulator.

4.- Wiring of the voltage regulator to current inverter.

5.- Wiring of lighting loads.

6.- Wiring of wind turbine to the stand-alone installation.

7.- Wiring of wind turbine to the on-grid installation.

8.- Wiring of permanent magnets synchronous three-phase generator to the stand-alone installation.

9.- Wiring of permanent magnets synchronous three-phase generator to the on-grid installation.

10.- Testing of the correct battery charge.

11.- Electric loads influence on the electrical parameters of the system.

- Several other exercises can be done and designed by the user.

## REQUIRED SERVICES

- Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 20 Kw.

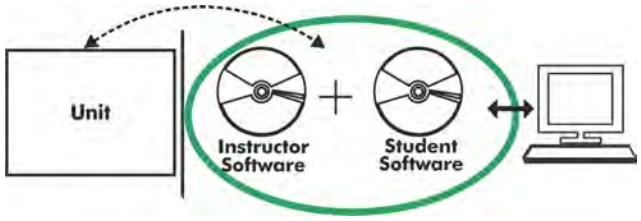
## DIMENSIONS AND WEIGHTS

WCWP:

-Dimensions: 1500 x 400 x 1800 mm. approx.
(59.05 x 15.75 x 70.86 inches approx.)

-Weight: 80 Kg. approx.
(194 pounds approx.)

**WCWP/ICAI. Interactive Computer Aided Instruction Software System:**




With no physical connection between unit and computer, **this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF).** Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

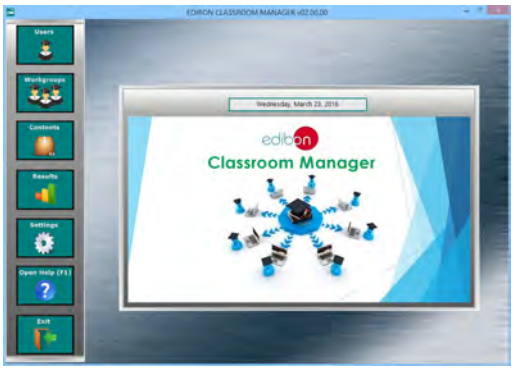
## Instructor Software

- ECM-SOF. **EDIBON Classroom Manager (Instructor Software).**

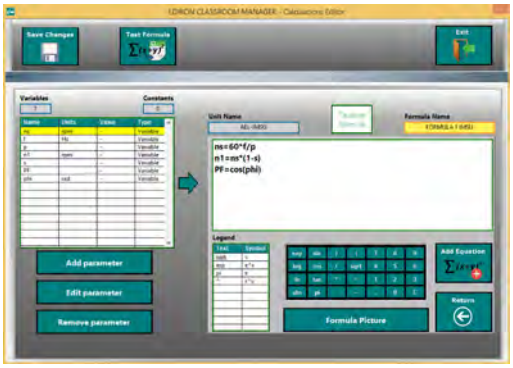
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

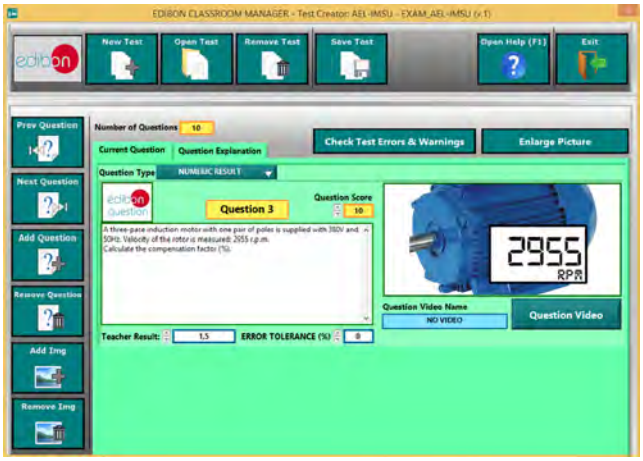
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation System Solver Engine.**
- **Updatable Contents.**
- **Report generation, User Progression Monitoring and Statistics.**




ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen




ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional

## Student Software

- ESL-SOF. **EDIBON Student Labsoft** (**Student Software**).

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

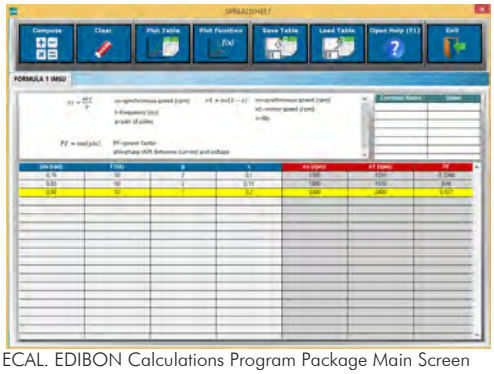
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge and progression.**
- **Test self-correction.**
- **Calculations computing and plotting.**
- **Equation System Solver Engine.**
- **User Monitoring Learning & Printable Reports.**
- **Multimedia-Supported auxiliary resources.**


ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen

EPE. EDIBON Practical Exercise Program Package Main Screen

For more information see **ICAI** catalogue. Click on the following link:
www.edibon.com/en/files/expansion/ICAI/catalog


ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

✱ Specifications subject to change without previous notice, due to the convenience of improvement of the product.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