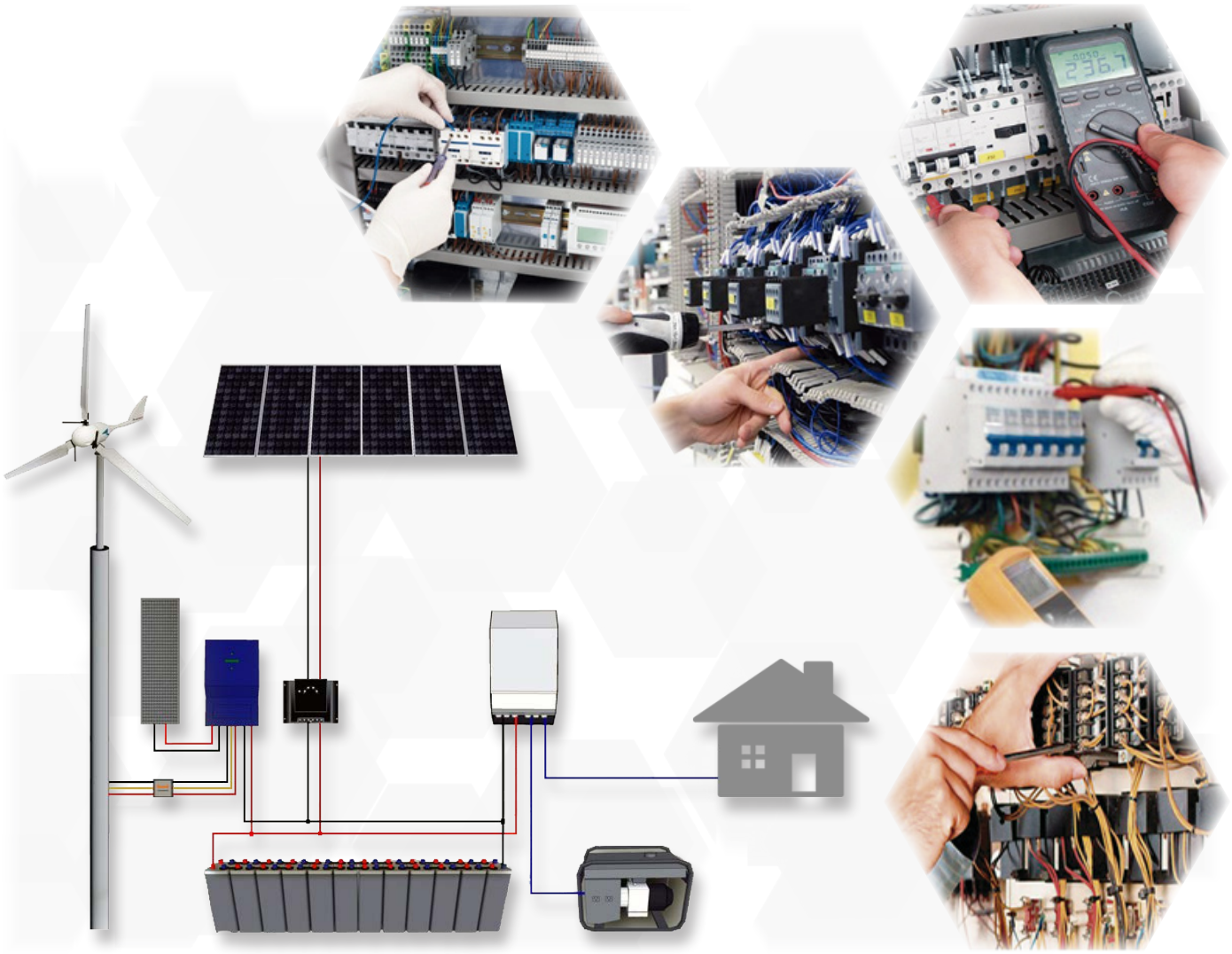
Engineering and Technical Teaching Equipment

Professional Practices in Wiring Installations and Commissioning of Photovoltaic System

AEL-WCPV

www.edibon.com
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 the most important renewable energies is the photovoltaic solar energy, which transforms solar 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)

Certificate and Worlddidac Member

GENERAL DESCRIPTION

The Professional Practices in Wiring Installations and Commissioning of Photovoltaic System, "AEL-WCPV", has been designed by EDIBON for the training at professional-practical level in the field of the installations, wiring and commissioning of photovoltaic solar energy systems.

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

To acquire a complete knowledge, the system 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.

This vocational training system includes a series of kits according to the educational requirements:

- FP-KIT-1. Feeders Installation Kit.
- FP-KIT-4. Wiring Installation Kit.
- FP-KIT-5. Measuring Kit.
- FP-KIT-16. Photovoltaic Generation Kit.
- FP-KIT-17. Stand-Alone Photovoltaic Installation Kit.
- FP-KIT-18. On-Grid Photovoltaic Installation Kit.
- FP-KIT-19. Lighting Consumption Kit.
- MED65. Digital Multimeter.
- FP-MEG. Megohmmeter.
- CHER. Tool Box.
- FP-STR. Assembly Frame with Safe Electrical Power Supply.

Optional learning software:

In addition, EDIBON provides optional software (AEL-WCPV/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

- FP-KIT-1. **Feeders Installation Kit.**

  Differential magnetothermal, 4 poles, 25 A, 300 mA AC 6 KA.

  Single-phase fuse holder for DIN rail mounting:

    Fuse: 1 x 30 A.

  Three-phase fuse holder for DIN rail mounting:

    Fuses: 3 x 30 A.

- FP-KIT-4. **Wiring Installation Kit.**

  100 meters of grey wire of 2.5 mm^2.

  100 meters of brown wire of 2.5 mm^2.

  100 meters of black wire of 2.5 mm^2.

  100 meters of green/yellow wire of de 2.5 mm^2.

  25 meters of screened wire.

  Flanges.

  Wire terminals.

  Connection terminals.

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

  Clamp Meter:

    Clamp for alternating/direct current measurements contactless.

  The clamp can measure:

    Current.

    Voltage.

    Resistance.

  Voltage and continuity tester:

    Voltage range: 12 - 690 VAC.

    Phases rotating detection in three-phase systems.

    Polarity tester.

- FP-KIT-16. **Photovoltaic Generation Kit.**

  Three lamps panel to simulate solar radiation:

    Power: 3 x 250 W.

    Switch ON/OFF.

    Intensity Regulator.

    Aluminum frame.

  96 W Photovoltaic Panel:

    Maximum Power: 96 W.

    Voltage at maximum power: 17.8 V.

- FP-KIT-17. **Stand-Alone Photovoltaic Installation Kit.**

  Sine-Wave inverter:

    Nominal power: 375 VA.

    Input voltage: 12 VDC.

    Output voltage range: 210 - 245 VAC.

  Electronic battery regulator:

    Possibility of connection to 12 or 24 VDC.

    LEDs to indicate the state of charge of the battery.

    Protection against:

      Overcurrent.

      Short-circuits.

      Reversal connection of solar panels or batteries.

  Battery:

    Battery voltage: 12 V.

    Battery capacity: 70 Ah.

- FP-KIT-18. **On-Grid Photovoltaic Installation Kit.**

  Micro inverter DC to AC:

    Nominal power: 350 W.

    Input voltage range: 18 - 60 VDC.

    Output voltage range: 184 - 264 VAC.

- FP-KIT-19. **Lighting Consumption Kit.**

  Two 12 VDC lamps.

  Two 230 VAC (PH+N) halogen bulb.

  Four switches.

- MED65. **Digital Multimeter.**

  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.

  Maximum resistance: 400 MΩ.

  Continuity tester.

- CHER. **Tool Box.**

  It contains the following tools:

  Allen key.

  Cross-head screwdriver.

  Flat-head screwdriver.

  Rubber hammer.

  Insulation tape.

  Soldering iron.

  Tin.

  Heat shrink.

  Cable stripper.

  Crimper.

  Voltage Tester.

  Meter.

- FP-STR. **Assembly Frame with Safe Electrical Power Supply.**

  Aluminum structure:

  Three alminum 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 height: 1800 mm.

  Workineight: 1000 mm.

  Width: 1500 mm.

  Three-Phase connection plug.

  Safe electric box:

  Differential magnetothermal, 4 poles, 25A, 300mA AC 6KA.

  Emergency stop mushroom (230/400 VAC):

  5-wire hose for connection to frame.

  Signal lamp of voltage presence.

- **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.- Testing of open-circuit photovoltaic panel and measurement of the output voltage.

2.- Testing of short-circuit photovoltaic panel and measurement of the current.

3.- Wiring of the photovoltaic panel to the voltage regulator.

4.- Wiring of the battery to the voltage regulator.

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

6.- Wiring of lighting loads.

7.- Wiring of DC photovoltaic stand-alone installation.

8.- Wiring of AC photovoltaic stand-alone installation.

9.- Wiring of AC photovoltaic on-grid installation.

10.-Installations and wiring in series of two photovoltaic panels.

11.-Installations and wiring in parallel of two photovoltaic panels.

12.-Checking and study of feeding from the battery.

13.-Electric loads influence in the electrical parameters of the system.

14.-Influence of photovoltaic panel inclination angle.

15.-Study of the influence of solar radiation in energy production.

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

REQUIRED SERVICES

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

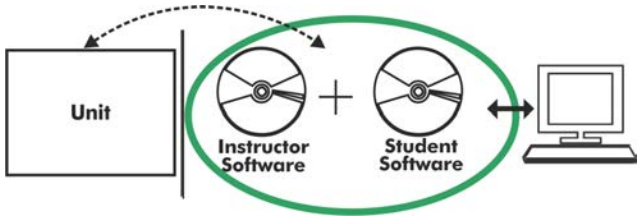
DIMENSIONS AND WEIGHTS

AEL-WCPV:

-Dimensions: 1500 x 400 x 1800 mm approx.
(59.05 x 15.74 x 70.86 inches approx.)

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

AEL-WCPV/ICAI. Interactive Computer Aided Instruction Software System:



With no physical connection between unit and computer (PC), **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).

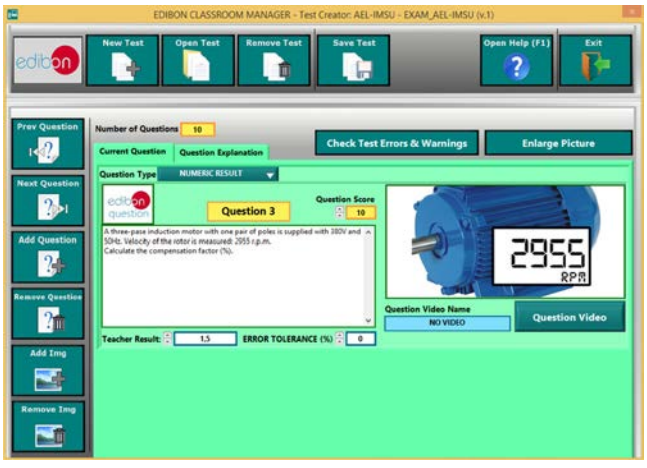
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual 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:

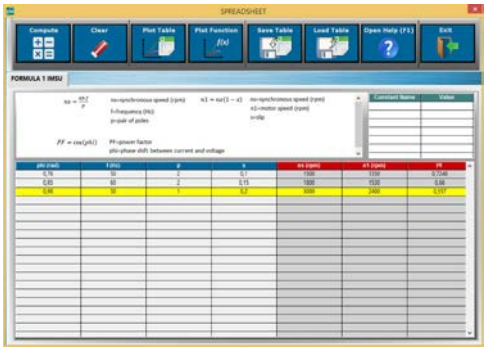
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge 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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