

## 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.



Certificate of Approval of the  
Quality Management System



European Union Certificate  
(total safety)



UL and CSA Regulations  
(All our products are manufactured according  
to current UL and CSA regulations)



Certificate of Approval of the  
Environmental Management System



Worlddidac Association  
Certificate of Membership

## GENERAL DESCRIPTION

The Wiring Installation Training for Photovoltaic Systems, "WIT-PHS", 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.

The "WIT-PHS" application includes the following elements:

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

The "WIT-PHS" application includes the following elements:

- **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.



MED65

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

- Two 12 VDC lamps.
- Two 230 VAC (PH + N) halogen bulb.
- Four switches.



FP-KIT-19

- **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-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-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-16

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

- Clamp meter:
- Clamp for alternating/direct current measurements contactless.
- The clamp can measure:
- Current.
- Voltage.
- Resistance.
- A voltage and continuity tester:
- Voltage range: 12 – 690 VAC.
- Phases rotating detection in three-phase systems.
- Polarity tester.



FP-KIT-5

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

- 100 m of grey wire of 1.5 mm<sup>2</sup>.
- 100 m of brown wire of 1.5 mm<sup>2</sup>.
- 100 m of black wire of 1.5 mm<sup>2</sup>.
- 100 m of green/yellow wire of de 1.5 mm<sup>2</sup>.
- 25 m of screened wire.



FP-KIT-4

## 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-1

- **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 height: 1800 mm.

Useful working height: 1000 mm.

Width: 1500 mm.

Three-phase connection plug.

Safe electric box:

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

Emergency stop mushroom (230/400 VAC).

5-wire hose for connection to frame.

Signal lamp of voltage presence.



FP-STR

- **CHER. Tool Box.**

Crimper.

Tin.

Meter.

Insulating tape.

Heat shrink.

Pin punch.

Star and flat screwdrivers.

Allen keys.

Soldering iron and soldering iron support.

Rubber hammer.

Connection terminals.

Cable ties.

Cable cutters.

Clamps.



CHER

- **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.

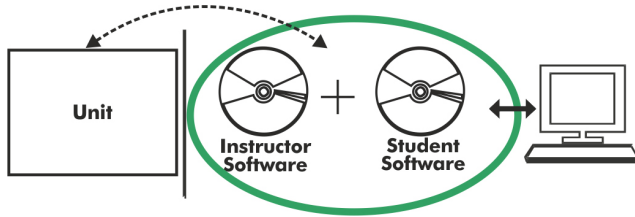
### REQUIRED SERVICES

- Electrical supply: three-phase, 380 VAC – 400 VAC/50 Hz. or 190 VAC – 240/60 Hz, 20 kW.

### DIMENSIONS AND WEIGHTS

WIT-PHS:

- 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.)

**WIT-PHS/ICAI. Interactive Computer Aided Instruction Software:**

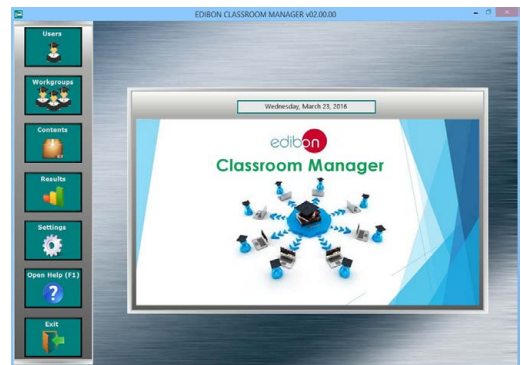
With no physical connection between unit and computer, this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment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

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

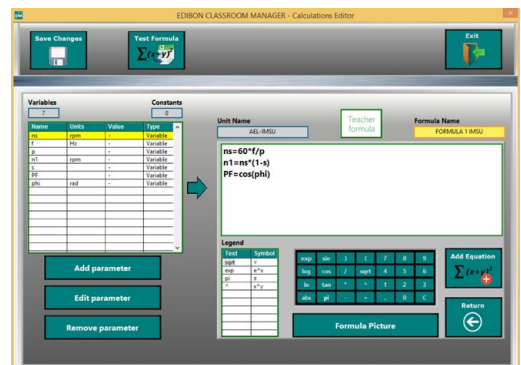
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

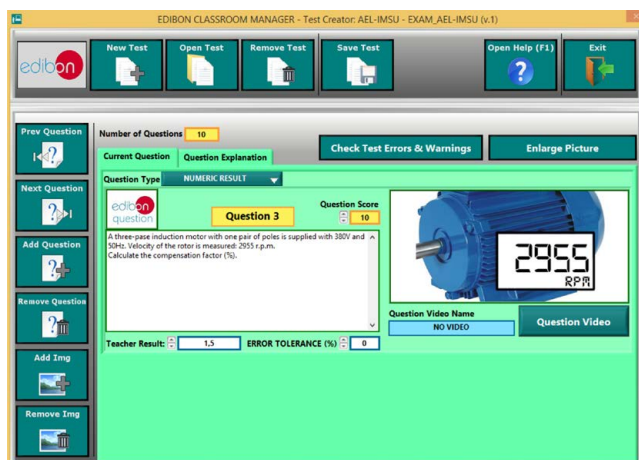
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



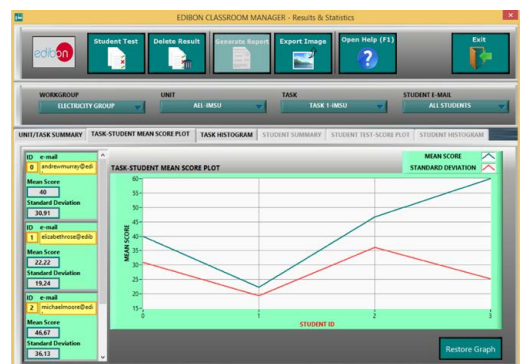
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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:

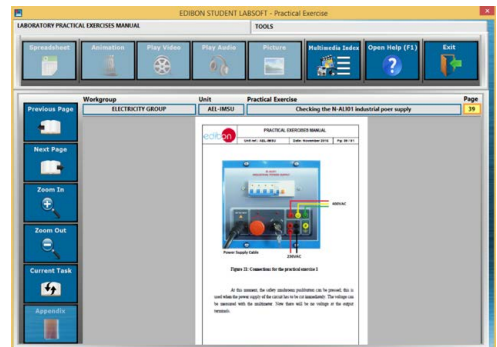
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge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

For more information see ICAI catalogue. Click on the following link:

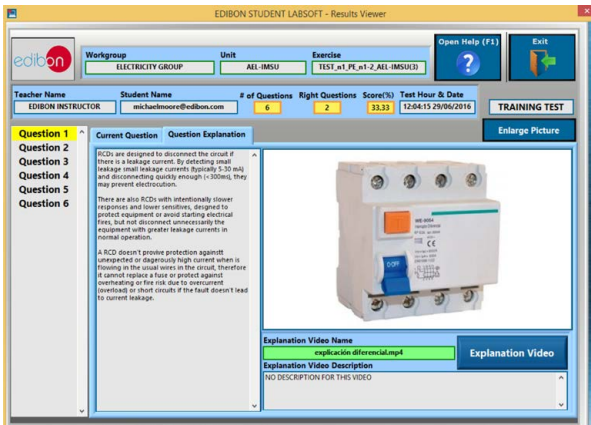
[www.edibon.com/en/interactive-computer-aided-instruction-software](http://www.edibon.com/en/interactive-computer-aided-instruction-software)



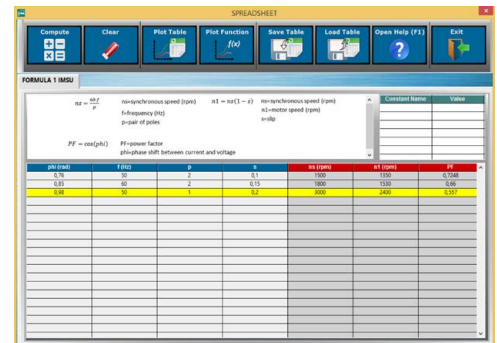
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



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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REPRESENTATIVE:

