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 ↳ PRODUCTS  
 ↳ 40.- ELECTRICITY

### INTRODUCTION

A differential protection is a kind of electrical protection that is able to protect a line or device delimited between two points. For that, it sizes the current of these two points and then it compares both, if the currents are equal, it means there are not current leakages between the two points, but if the currents are different there is a current leakage and the protection trips to open the circuit. In case of a differential protection switch of home installations, the measuring is done between phase and neutral because they are single-phase installations.



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 Differential Automatic Switches Application, "AEL-AE4" has been designed by Edibon in order to demonstrate how a differential protection switch works when an earth leakage occurs.

This application includes all necessary elements to understand the behavior of a differential protection switch. In order to test the differential protection this application includes a series of modules that allow provoke an earth leakage with aid of a variable resistor load. Thus, it will be possible to measure the trip current threshold of the differential switch.

This application includes modules such as analog voltmeter and ammeter to measure currents and voltages fault, tester protection module, fault injection module, etc.

The AEL-AE4 includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-TRANS01. Single-phase transformer with galvanic isolation, 230/230 VAC, 500 VA.
- N-DIF. Differential Protection.
- N-MED65. Digital Multimeter.
- N-FAULT. Fault Injection Module with Human Body Impedance Selector.
- N-MEDV. Analog Voltmeter.
- N-MEDI. Analog Ammeter.
- N-TSTF. Tester Protection module.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AE4/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).

The application AEL-AE4 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-A.

Optionally the AEL-WBR. Electrical Workbench (Rack) can be supplied to place the rack/s.

Option B:

This application can be mounted on rail.

Optionally the AEL-WBC. Electrical Workbench (Rail) can be supplied to mount the modules.

## SPECIFICATIONS

The application includes the following modules:

- **N-ALI02. Domestic Main Power Supply.**

Supply voltage (Single-Phase): 230 VAC, PH+N+G.

ON-OFF removable key.

Output Voltage Connections:

Two Single-Phase: 230 VAC

Single-Phase supply hose connecting plug.

Differential magnetothermal, 2 poles, 25 A, 30 mA AC 6 KA.



N-ALI02

- **N-TRANS01. Single-phase transformer with galvanic isolation, 230/230 VAC, 500 VA.**

Rated power: 500 VA.

Input voltage: 230 VAC.

Output voltage: 230 VAC.

Earth-Neutral connection switch.

2 A fuses.

On-Off switch.

Virtual GND connector.



N-TRANS01

- **N-DIF. Differential Protection.**

Differential protection.

Input terminals: 230 VAC.

Output terminals: 230 VAC.

Sensitivity 30 mA.



N-DIF

- **N-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.



N-MED65

## Specifications

- N-FAULT. **Fault Injection Module with Human Body Impedance Selector.**

Fault injection push-button.

Human impedance selector: 1  $\Omega$ , 2  $\Omega$ , 20  $\Omega$ , 200  $\Omega$ .

Input connections (a, b).



N-FAULT

- N-MEDV. **Analog Voltmeter.**

Voltage measurement range 0 – 150 VAC.

Two voltage terminals.



N-MEDV

- N-MEDI. **Analog Ammeter.**

Current measurement range 0 – 500 mA.

Two current terminals.



N-MEDI

- N-TSTF. **Tester Protection module.**

Module for earth fault tests.



N-TSTF

- **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.- Checking the working of the main power supply.               | 5.- Measurement of contact voltage with different contact impedance.        |
| 2.- Study of basic differential protection.                      | 6.- Measurement of earth leakage currents with different contact impedance. |
| 3.- Study of differential protection sensitivity.                |   |
| 4.- Study of earth leakage faults with variable earth impedance. |   |

### REQUIRED SERVICES

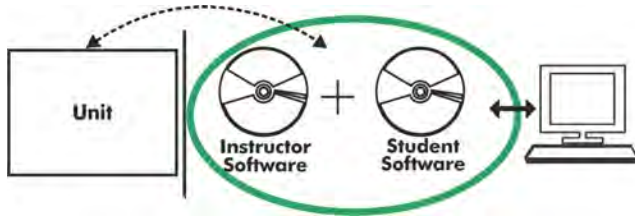
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|--|
| - Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 20 Kw. |
|--|

### DIMENSIONS AND WEIGHTS

- |  |
|--|
| AEL-AE4:   |
| - Dimensions: 640 x 320 x 670 mm approx.<br>(25.19 x 12.59 x 26.37 inches approx.) |
| - Weight: 60 Kg approx.<br>(132 pounds approx.)                                    |

## Optional

### AEL-AE4/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.

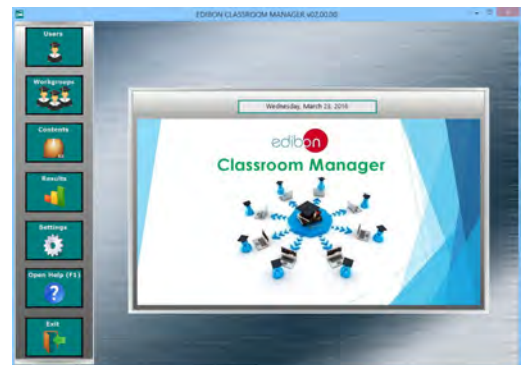
### Instructor Software

- 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:

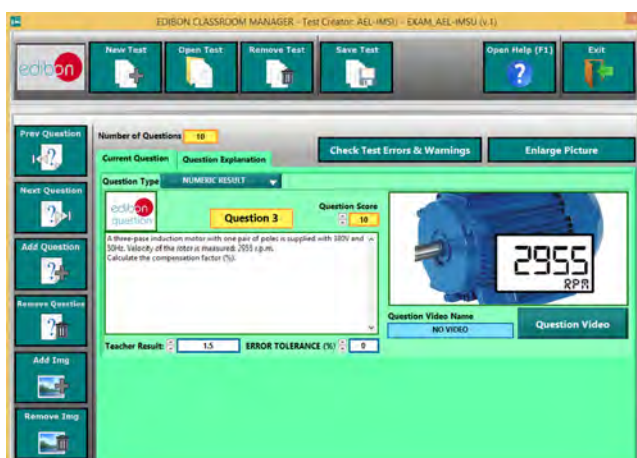
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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

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

[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



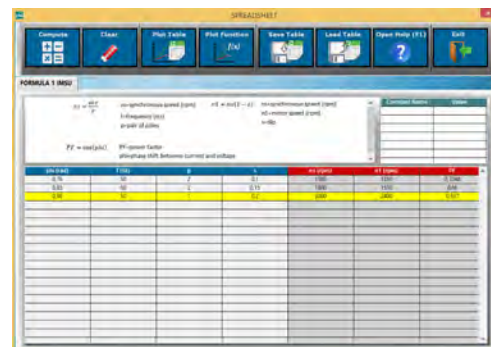
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



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:

