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 ↳ PRODUCTS
 ↳ 40.- ELECTRICITY

INTRODUCTION

In a low-voltage electrical system, one of the objects to study are single-phase faults. When a single-phase fault happens, it affects at the rest of the electric system because it produces a very increase current which also affects the voltages of the rest of the equipment connected to the same grid, this means if we have a single-phase fault, we could damage the rest of the charges of the same electrical system. In addition, the safety of persons is very important in this kind of installations. Therefore, the study of some kind of protections and the selectivity is very significant.



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 Single-Phase Installations Faults Application, "AEL-AD33", has been designed to study several protections belonging to home installations. Through the safety elements, the student can simulate different faults and verify the reasons why each type of protection acts. It includes some innovative electric devices for the protection of people and installations against the effects of electric current, which ensure the continuity of power availability, as well as people safety. It includes a single-phase transformer to simulate earth derivations under safety conditions. It includes protections for: differential protection with automatic reset and differential protection with variable sensitivity. To check all protections, a variable resistor is included to control current derivations. It also has meters to know the amount of derivation current and verify the protection's sensitivity.

The AEL-AD33 includes the following modules:

- N-ALIO2. Domestic Main Power Supply.
- N-MED65. Digital Multimeter.
- N-TRANS01. Single-phase Galvanic Isolation Transformer 230/230 VAC, 500 VA.
- N-DIF. Differential Protection (RCD).
- N-DIFVS. Differential Protection with Variable Sensivity RCD.
- N-DIFR. Differential Protection with Automatic Reset RCD.
- N-FAULT. Fault Injection Module with Human Body Impedance Selector.
- N-TSTF. Leakage to Ground Tester Module.
- N-MVA. Analog Voltmeter.
- N-MCA. Analog Ammeter.

Similar applications available:

- AEL-AD33T. Three-phase Installations Faults Application.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD33/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-AD33 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following rack:

- 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-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

- **N-TRANS01. Single-phase Galvanic Isolation Transformer 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 (RCD)**

Rated voltage: 230 VAC.

Rated current: 25 A.

Sensitivity: 30 mA.

L, N: current inlet terminals.

L, N: current outlet terminals.



N-DIF

- **N-DIFVS. Differential Protection with Variable Sensivity RCD.**

Inputs:

Auxiliary voltage UH: AC/DC 12 V, AC/DC 24 ... 230 V.

Voltage range: AC:

0.8 ... 1.1 UN.

DC: 0.9 ... 1.25 UN.

Nominal frequency UH: 50 ... 400 Hz.

Nominal consumption:

AC 230 V: 4 VA.

AC 24 V: 1.6 VA.

DC 24 V: 1 W.

Measuring value adjustable via rotational switch:

AC 0.01; 0.03 A; 0.1 A; 0.3 A; 0.6 A; 1 A; 2 A; 5 A; 10 A.

Frequency range: 20 Hz ... 2 kHz at failure current < 50 Hz and the "auto reset" function, a time delay must be adjusted, so that the relay does not buzz before switching.

Hysteresis: approx. 4% of trip value, fixed.

Accuracy: $\leq \pm 15\%$.

Repeat accuracy: $\leq \pm 1\%$.

Temperature drift: $\leq \pm 0,05\% / K$.

Reaction time: 10 ... 30 ms.

Response delay t_v : 0 ... 10 s adjustable (logarithmic scale in order to allow also short time delay to be adjusted without problems).



N-DIFVS

• N-DIFR. **Differential Protection with Automatic Reset RCD.**

Test button on residual current device.

Control lever.

Auto On/Auto Off selection flap:

Auto Off: recloser OFF.

REDtest = residual current device.

Auto On: recloser ON.

REDtest = residual current device + automatic restart.

Operating mode LED.



N-DIFR

• N-FAULT. **Fault injection module with human body impedance selector.**

Fault injection push-button.

Human impedance selector: 1 Ω, 2 Ω, 20 Ω, 200 Ω.

Input connections (a, b).



N-FAULT

• N-TSTF. **Leakage to ground tester module Fault.**

Injection push-button.

Transformer center earth connection.

Differential protection center.

User fault impedance connection.

Load connection.

Variable earth impedance.



N-TSTF

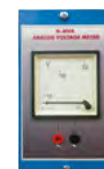
• N-MVA. **Analog Voltmeter.**

Range: 0-150 VAC.

Input terminals: Va, Vb.

Accuracy: 1.5 %.

Scale: 90 °.



N-MVA

• N-MCA. **Analog Ammeter.**

Range: 0-500 mA

Input terminal: Va.

Output terminal: Vb.

Accuracy: 1.5 %

Scale: 90 °.



N-MCA

• 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.- Study the basic concepts of differential protection.
- 2.- Study of differential protection with variable sensitivity.
- 3.- Study of differential protection with automatic restore.
- 4.- Adjustment of the protection sensibility of the differential protection.
- 5.- Study of Single-phase ground short-circuit with basic differential protection.
- 6.- Study of Single-phase ground short-circuit with short-circuit impedance and basic differential protection.
- 7.- Study of Single-phase ground short-circuit with differential protection with variable sensitivity.
- 8.- Study of Single-phase ground short-circuit with short-circuit impedance and differential protection with variable sensitivity.
- 9.- Study of Single-phase ground short-circuit with differential protection with automatic restore.
- 10.-Study of Single-phase ground short-circuit with short-circuit impedance and differential protection with automatic restore.
- 11.-Study of isolation coordination.

REQUIRED SERVICES

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

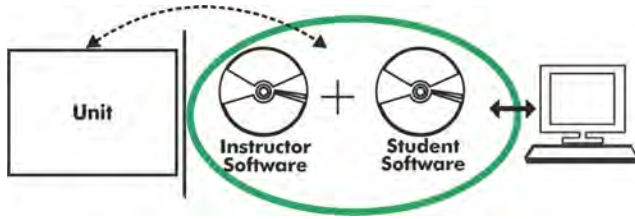
DIMENSIONS AND WEIGHTS

AEL-AD33:

- Dimensions: 640 x 320 x 920 mm approx.
(25.19 x 12.59 x 32,22 inches approx.)
- Weight: 60 Kg approx.
(132 pounds approx.)

Optional

AEL-AD33/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.

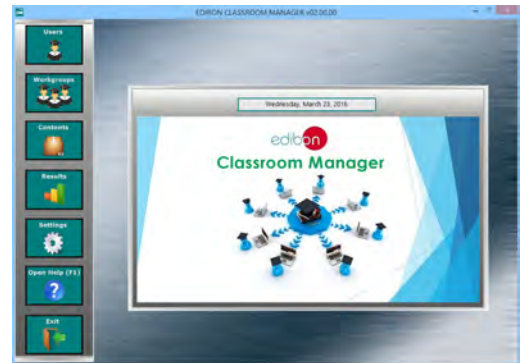
Instructor Software

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

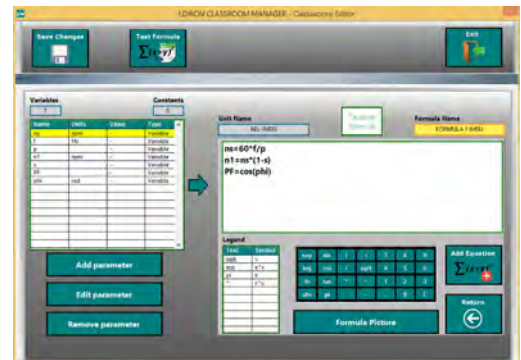
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

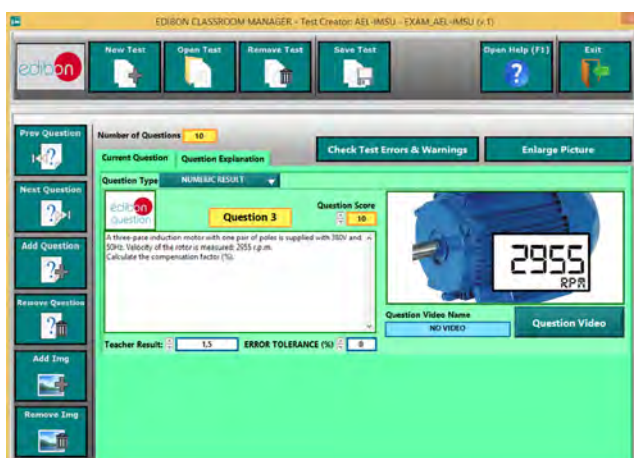
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



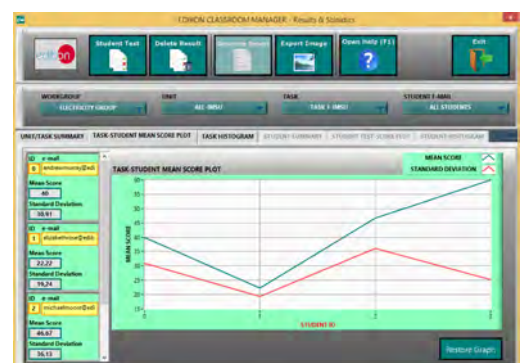
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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



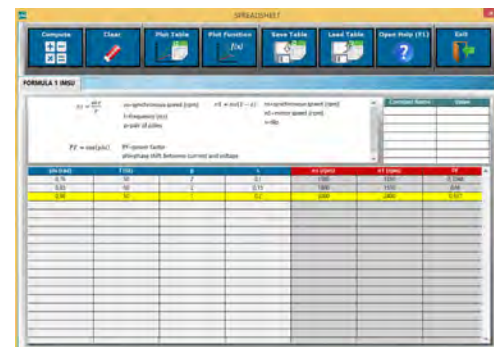
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



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:

