edibon

Engineering and Technical
Teaching Equipment

Protection Measures in Electrical Installations

AEL-PMEI

Configuration example of AEL-PMEI application + AEL-PC + AEL-WBR

INTRODUCTION

The students who begin their professional career as electrical installers and electrical maintenance technicians require a hands-on learning with equipment that reflect faithfully the electrical installations in which they will work in the future. The election of the electrical protections in an installation, as well as the correct equipment verification with the properly instrumentation is one of the many skills that will be acquiered with this application.

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 Protection Measures in Electrical Installations, "AEL-PMEI", has been designed by Edibon for training practical and professional level in the field of installation and testing of the main electrical protections for the housing and industry and devices involved in the basic circuits.

This application will provide future professionals with the essential knowledge and skills on the installation and verificacion of the different electrical protections used in homes, industries and buildings, such as circuit breakers, differentials, surge protections and fuses, and also about points of light, power outlets.

In order to acquire complete knowledge, the application includes a specific manual which explains at a theoretical and practical level the aspects related to the installation and wiring procedures for these installations.

The learning goals of this application can be summarized as follows: understanding of electrical installations, measure protections for different installations, selection and test of measurement instrumentations for the verification of the installation and possible problems, starting the low voltage installation, correct utilization of the personal protection equipment and problems solution in electrical systems.

Finally, the application allows simulating different electrical faults for the representation of serveral issues that the professional might face in the real life.

In order to acquire complete knowledge, the application includes a specific manual which explains at a theoretical and practical level the aspects related to the installation and test procedures for these installations.

The AEL-PMEI application includes the following elements:

- Differential Switches.

- Circuit Breaker Switches.

- Incandescent Lamps.

- Industrial Energy Supplying with energy counter.

- General Control Panel and Protection.

- Surge Arresters.

- Power Outlets.

- Measuring Instrumetation:

    Clamp Meter.

    Voltage and continuity tester.

    Digital Multimeter.

    Checker of Residual Currents (RCD).

Recommended elements:

- AEL-PC. Touch Screen and Computer.

- AEL-WBR. Electrical Workbench (Rack).

The AEL-PMEI application includes the following elements:

- **Differential Switches.**

    Differential Switch 4 poles, 63A, 300mA and AC class.

    Differential Switch 4 poles, 40A, 30mA and AC class.

    Differential Switch 4 poles, 25A, 30mA and AC class.

    Differential Switch 2 poles, 25A, 30mA and AC class.

- **Circuit Breaker Switches.**

    Circuit breaker 4 poles, 16A, a cutting power of 6 kA and Curve C.

    Circuit breaker 3 poles, 60A, a cutting power of 10 kA and Curve D.

    Circuit breaker 3 poles, 25A, a cutting power of 10 kA and Curve C.

- **Incandescent Lamps.**

    Halogen lamp, 33W, 230V.

    Single Phase Outlet 230V.

    2 x Switches.

    4 x Switch of double way.

- **Industrial Energy Supplying with energy counter.**

    3 x Carry fuses.

    Carry fuse single phase encapsulated.

    3 x Fuses.

    Fuse for neutral.

    Three-phase energy meter.

- **General Control Panel and Protection.**

    Switch of Control of Potency, SCP, 20A.

    Automatic General Switch, AGS, 25A.

    Differential Switch, DS, 40A 30mA type A.

    PIAs:

        Automatic Switch 10A.

        2 x Automatic Switch 16A.

        Automatic Switch 25A.

        Automatic Switch 20A.

- **Surge Arresters.**

    Protector against transient modular of 500V, a cutting power of 40 kA and type 2.

    Protector against transient modular of 275V, a cutting power of 40 kA and type 2.

    Protector against transient modular of 255V, a cutting power of 5 kA and type 3.

    Connecting to lightning rod.

- **Power Outlets.**

    4 x Outlets with a protective earth.

    Industrial outlet 3P + N + E.

- **Measuring Instrumentation**.

    Clamp Meter:

        Clamp for alternating current measurements contactless.

        The clamp can measure:

            Current.

            Voltage.

            Resistance.

    Voltage and continuity tester:

        Voltage range: 12-690V AC.

        Phases rotating detection in three-phase systems.

        Polarity tester.

    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 bo able to measure:

            Voltage.

            Current.

            Resistance.

            Capacitors capacity.

            Temperature.

    Checker of Residual Currents (RCD).

        This module is able to do cross-checks of impedance of connection to ground along with test of devices of residual currents (RCD).

Recommended elements:

- AEL-PC. **Touch Screen and Computer.**

    Touch Screen:

        Energy efficiency class: A.

        Screen diagonal: 68.6 cm (27 inch (s)).

        Power consumption (operating): 26 watts.

        Annual energy consumption: 38 kWh.

        Power consumption (standby / off) 0.49 watts.

        Screen resolution: 1920 x 1080 pixels.

    Computer:

        Processor Number: Intel Core i7-6600U Processor (4M Cache, up to 3,40 GHz).

        Cache: 4 MB Intel Smart Cache.

        Clock speed: 2.6 GHz.

        # Of Cores/# of Threads: 2/4.

        Max. TDP/Power: 15 W.

        Memory Types: DDR4-2133, LPDDDR3-1866, DDR3L-1600.

        Graphics: Intel HD Graphics 530.

        Slot for PCI Express.

- AEL-WBR. **Electrical Workbench (Rack).**

- **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, installation and test of protection fuses of the general line power supply.

2.- Wiring, installation and test of surge protection devices.

3.- Wiring, installation and test of three phase energy meter.

4.- Wiring, installation and test of the General Control and Protection Box.

5.- Wiring and test of Power Control Switch.

6.- Wiring and test of the General Circuit breakers.

7.- Wiring and test of Residual Current Device (RCD).

8.- Wiring and test of residual circuit breakers selective, both industrial and domestic.

9.- Wiring and test of light points corresponding to the C1 circuit.

10.- Wiring and test of power outlets corresponding to the C2 circuit.

11.- Wiring and test of industrial power outlet on its corresponding circuit.

12.- Study of various problems in domestic and industrial electrical installation.

13.- Measuring of the resistance of the electrode to ground.

14.- Study and verification of different protection measures.

15.- Study of lighting and surge protection.

16.- Verification of continuity of protective conductors connections.

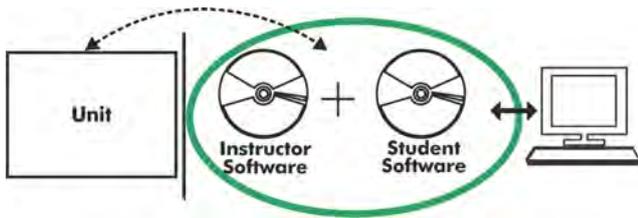- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 3 kW.

DIMENSIONS AND WEIGHTS

AEL-PMEI:

- 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-PMEI/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.

- 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.

Instructor Software

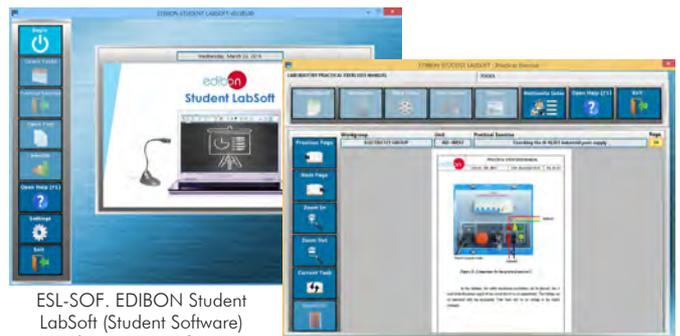ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen

ECAL. EDIBON Calculations Program Package - Formula Editor Screen

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

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

- 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

Student 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

AEL-PMEI/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit. It is useful for Technical and Vocational level.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them. There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- An incorrect calibration is applied to them.

- Non-linearity.

Faults affecting the actuators:

- Actuators channels interchange at any time during the program execution.

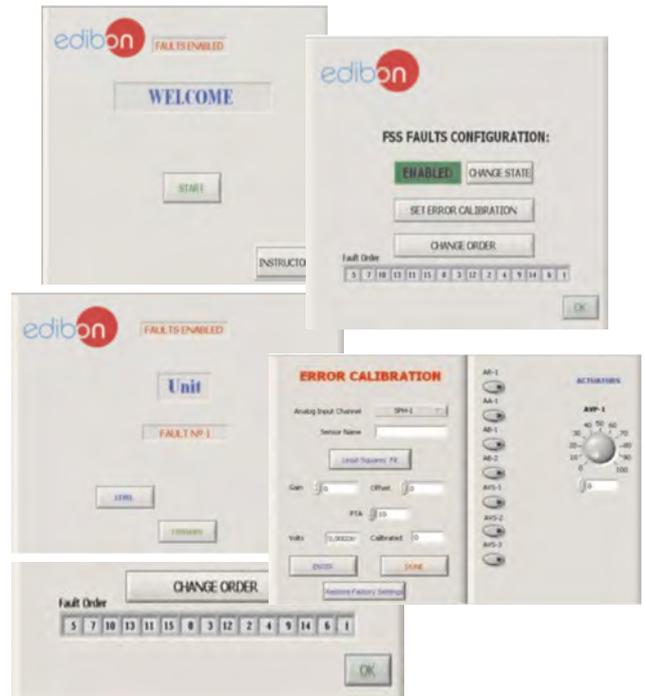- Response reduction of an actuator.

Faults in the controls execution:

- Inversion of the performance in ON/OFF controls.

- Reduction or increase of the calculated total response.

- The action of some controls is annulled.

On/off faults:

- Several on/off faults can be included.

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

Example of some screens

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

REPRESENTATIVE: