



www.edibon.com

↳ PRODUCTS

↳ 40.- ELECTRICITY

**AEL-1.
ELECTRICAL
INSTALLATIONS LAB**

AEL-2.
HOME AUTOMATION
SYSTEMS LAB

AEL-3.
ELECTRICAL
MACHINES LAB

AEL-4.
ELECTROMECHANICAL
CONSTRUCTIONS LAB

AEL-5.
POWER SYSTEMS
AND SMART
GRID TECHNOLOGY
LAB

Key features:

- ▶ **SCADA Control System.**
- ▶ **Specialized EDIBON Softwares, based on Labview, for:**
 - SCADA Control Software.
 - Data Acquisition Software.
 - Computer Aided Instruction Software.
 - ... and others.
- ▶ **Touch Screens and computers.**
- ▶ **Functional and self contained Electrical Workbench with instrumentation panel with all the required elements to supply power and control in the workbench.**
- ▶ **Intuitive, quick and accurate interaction of the user with the Electrical Workbench.**
- ▶ **Complete and functional training solution for electricity learning purposes.**
- ▶ **Covering all areas of electricity field.**
- ... and others possibilities.



ISO 9000: Quality Management
(for Design, Manufacturing,
Commercialization and After-sales service)



European Union Certificate
(total safety)

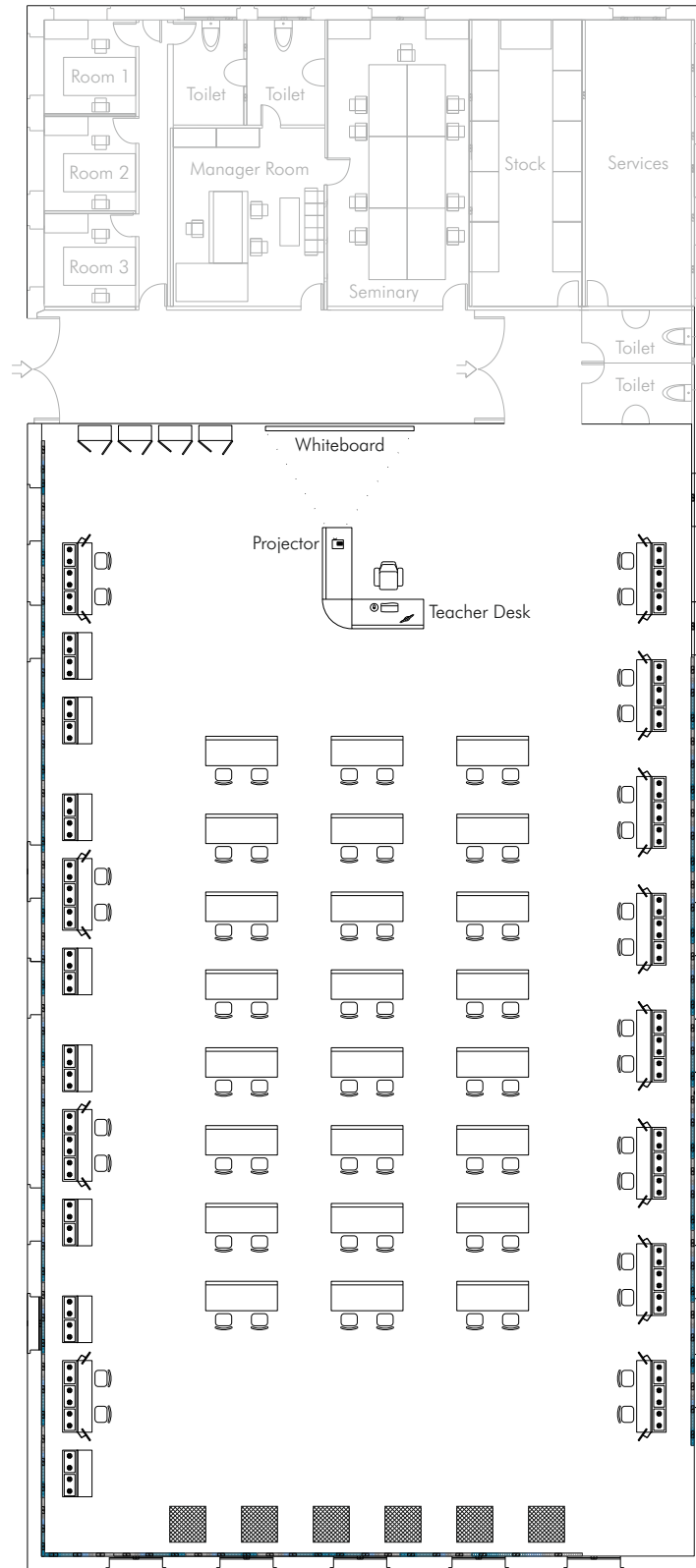







**Certificates ISO 14000 and
ECO-Management and Audit Scheme**
(environmental management)



Worlddidac Quality Charter
Certificate and
Worlddidac Member

Classroom and Laboratory Lay Out



-  AEL-WTS. Laboratory Workplace Table
-  AEL-WBC. Electrical Workbench (Rail) + 2 x AEL-PC. Two Touchscreen and computers
-  AEL-WBM. Electrical Workbench (Mobile)
-  AEL-MC. Multipurpose Cabinet
-  AEL-WIC. Electrical Installations Cabinet

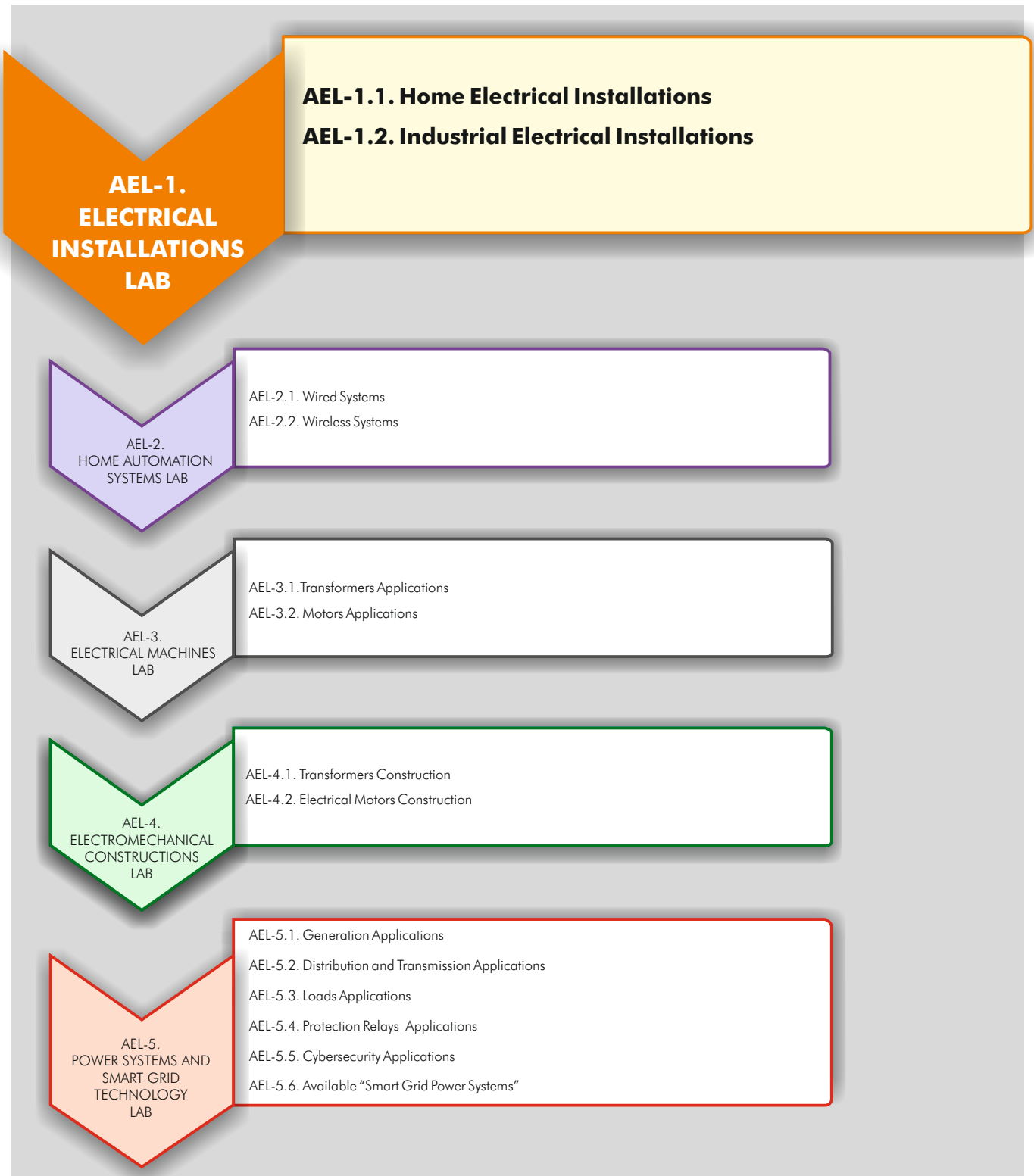
EDIBON, a company with more than 35 years of experience designing and implementing training systems, has a wide variety of applications adapted to XXI century new technologies.

Apart from providing a solid theoretical basis, EDIBON units and applications are aimed at technical professional training, vocational training, for higher education and even applied research, as well as at the improvement in all fields through advanced systems.

The electricity area includes five great groups that cover **Electrical Installations**, Home Automation Systems, Electrical Machines, Electromechanical Constructions, Power Systems and Smart Grid Technology.

All the units have a modular and intuitive design, with real elements used in the industry and technological market.

In this catalog we will cover "AEL-1. Electrical Installations Lab."



AEL-1. Electrical Installations Lab

The AEL-1. Electrical Installations Lab is formed by:

AEL-WBC. Electrical Workbench (Rail)



AEL-WBR. Electrical Workbench (Rack)



+

Applications
(to be mounted on rail)



AEL-AD33



AEL-AD3A

...



AEL-AD33 + N-RACK-A



AEL-AD3A + N-RACK-A

...

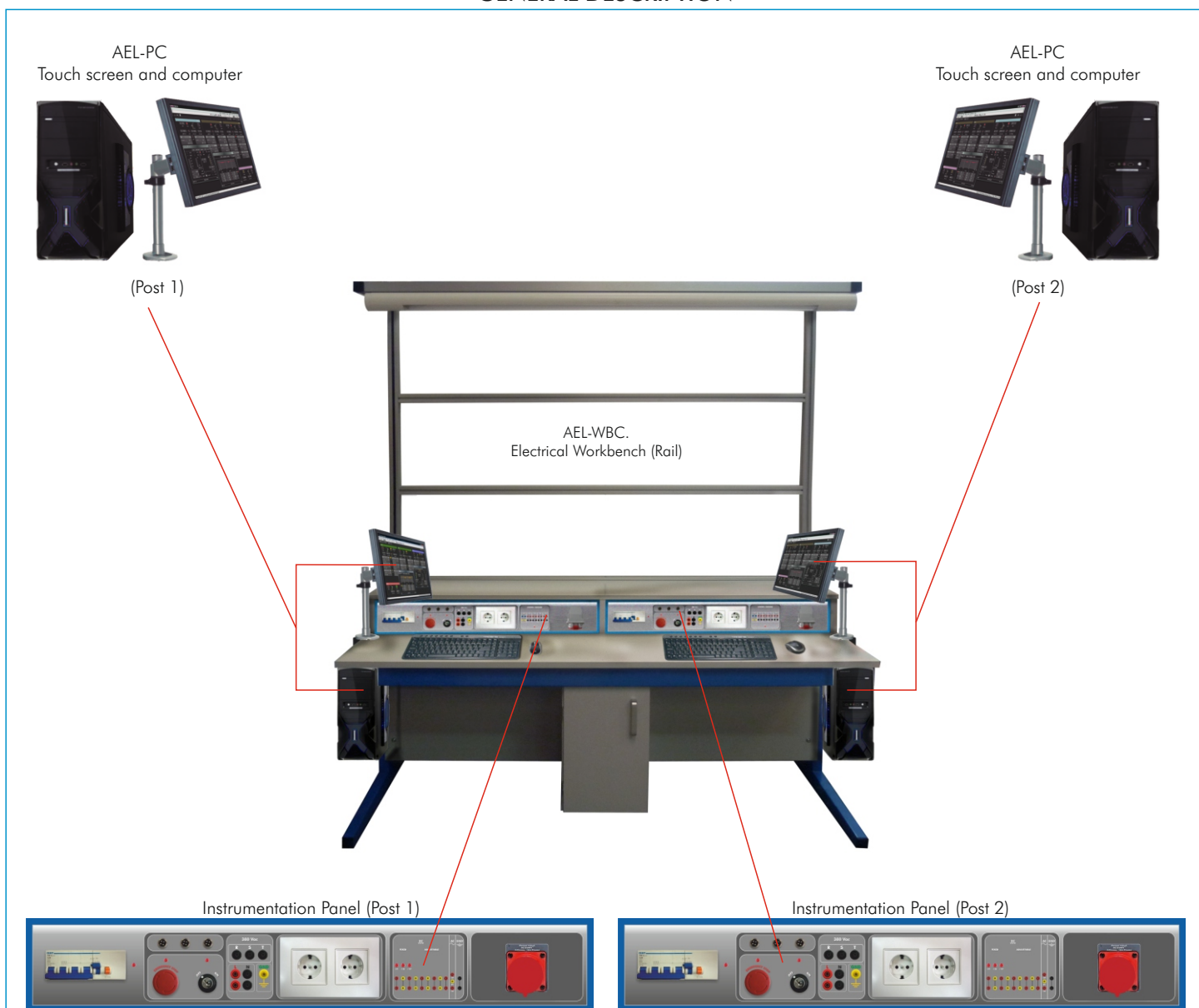
+

Learning Software Packages



Electrical Workbench

GENERAL DESCRIPTION



The Electrical Workbench has been designed to offer the students and teachers the necessary tools to learn and teach about the XXI century technologies.

The Electrical Workbench consists of:

Furniture, itself:

Consists of the frame that allows to locate the applications, lighting fitting, table, supports, etc.

Instrumentation Panel:

The workbench has been designed to be used by one or two students. Each student has access to its own instrumentation panel.

There are two Electrical Workbench versions:

AEL-WBC. Electrical Workbench (Rail).

The AEL-WBC is a workbench designed with rails in order to put and remove all electrical modules free.

AEL-WBR. Electrical Workbench (Rack).

The AEL-WBR is a workbench designed with strong rack in order to fix all electrical modules.

Optional:

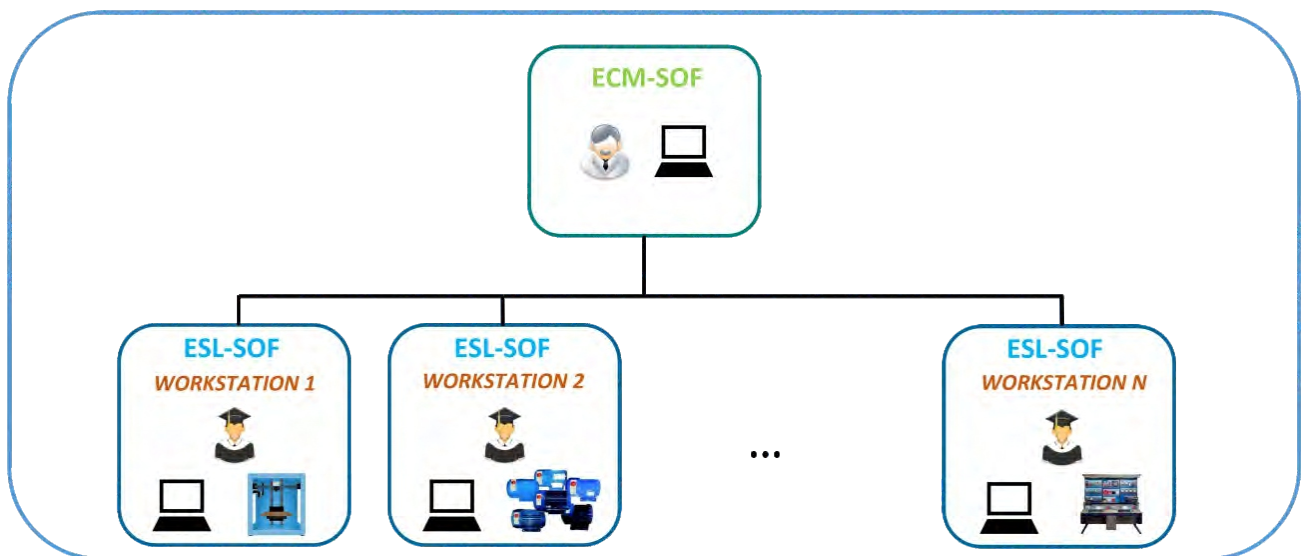
Touch screen and computer (AEL-PC):

The workbench can be supplied with one or two touch screens and computers. Thus, both students and teachers gain quick access to the applications to control them better, obtaining the maximum man-machine interaction.

In summary, technology, quality and aesthetics are combined in this piece of furniture in order to offer the best features for both research and teaching fields.

Learning Software Packages

GENERAL DESCRIPTION



* Contents included for all ECM-SOF and ESL-SOF Workstations.

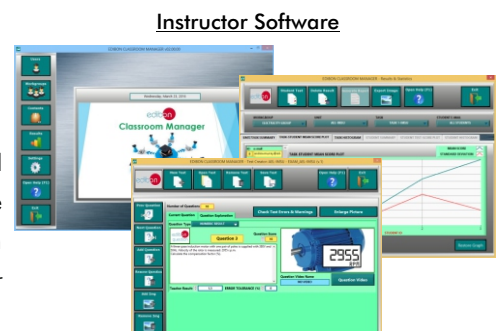
EDIBON has different software packages to provide students the maximum level in training systems.

Example of some Software Screens:

Interactive Computer Aided Instruction Software System

- 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.



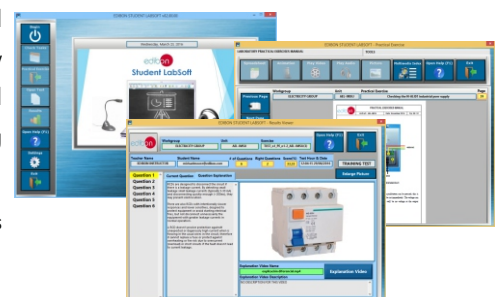
Instructor Software

- ESL-SOF. EDIBON Student Labsoft (Student Software):

ESL 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.

NOTE: Will be necessary acquire a license per student.



Student Software

AEL-Series. List of **APPLICATIONS**

| AEL-1. ELECTRICAL INSTALLATIONS LAB | |
|--|--|
| AEL-1.1. Home Electrical Installations | AEL-1.2. Industrial Electrical Installations |
| <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">Lighting and Control Applications</p> <ul style="list-style-type: none"> • AEL-AD13. Entry Phone Application. • AEL-AD14. Audio and Video Entry Phone Application. • AEL-AD6A. Luminosity Control Application. • AEL-AD6B. Basic Luminosity Control Application. • AEL-AD24. Position Switches Application. • AEL-AD5. Lighting Application with Timer Switch. • AEL-AI13-E. Electrotechnics Application focused on Lighting. • AEL-AE4. Differential Automatic Switches Application. <p style="text-align: center;">Climatization Applications</p> <ul style="list-style-type: none"> • AEL-AD9A. Heating Control Application. • AEL-AD9B. Basic Heating Control Application. | <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">Industrial Control Engineering Applications</p> <ul style="list-style-type: none"> • AEL-CM1. Logical Control Operations Application. • AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors. • AEL-CM3. Automatic Control Operations II Application. • AEL-CM4. Automatic Control Operations with Contactors and Sensors IV Application. • AEL-MED. Industrial Installations Monitoring Application. <p style="text-align: center;">Fault Applications</p> <ul style="list-style-type: none"> • AEL-AD33. Single-Phase Installations Faults Application. • AEL-AD33T. Three-phase Installations Faults Application. <p style="text-align: center;">Relays Applications</p> <ul style="list-style-type: none"> • AEL-PRTS. Protective Relaying Application. • AEL-AE5. Protection Relays Control Application. <p style="text-align: center;">Loads Applications</p> <ul style="list-style-type: none"> • AEL-AI13-A. Electrotechnics Application Focused on RLC Circuits. |

AEL-Series. List of APPLICATIONS
AEL-1.1 HOME ELECTRICAL INSTALLATIONS

Some Lighting and Control Applications



AEL-AD13. Entry Phone Application.



AEL-AD14. Audio and Video Entry Phone Application.



AEL-AD6A. Luminosity Control Application.



AEL-AD6B. Basic Luminosity Control Application.



AEL-AD24. Position Switches Application.



AEL-AD5. Lighting Application with Timer Switch.



AEL-AI13-E. Electrotechnics Application focused on Lighting.



AEL-AE4. Differential Automatic Switches Application.

Some Climatization Applications



AEL-AD9A. Heating Control Application.



AEL-AD9B. Basic Heating Control Application.

... and more.

The above applications can be COMBINED in different ways or configurations according to particular needs. See some examples below:



Illumination and Lighting Control Workbench



Differential Switches and Luminosity Control Workbench



Switches and Heating Control Workbench



Heating Control Workbench



Entry Phone Application and Luminosity Control Workbench

SOME CONFIGURATIONS CURRENTLY SUPPLIED



Differential Automatic Switches Application + Audio and Video

AEL-Series. List of APPLICATIONS
AEL-1.2 INDUSTRIAL ELECTRICAL INSTALLATIONS

Some Industrial Control Engineering Applications



AEL-CM1 . Logical Control Operations Application.



AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors.



AEL-CM3. Automatic Control Operations II Application.



AEL-CM4. Automatic Control Operations with Contactors and Sensors IV Application.



AEL-MED. Industrial Installations Monitoring Application.

Some Fault Applications



AEL-AD33. Single-Phase Installations Faults Application.



AEL-AD33T. Three-phase Installations Faults Application.



AEL-PRTS. Protective Relaying Application.



AEL-AE5. Protection Relays Control Application.



AEL-AI13-A. Electrotechnics Application Focused on RLC Circuits.

Some Relays Applications

Some Loads Applications

The above applications can be COMBINED in different ways or configurations according to particular needs. See some examples below:



Manual Starters and Velocity Commutators and Monitoring Workbench



Faults and Protection Relays Workbench



Automatic Control Operations Workbench



Protective Relays Workbench



Logical Control Operations and Manual Starters and Velocity Commutators Workbench

SOME CONFIGURATIONS CURRENTLY SUPPLIED



Electrotechnics, Three-Phase Installations Faults and Logical Control Operations Workbench

The Electrical Installations Lab (AEL-1) is focused on the theoretical-practical study of home and industrial electrical systems employed nowadays.

On one hand, this area covers all those applications and applications designed to study home electrical installations and industrial electrical installations. Besides, it includes a series of applications to study the most common electrical faults generated in actual electrical installations. After simulating those faults, a great variety of protection relays will be studied with the applications designed for that purpose.

On the other hand, there is a specific area for the training of home and industrial professional wiring, using perfectly conditioned cabinets to integrate the components.

The complete Electrical Installations Lab (AEL-1) includes:

- Electrical Workbench.
- Software packages.
- Applications.

Electrical Workbench:

There are two Electrical Workbench versions:

AEL-WBC. Electrical Workbench (Rail).

The AEL-WBC is a workbench designed with rails in order to put and remove all electrical modules free. The frame consists of three levels to get a maximum space for the modules and applications. Besides, the user can put and remove manually all electrical modules and make free configurations to construct different applications.

The advantage of this workbench is that all modules can be put and removed free and quick, so the student can change quickly to other practical exercises.

AEL-WBR. Electrical Workbench (Rack).

The AEL-WBR is a workbench designed with strong rack in order to fix all electrical modules. Each module will be fixed with screws. The frame consists of three racks to support different applications.

The advantage of this workbench is that all applications are perfectly covered to get a homogeneous and strong unit.

The Electrical Workbench is ready to use Specialized EDIBON Softwares, based on Labview, for:

- SCADA Control Software.
- Data Acquisition Software.
- Computer Aided Instruction Software.
- ...others.

It is a complete and functional training solution for electricity learning purposes, with intuitive, quick and accurate interaction of the user with the Electrical Workbench.

It is a functional and self contained Electrical Workbench, with wide working area for several applications, with instrumentation panel including all the required elements to supply power and control in the workbench.

The Electrical Workbench is mainly formed by:

Furniture, itself:

- Formed by the frame that allows to allocate the applications, lighting fitting, table, supports, etc.
- Dimensions: 2000 x 1000 x 1900 mm approx.

Instrumentation Panel:

- 2 x Control and supply panels.
- Three-phase and single-phase power systems.
- Independent Residual Circuit Breaker (RCB).
- Two single-phase sockets.
- Different level control voltages for signals applications.
- Integrated lighting system.

Technical data:

- 1 x Differential Protection, 1 x Emergency Stop Button and 1 x Safety Key.
- Power Terminal Connections: 1 x Three-phase terminals: 380 Vac + N+ GND and 1 x Single-phase terminals: 230 Vac + GND and 2 x Single-phase plugs + 2 x Three-phase plugs.
- Control terminals: 2 x 24 Vac., 2 x (+24) Vdc., 2 x (+12) Vdc., 2 x (-12) Vdc. and 2 x (+5) Vdc.
- Power Supply required: 380 Vac 3PH + N + GND.

Optional:

- Touch screen and computer (AEL-PC).
- The workbench can be supplied with one or two touch screens and computers.



Software packages:

ICAI. Interactive Computer Aided Instruction Software System:

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 Workgroups, Tasks 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.**

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.

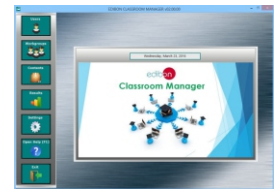
Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

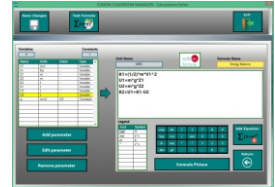
- Student Log-In & Self-Registration.**
- Existing Tasks checking & Monitoring.**
- Default contents & scheduled tasks available to be used from the first session.**
- Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- Evaluation Methods to prove your knowledge and progression.**
- 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 catalog. Click on the following link:
www.edibon.com/en/files/equipment/ICAI-ELEC/catalog

Instructor Software



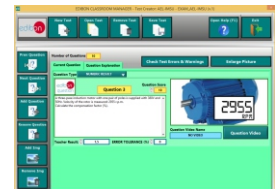
ECM-SOF. EDIBON Classroom Manager Software Application main screen



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

Student Software



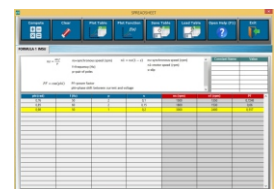
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package-Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

Applications:
**AEL-1.1
Home Electrical Installations**

 Lighting and Control Applications

AEL-AD13. Entry Phone Application.

The Entry Phone Application, "AEL-AD13", has been designed by Edibon in order to show the functionality of an entry phone system.

The AEL-AD13 consists of a series of modules that allow the students to understand how the main elements of the entry phone systems work. Phone, door opener, interphone and phones power supply are devices included in this application, and the safety connectors which it is easier to learn the wiring and take experience with these kinds of installations.

The AEL-AD13 includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-POR01. Phones Power Supply Module.
- N-POR02. Phone.
- N-POR03. Interphone (outdoor).
- N-POR06. Door Opener Module.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD13/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-AD13 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on the Domestic Power Supply.
- 2.- Checking the working of the Phones Power Supply.
- 3.- Wiring the supplying of phone, interphone and the door opener.
- 4.- Real application of an audio entryphone system.
- 5.- Checking the working of the door opener with the telephone.
- 6.- Checking the communication between the telephone and interphone.

For more information see **AEL-AD13** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD13/catalog



AEL-AD13

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AD14. Audio and Video Entry Phone Application.

The Audio and Video Entry Phone Application, "AEL-AD14", has been designed by Edibon in order to show the functionality of this kind of entryphone.

Video Entry Phone is a stand-alone intercom application system used to manage calls made at the entrance to a building with access controlled by audiovisual communication between the inside and outside. The most important feature of video door entry is that it enables the person indoors to identify the visitor and, if they wish, engage in conversation and/or open the door to allow access to the person calling.

This application consists of a series of modules that allow the students to understand how the main elements of the Audio and Video Entry Phone Application work. Phone, video camera, door opener, interphone and phones power supply are devices located in panels with safety connectors in order to the students take experience cabling and testing these types of elements.

The AEL-AD14 includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-POR04. Video camera.
- N-POR05. Phone/Monitor.
- N-POR06. Door Opener.
- N-POR08. Video-Interphone Power Supply.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD14/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-AD14 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Checking the working of the video-interphone power supply.
- 3.- Wiring the supplying of video interphone, telephone and door opener.
- 4.- Real application of an audio and video entryphone system.
- 5.- Checking the communication between video interphone and telephone.
- 6.- Checking the working of the door opener with the telephone.



AEL-AD14

For more information see **AEL-AD14** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD14/catalog

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AD6A. Luminosity Control Application.

The Luminosity Control Application, "AEL-AD6A" is an application designed to study how a luminosity control application works. This application consists of different modules such as switches with lights, fluorescent lamps, halogen lamps, presence and movement sensor, etc. These modules allow the students to acquire experience wiring of lighting automation circuits and circuit-switched.

This application has a motion sensor that can be connected to the lighting circuit to realize different automations. Besides, through this unit, the student can study different cabling made in these installations.

The AEL-AD6A includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-INT18. 1-pole Switch + 1-pole Switch Light.
- N-COM14. 2 Commutators.
- N-REG06. Voltage Electronic Regulator (Switch) 40 to 300 W / 230 VAC.
- N-LAM08. 2 Lamps - holders + Incandescent Lamps 40 W.
- N-LAM09. Fluorescent lamp.
- N-LAM10. 2 Halogen Lamp.
- N-SEN26. Presence and Movement Sensor (Wall).

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD6A/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-AD6A 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.

Some practical possibilities:

- 1.- Checking and measuring on the domestic main power supply.
- 2.- Light control from a switch.
- 3.- Light control from two devices
- 4.- Control of fluorescent tube with different control circuits.
- 5.- Study the control of the luminosity of a halogen lamp.
- 6.- Study the control of the luminosity of an incandescent lamp through a voltage electronic regulator.
- 7.- Variation of the luminous intensity.
- 8.- Switching control of the lamp using a movement sensor.

For more information see **AEL-AD6A** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD6A/catalog



AEL-AD6A

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AD6B. Basic Luminosity Control Application.

The Basic Luminosity Control Application, "AEL-AD6B", is an application designed to study how a luminosity control application works. This unit is composed by several modules in order to carry out practices related to switching circuits to control different lamps.

Through this application, the student can understand different cabling made in the lighting systems.

The AEL-AD6B includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-INT18. 1-pole Switch + 1-pole Switch Light.
- N-COM14. 2 Commutators.
- N-REG06. Voltage Electronic Regulator (Switch) 40 to 300 W / 230 VAC.
- N-LAM08. Two Incandescent lamps.
- N-LAM10. Two Halogen lamps.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD6B/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-AD6B can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on the domestic main power supply.
- 2.- Light control from a switch.
- 3.- Light control from two devices.
- 4.- Study the control of the luminosity of a halogen lamp.
- 5.- Study the control of the luminosity of an incandescent lamp through a voltage electronic regulator.
- 6.- Variation of the luminous intensity.

For more information see **AEL-AD6B** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD6B/catalog



AEL-AD6B

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AD24. Position Switches Application.

The Position Switches Application, "AEL-AD24", has been designed by Edibon in order to demonstrate how the different safety switches work, such as MBB (Make before break), BBM (break before make) and instantaneous micro-switch. This kind of device consists of an actuator mechanically linked to a set of contacts. When an object comes into contact with the actuator, the device operates the contacts to make or break an electrical connection. For instance, limit switches are used in a variety of applications and environments for their ruggedness, ease of installation, and reliability of operation. They can determine the presence or absence, passing, positioning, and end of travel of an object. They were first used to define the limit of travel of an object; hence the name Limit Switch.

This application includes all necessary elements to understand how work MBB, BBM and instantaneous switches. In addition, a series of lamps are included to show the switches' state.

The AEL-AD24 includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-ALI03. AC Auxiliary Power Supply (24 VAC).
- N-SEN01. Instantaneous Micro-Switch Module.
- N-SEN02. MBB Micro-switch Module.
- N-SEN03. BBM Micro-switch Module.
- N-LAM03. 3 Push-buttons and Pilot-lights.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD24/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-AD24 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Checking the working of auxiliary power supply.
- 3.- Checking the working of push-buttons and pilot-lights.
- 4.- Checking the working mode of an instantaneous micro-switch module.
- 5.- Checking the working mode of a MBB micro-switch.
- 6.- Checking the working mode of the BBM micro-switch module.
- 7.- Real application of the position switch.

For more information see **AEL-AD24** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD24/catalog



AEL-AD24

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AD5. Lighting Application with Timer Switch.

The Lighting Application with Timer Switch, "AEL-AD5", is designed with the aim to show the working of timer switches and other lighting switches. This application is formed by the following modules: a timed switch, a module with a switch, commutators group, a bell push-button, two modules with two incandescent lamps each one and a low consumption fluorescent module. With all of these devices the student can learn the working of timed switches applied to lighting, and simulate different situations to apply the automatic timed lighting and learn the wiring of these kinds of installations.

El AEL-AD5 includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-CTI10. Multi-function Timer.
- N-INT21. Switch + Commutators group + bell push-button. (2 units)
- N-LAM08. 2 Lamp holders + 2 Incandescent Lamps. (2 units)
- N-LAM13. Low Consumption Fluorescent Lamp Module.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD5/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-AD5 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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Adjusting the opening time of the timed switch.
- 3.- Checking the working of the application with the incandescent lamps module.
- 4.- Checking the working of the application with the low consumption fluorescents module.

For more information see **AEL-AD5** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD5/catalog



AEL-AD5

Applications:

AEL-1.1
Home Electrical Installations

Lighting and Control Applications

AEL-AI13-E. Electrotechnics Application focused on Lighting.

The Electrotechnics Application focused on Lighting, "AEL-AI13-E", is designed with the aim of students who are starting to learn about electricity, can differentiate clearly between the kinds of connections of some devices, in this case, lighting devices, such as, serial connections and parallel connections and with control elements, such as, switches or push-buttons. For that, this application includes a main power supply, a power supply module, a fluorescent lamp with which you can learn the method of connection of this kind of lamp, a digital multimeter, a relays' module with switches and a lighting module with switches, push-buttons and a buzzer. Combining all of these modules, you can experiment some situations of lighting control to understand the working of these devices and reinforce concepts about electricity.

The AEL-AI13-E includes the following modules:

- N-ALI02. Domestic main power supply.
- N-ALI10. Power Supply Module.
- N-LAM09. Fluorescent Lamp.
- N-MED65. Digital Multimeter.
- N-REL50. Control Relays Module.
- N-LAM26. Lighting Module.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AI13-E/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-AI13-E can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on of the main power supply.
- 2.- Lamp controlled by a switch or a push-button.
- 3.- Lamp controlled by relays.
- 4.- Acoustic indicator circuit.
- 5.- Parallel and series association switches.
- 6.- Switching a fluorescent tube.
- 7.- Association of switch-controlled lamps.
- 8.- Lamp control from three points.
- 9.- Lamps managed through relays.
- 10.- Switch on lamps through a switch.
- 11.- Simultaneous lamp and switch connection.

For more information see **AEL-AI13-E** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AI13-E/catalog



AEL-AI13-E

Applications:

AEL-1.1
Home Electrical Installations

 Lighting and Control Applications

AEL-AE4. Differential Automatic Switches Application.

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.

Some practical possibilities:

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

For more information see **AEL-AE4** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AE4/catalog



AEL-AE4

Applications:

AEL-1.1
Home Electrical Installations

Climatization Applications

AEL-AD9A. Heating Control Application.

The Heating Control Application, "AEL-AD9A", has been designed by Edibon to study how a heating control application works. This application allows the students understand the control logic of a thermostat and it offers the possibility of work with a heating thermostat and with a thermostat for heating or refrigeration. The AEL-AD9A includes lamps and bells in order to simulate the behavior of an air conditioning system.

The AEL-AD9A includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-TIM01. Bell 70 dB Module. (2 units).
- N-SEL09. Double Luminous Signalling red-green 230 VAC. (2 units).
- N-MED76. Thermostat for Heating Module.
- N-MED77. Thermostat for Heating and Refrigeration Module.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD9A-C/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-AD9A can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Checking and measuring on the domestic main power supply.
- 2.- Checking the working of the thermostat for heating and tests.
- 3.- Checking the working of the thermostat for heating and refrigeration, and tests.
- 4.- Test with several temperatures and the green and red lights.
- 5.- Test with several temperatures and the bell.
- 6.- Combining the lights modules with the bells.

For more information see **AEL-AD9A** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD9A/catalog



AEL-AD9A

Applications:

AEL-1.1
Home Electrical Installations

Climatization Applications

AEL-AD9B. Basic Heating Control Application.

The Basic Heating Control Application, "AEL-AD9B", has been designed by Edibon to study how a heating control application works. This application allows the students understand the control logic of a thermostat. The AEL-AD9B includes lamps and a bells in order to simulate the behavior of an heating control system.

The AEL-AD9B includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-TIM01. Bell 70 dB Module.
- N-SEL09. Double Luminous Signalling red-green 230 VAC.
- N-MED76. Thermostat for Heating Module.

Expansion learning software:

In addition, Edibon provides expansion learning software(AEL-AD9B/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-AD9B can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks:

- N-RACK-B.

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.

Some practical possibilities:

- 1.- Checking and measuring on the domestic main power supply.
- 2.- Checking the working of the thermostat for heating.
- 3.- Test with several temperatures and the green and red lights.
- 4.- Test with several temperatures and the bell.
- 5.- Combining the lights module with the bell.

For more information see **AEL-AD9B** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD9B/catalog



AEL-AD9B

Applications:

AEL-1.2
Industrial Electrical Installations

Industrial Control Engineering Applications

AEL-CM1. Logical Control Operations Application.

The Logical Control Operations Application, "AEL-CM1", has been designed by Edibon to study basic logics operations using timers, push-button, signaling lamps, contactors, thermal relays and combinations of them used in the industrial world.

This application allows the students acquire knowledge about how carry out different logic wirings with several relays and circuit breakers. The user will learn a lot of control logics, for example "OR" and "AND" logic, locking systems, etc. These control logic are very used in the industry to automate processes or other operations, such as starting of motors.

This application includes all necessary modules and accessories for programming the basics control logic and lamps which show the circuit breakers state.

The AEL-CM1 includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-PUL02. Emergency Push-Button Module.
- N-PUL48. Three Double Chamber Push-Buttons Module.
- N-LAM02. Three Auxiliary Lamps Module.
- N-CON01. 3-poles Contactor (24 VAC) (2 units).
- N-REL30. Synchronization Relay Module.
- N-ALI03. AC Auxiliary Power Supply.

Additional and recommended applications:

- AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors.
- AEL-CM3. Automatic Control Operations II.
- AEL-CM4. Automatic Control Operations with Contactors and Sensors IV.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-CM1/ICA1) 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-CM1 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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Checking the working of the auxiliary power supply.
- 3.- Checking the working of lamps.
- 4.- Signaling of contactor state.
- 5.- Logic OR operator in electrical circuits.
- 6.- Logic OR operator with locking in electrical circuits.
- 7.- Logic AND operator in electrical circuits.
- 8.- Sequential operation with contactor and timers.
- 9.- Utilization of static timer with excitation delay.

For more information see **AEL-CM1** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-CM1/catalog



AEL-CM1

Applications:

AEL-1.2
Industrial Electrical Installations

Industrial Control Engineering Applications

AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors.

The Application of Manual Starters and Velocity Commutators with Asynchronous Motors, "AEL-CM2", has been designed by Edibon to study how Dahlander and Three-Phase Induction Motor with Wound Rotor are wired and controlled. Besides, this application shows the most important methods of motor operations used in the industry, such as changing the rotation direction, manual star-delta starter, direct starter, direct starter with inversion, manual Dahlander commutator, starting with resistors, etc.

This application includes a series of modules and motors which allow study in depth all issues mentioned before.

In addition, this application has a flywheel with the purpose of simulate a dynamic load in the motors and to check how they work in this situation.

The AEL-CM2 includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-ARR01. Manual Star-Delta Starter.
- N-ARR05. Manual Star-Delta Starter with Inversion.
- N-ARR07. Manual Dahlander Commutator, 2 Speeds.
- N-ARR12. Direct Starter Module.
- N-ARR13. Direct starter with inversion.
- EMT8. Asynchronous Three-Phase Motor with Wound Rotor.
- EMT9. Dahlander Three-Phase Motor (two speeds).
- N-TRANS03. Three-Phase Autotransformer 400/230 VAC, 1 kVA.
- FLYW. Flywheel.
- N-REFTI. Three-Phase Independent Resistor Module.

Additional and recommended applications:

- AEL-CM1. Logical Control Operations Application.
- AEL-CM3. Automatic Control Operations II.
- AEL-CM4. Automatic Control Operations with Contactors and Sensors IV.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-CM2/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-CM2 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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Manual Star-Delta starter of asynchronous three-phase induction motor with wound rotor.
- 3.- Manual start and reverse operation of asynchronous three-phase induction motor with wound rotor.
- 4.- Manual Star-Delta with inversion circuit of asynchronous three-phase induction motor with wound rotor.
- 5.- Manual soft starter with resistors of asynchronous three-phase induction motor with wound rotor.
- 6.- Manual start and reverse operation of Dahlander motor.
- 7.- Manual speed variation of a Dahlander motor.
- 8.- Manual speed variation of a Dahlander motor with inversion.

For more information see **AEL-CM2** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-CM2/catalog



AEL-CM2

Applications:

AEL-1.2
Industrial Electrical Installations

Industrial Control Engineering Applications

AEL-CM3. Automatic Control Operations II.

The Automatic Control Operations II, "AEL-CM3", has been designed by EDIBON to study automatic operations with Three-Phase Induction Motors of Squirrel Cage.

The student will learn how carry out logic wirings with several relays, timers and circuit breakers to get direct starting, star/delta start or run investment operations. With this application the student will learn how control the induction motor developing logic wirings. This application includes a flywheel to simulate different load conditions in the electrical machine. The flywheel is coupled to the motor shaft in order to produce a higher moment of inertia.

Moreover, the AEL-CM3 will show the students to realize auxiliary wirings for emergency situations while the motor is working.

The AEL-CM3 includes the following modules:

- N-ALI01. Industrial Power Supply.
- N-ALI03. AC Auxiliary Power Supply.
- N-PUL02. Emergency Stop Push-Button Module (24 VAC).
- N-PUL48. Three Double Chamber Push-Buttons Module.
- N-LAM02. Three Auxiliary Lamps Module.
- N-CON01. 3-poles Contactor (24 VAC). (4 units).
- N-REL47. Thermal Relay Module.
- N-REL30. Synchronization Relay Module (2 units).
- N-TRANS03. Three-Phase Autotransformer 400/230 VAC, 1kVA.
- EMT7. Asynchronous Three-Phase Motor of Squirrel Cage.
- FLYW. Flywheel.

Additional and recommended applications:

- AEL-CM1. Logical Control Operations Application.
- AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors.
- AEL-CM4. Automatic Control Operations with Contactors and Sensors IV.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-CM3/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-CM3 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following rack:

- N-RACK-M. (2 units).

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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Checking and measuring on the auxiliary power supply.
- 3.- Checking and measuring on the lamps.
- 4.- Study of the basic control elements of three-phase induction motor.
- 5.- Thermal relay operation.
- 6.- Manual star-delta circuit of three-phase induction motor.
- 7.- Automatic star-delta circuit of three-phase induction motor with timers.
- 8.- Manual starting and reversing operation of the induction motor.
- 9.- Automatic Star/Delta reversing circuit of three-phase induction motor with timers.

For more information see **AEL-CM3** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-CM3/catalog



AEL-CM3

Applications:

AEL-1.2
Industrial Electrical Installations

Industrial Control Engineering Applications

AEL-CM4. Automatic Control Operations with Contactors and Sensors IV.

The Automatic Control Operations with Contactors and Sensors IV, "AEL-CM4", application has been designed by EDIBON for the study of automatic control operations with contactors and sensors connected to a load (induction motors, conveyor belts, lighting, etc).

This application allows the students to acquire the most important knowledge about the working mode of industrial installations equipped with circuit breakers, sensors and induction motors. Through this application can be studied the most significant sensors used in the industry such as limit switches, pulse counters, inductive proximity sensors, capacitive proximity sensors, barrier photo-electric sensors, level magnetic sensors and level controller devices. All these elements will be wired with basic and complex control logic circuits explained step by step from basic level to advanced level.

The AEL-CM4 includes the following modules:

- N-ALI01. Industrial Power Supply.
- N-ALI03. AC Auxiliary Power Supply.
- N-PUL48. Three Double Chamber Push-Buttons Module. (2 units).
- N-LAM02. Three Auxiliary Lamps Module.
- N-CON01. 3-poles Contactor (24 VAC). (4 units).
- N-REL47. Thermal Relay Module.
- N-SFC. Limit Switch Module.
- N-MED47. Pulse Counter Module.
- N-SEN05. Cylindrical Inductive Proximity Sensor Module.
- N-SEN013. DC Cylindrical Capacitive Proximity Sensor Module.
- N-SEN21. Barrier Photoelectric Sensor (Emitter) Module.
- N-SEN22. Barrier Photoelectric Sensor (Receptor) Module.
- N-SEN23. Reflecting Photoelectric Sensor (Emitter) Module.
- N-SEN24. Reflecting Photoelectric Sensor (Receptor) Module.
- N-SEN25. Level Magnetic Sensor Module.
- N-DPP. Water Tank Module.
- N-CNV. Level Controller Module.
- EMT7. Asynchronous Three-Phase Motor of Squirrel Cage.

Additional and recommended applications:

- AEL-CM1. Logical Control Operations Application.
- AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors.
- AEL-CM3. Automatic Control Operations II.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-CM4/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-CM4 can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following racks.

- N-RACK-A. (2 units).

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.

Some practical possibilities:

- 1.- Checking and measuring on the industrial power supply.
- 2.- Checking and measuring on the AC auxiliary power supply.
- 3.- Checking the working of the lamps.
- 4.- Checking and wiring demonstration of the limit switch.
- 5.- Checking, wiring and programming demonstration of the pulse counter.
- 6.- Checking and wiring demonstration of the cylindrical inductive proximity sensor.
- 7.- Checking and wiring demonstration of the DC cylindrical capacitive proximity sensor.
- 8.- Checking and wiring demonstration of the barrier photoelectric emitter and receptor sensor.
- 9.- Checking and wiring demonstration of the reflecting photoelectric emitter and receptor sensor.
- 10.- Checking and wiring demonstration of the level magnetic sensor.
- 11.- Checking and wiring demonstration of the level controller.
- 12.- Study of the basic control elements of the three-phase induction motor.
- 13.- Study of the control of the squirrel cage three-phase induction motor with the limit switch.
- 14.- Starting and reversing operation of the induction motor.
- 15.- Starting and reversing operation of motor with induction motor, capacitive, inductive and barrier photoelectric sensors.
- 16.- Starting and reversing operation of the induction motor using capacitive, inductive and barrier photoelectric sensors and pulse counter.
- 17.- Checking the working of Reflecting photoelectric sensor, inductive sensor and pulse counter.
- 18.- Checking the working of Level magnetic sensor and level controller.
- 19.- Simulation of a water tank filling.

For more information see **AEL-CM4** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-CM4/catalog



AEL-CM4

Applications:

AEL-1.2
Industrial Electrical Installations

Industrial Control Engineering Applications

AEL-MED. Industrial Installations Monitoring Application.

The Industrial Installations Monitoring Application, "AEL-MED", is an application designed with the objective of introducing the consumption supervision of industrial installations. For that, the application contains the next modules: a main power supply, a voltmeter, an ammeter AC, a frequency meter to check the quality of the service or detect interferences, a network analyzer with active and reactive power consumption, this allow us to calculate for example the power factor in each instant, an hour counter and a four position selector to measure different points. With all of this equipment it is possible to supervise an industrial installation and announce the students the different kinds of devices used for these purposes.

The AEL-MED includes the following modules:

- N-ALI02. Domestic Main Power Supply.
- N-MED22. AC Voltmeter (0-400 V).
- N-MED10. AC Ammeter (0-5 A).
- N-MED26. Reed Frequency Meter 50 Hz, 400 V.
- N-EALD. Network Analyzer Unit with Data Acquisition.
- N-MED49. Hour Counter.
- N-SWT4. Four position selector (measuring point selector).

Additional and recommended modules:

- EMT7. Asynchronous Three-Phase Motor of squirrel cage.
- EMT9. Dahlander Three-Phase Motor (two speeds).
- N-REF/T. Three-Phase Resistor Load with Commutator Module.
- N-IND/T. Three-Phase Inductive Load with Commutator Module.
- N-CON/T. Three-Phase Variable Capacitor Load with Commutator Module.
- FLYW. Flywheel.
- FRECP. Eddy Current Brake.
- N-WCC/M. DC Motor Speed Controller (intermediate option).

If the Option A (modules mounted on rack) is chosen, the rack/s required will depend on the optional modules requested by the customer.

Expansion learning software:

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

Option A:

This application needs the following rack:

- N-RACK-M.

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.

Some practical possibilities:

- 1.- Measurement of voltage and current in the installations.
- 2.- Measurement of the energy consumption, both active and reactive, and calculate the power factor of the installations.
- 3.- Registry of hours of service.
- 4.- Development of remote measurement stations.

For more information see **AEL-MED** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-MED/catalog



AEL-MED

Applications:

AEL-1.2
Industrial Electrical Installations

Fault Applications

AEL-AD33. Single-Phase Installations Faults Simulator

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-ALI02. 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.

Some 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.

For more information see **AEL-AD33** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD33/catalog



AEL-AD33

Applications:

AEL-1.2
Industrial Electrical Installations

Fault Applications

AEL-AD33T. Three-phase Installations Faults Application.

The Three-phase Installations Faults Application, "AEL-AD33T", has been designed to study several protections belonging to industrial installations. Through safety elements, the students 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 three-phase transformer in order to simulate earth derivations under safety conditions.

It is also possible to change the configuration of ground connection of the charges connected to the system. Some of those configurations are: TN, IT, TN-S, TN-C, TN-C-S.

Besides, the following protections are included: protection by earthing, protection by differential circuit breaker with automatic reset and protection by differential circuit breaker 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 sensivity of the protections.

The AEL-AD33T includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-MED65. Digital Multimeter.
- N-TRANS03. Three-Phase Autotransformer 400/230 VAC, 1 kVA.
- N-TDIF. Three-phase Differential Protection.
- N-TDIFVS. Three-phase Differential Protection with variable sensitivity.
- N-TDIFFR. Three-phase Differential Protection with automatic resetting.
- N-FAULT. Fault Injection Module with Human Body Impedance Selector.
- N-TSTF3. Tester Protection module (3-phase).
- N-MVA. Analog Voltmeter.
- N-MCA. Analog Ammeter.

Similar applications available:

- AEL-AD33. Single-Phase Installations Faults Application.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AD33T/ICA) 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-AD33T can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following rack:

- N-RACK-A.
- N-RACK-B.

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.

Some practical possibilities:

- 1.- Study of basic concepts of three-phase differential protection.
- 2.- Study of three-phase differential protection with variable sensitivity.
- 3.- Study of three-phase differential protection with automatic restore.
- 4.- Adjustment of sensibility of the three-phase differential protection.
- 5.- Study of short-circuits in three-phase system with basic differential protection.
- 6.- Study of short-circuits in three-phase system with short-circuit impedance and basic differential protection.
- 7.- Study short-circuits in three-phase system with differential protection with variable sensitivity.
- 8.- Study short-circuits in three-phase system with short-circuit impedance and differential protection with variable sensitivity.
- 9.- Study short-circuits in three-phase system with differential protection with automatic restore.
- 10.- Study short-circuits in three-phase system with short-circuit impedance and differential protection with automatic restore.
- 11.- Study of isolation coordination.
- 12.- Checking the differences between some different grid system configurations in the face of disturbances.

For more information see **AEL-AD33T** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AD33T/catalog



AEL-AD33T

Applications:

AEL-1.2
Industrial Electrical Installations

Relays Application

AEL-PRTS. Protective Relaying Application.

The Protective Relaying Application, "AEL-PRTS", has been designed by Edibon for the studying of the industrial protection relays more frequently used in low voltage electrical installations and distribution systems.

This application provides a full program for the learning in the installation, configuration and implementation at system level, of a great variety of protective relays such as the generator protective relay, the transformer protective relay and the induction motor protective relay.

The application is formed by different modules which can be classified according to the following structure:

Common electrical modules: power supply, voltmeters, ammeters, induction motor, synchronous generator, resistive loads, etc.

Power system modules: specific modules for training in the protective relay field such as current transformers, voltage transformers, power transformers, impedances, transmission lines, etc.

Protective relays: the application is constituted by protective relays of under/over-voltage, synchronism, under/over-frequency, phase balance, phase sequence, reverse power and power factor.

Several optional modules can be acquired to increase the practical possibilities of the trainer. These modules are, for example, distribution busbar, ring busbar, transmission lines, distribution transformers protective relays, inductive loads, etc.

The AEL-PRTS includes the following modules:

Power supplies:

- N-VPS01. AC 3PH Variable Power Supply.
- N-ALI03. AC Auxiliary Power Supply.
- N-SPI. Power Supply Impedance.

Measurement instrumentation:

- N-TRA32. Three-Phase Current Transformer 5 / 0,5 A.
- N-TRA33. Three-Phase Current Transformer 5 / 2,5-1 A.
- N-TRA34. Three-Phase Voltage Transformer 400 / 230 V.
- N-MED17. DC Voltmeter (0-200 V).
- N-MED79. DC Milliammeter (0 - 300 mA).
- N-MED80. DC Ammeter (0 - 3A).
- N-MED09. AC Ammeter (0-2.5 A). (2 units)
- N-MED11. AC Ammeter (0 - 10A).
- N-MED21. AC Voltmeter (0 - 250 VAC). (2 units)
- N-MED22. AC Voltmeter (0 - 400 VAC).
- N-MED33. Three-Phase Balanced Wattmeter (350-0-350 W, 440 VAC, 500 mA).
- N-MED39. Three-Phase Balanced Varmeter (350-0-350 VAR, 440 VAC, 500mA).

Power transmission lines and distribution:

- N-TRAG1. Transmission Grid 1 Module.

Faults injection modules:

- N-UFAM. Universal Fault Module.
- N-PTFI. Power Transformer with Faults Injection.

Protection relays:

- N-REL23/C. Three-Phase Over/Under-current Protection Relay.
- N-REL51. Reverse-Forward Protection Relay.
- N-REL52. Power Factor Protection Relay.
- N-REL53. AC/DC Sensivity Current Protection Relay.
- N-REL54. AC/DC Sensivity Voltage Protection Relay.

- N-REL55. Over/Under-frequency Protection Relay.
 - N-REL56. Three-Phase Sequence/Balance and Over/Under-voltage Protection Relay.
 - N-REL62. Synchronization and Synchronism-Check Relay.
- Motors, generators and loads:
- EMT6. Synchronous Three-Phase Motor Alternator.
 - EMT7/B. Asynchronous Three-Phase Motor of Squirrel Cage (4 Poles).
 - N-CAR37. Three / Single - Phase Resistor Load.
 - N-SYM. Synchronizing Lamps Module.
 - N-CAR20/B. Power Diodes Module.
 - FLYW. Flywheel.

Additional and recommended modules :

Transformers:

- N-TRA32. 3-Phase Distribution Transformer 120:240 / 120:240, 100VA.

Power transmission lines and distribution:

- N-TRAG2. Transmission Grid 2 Module.
- N-AE1/F. Faultable Transmission Line.
- N-AE1/B. Transmission Lines Simulation Basic Module.

Busbars:

- N-DISB1. Distribution Bus 1 Module.
- N-DISB2. Distribution Bus 2 Module.
- N-RBUS. Ring Bus Module.

Protection Relays:

- N-REL58. Single-Phase Under / Over Voltage Relay.
- N-REL60. Single-Phase Under / Over Current Relay.

Loads:

- N-CAR38. Three / Single - Phase Inductive Load.
- N-CAR39. Three / Single - Phase Capacitive Load.

Measurement instrumentation:

- N-MED26. Frequency meter (45 - 55 Hz).
- N-MED78. Three-Phase Power Factor Meter.

Starters:

- N-ARR12. Direct Starter Module.

Expansion learning software:

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

Option A:

This application needs the following rack:

- N-RACK-A (2 units).
- N-RACK-M (2 units).

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.



AEL-PRTS

Applications:

**AEL-1.2
Industrial Electrical Installations**

Relays Application

AEL-PRTS. Protective Relaying Application. (Continuation).

Some practical possibilities:

- 1.- Analysis of the X/R ratio in short-circuits.
- 2.- Wiring of the current transformer and setting of the three-phase over/under-current protection relay.
- 3.- Wiring of the current transformer and setting of the reverse-forward protection relay.
- 4.- Wiring of the current transformer and setting of the AC/DC sensivity current protection relay.
- 5.- Wiring of the current transformer and setting of the AC/DC sensivity voltage protection relay.
- 6.- Wiring of the current transformer and setting of the power factor protection relay.
- 7.- Setting and testing of over/under-frequency protection relay.
- 8.- Setting and testing of Three-Phase Sequence/Phase Balance and Over/Under-voltage protection relay.
- 9.- Setting and testing of synchronism check relay.
- 10.- Analysis of electrical system perturbations against phase to phase and phase to ground. Utilization of analog ammeters to visualize the perturbations.
- 11.- Wiring of resistive loads to the power system and measurement of balanced/unbalanced loads.
- 12.- Voltage system variation and study of the protection relays performance.
- 13.- Study of rotor earth fault protection.
- 14.- Study of loss of excitation protection.
- 15.- Study of over and under speed protection.

- 16.- Study of generator synchronization operations.
- 17.- Study of the Inrush magnetization current.
- 18.- Study of the differential protection.
- 19.- Study of three-phase distribution transformer protection diagram.
- 20.- Study of the stator-winding fault protection.
- 21.- Study of phase reversal protection.

For more information see **AEL-PRTS** catalog.

Click on the following link:

www.edibon.com/en/files/equipm/AEL-PRTS/catalog



AEL-PRTS

Applications:

AEL-1.2
Industrial Electrical Installations

Relays Application

AEL-AE5. Protection Relays Control Application.

The Protection Relays Control Application, "AEL-AE5", is designed with the aim to understand the working of protection relays. This application is formed by the next kind of relays: over current relays, which open the circuit when it detects a high level of current previously configured, and the leakage grounding relay, is capable to detect possible leakages to ground. To measure the currents, it is included current protection transformers, and to control the system, a three-pole contactor. Thus, the student can understand the working of the protection relays and simulate some scenes, such as, leakage grounding, through the elements included in this application.

The AEL-AE5 includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-ALI03. AC Auxiliary Power Supply (24 VAC).
- N-CON01. 3-poles Contactor (24 VAC).
- N-REF. Single-Phase Fixed Resistor (4 units).
- N-REL23/A. Earth leakage relay.
- N-REL23/B. Overcurrent relay.
- N-TRA10. Current Transformer 25/5 A.
- N-TRA31. Current Transformer 1/1000 A.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AE5/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-AE5 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.

Some practical possibilities:

- 1.- Checking and measuring on the main power supply.
- 2.- Checking and measuring on the auxiliary power supply.
- 3.- Start up of a three-phase contactor.
- 4.- Calculation of the transformation ratio of a toroid.
- 5.- Start up of an overcurrent relay.
- 6.- Start up of an earth leakage relay.

For more information see **AEL-AE5** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AE5/catalog



AEL-AE5

Applications:

AEL-1.2
Industrial Electrical Installations

————— Loads Applications —————

AEL-AI13-A. Electrotechnics Application Focused on RLC Circuits.

The Electrotechnics Application focused on RLC Circuits, "AEL-AI13-A", is designed with the aim to understand the working and the purposes of RLC circuits. For that, this application have a set of resistors, inductances and capacitors with different values in order to implement some different kinds of circuits. In addition this application has a rectifier made with diodes to check how the circuit responds in face of different voltage waves or to construct harmonics filters with different frequency bands. Thus, the student can learn about RLC circuits and their wiring.

The AEL-AI13-A includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-ALI10. Power Supply Module.
- N-CAR30. Inductances Module.
- N-CAR31. Capacitors Module.
- N-CAR32. Rectifier Diodes Module.
- N-CAR33. Resistive Components Module.
- N-MED65. Digital Multimeter.

Expansion learning software:

In addition, Edibon provides expansion learning software (AEL-AI13-A/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-AI13-A 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.

Some practical possibilities:

- 1.- Resistance measurement.
- 2.- Resistors in series association.
- 3.- Resistors in parallel association.
- 4.- Coils in series association.
- 5.- Coils in parallel association.
- 6.- Capacity measurement of a capacitor.
- 7.- Capacitors series association.
- 8.- Capacitors parallel association.
- 9.- Charge analysis of a capacitor.
- 10.- Discharge analysis of a capacitor.
- 11.- Calculate the time constant of a filter.
- 12.- Analysis of a RL circuit in series.
- 13.- Analysis of a RL circuit in parallel.
- 14.- Analysis of a RC circuit in series.
- 15.- Analysis of a RC circuit in parallel.
- 16.- Low-pass filter.
- 17.- High-pass filter.
- 18.- Star/delta transformation.
- 19.- Delta/star transformation.

For more information see **AEL-AI13-A** catalog.

Click on the following link:

www.edibon.com/en/files/equipment/AEL-AI13-A/catalog



AEL-AI13-A

ALL Advanced Electrical Laboratories (AEL-LABS)

| AEL-1. ELECTRICAL INSTALLATIONS LAB | |
|--|--|
| AEL-1.1. Home Electrical Installations | AEL-1.2. Industrial Electrical Installations |
| <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">Lighting and Control Applications</p> <ul style="list-style-type: none"> • AEL-AD13. Entry Phone Application. • AEL-AD14. Audio and Video Entry Phone Application. • AEL-AD6A. Luminosity Control Application. • AEL-AD6B. Basic Luminosity Control Application. • AEL-AD24. Position Switches Application. • AEL-AD5. Lighting Application with Timer Switch. • AEL-AI13-E. Electrotechnics Application focused on Lighting. • AEL-AE4. Differential Automatic Switches Application. <p style="text-align: center;">Climatization Applications</p> <ul style="list-style-type: none"> • AEL-AD9A. Heating Control Application. • AEL-AD9B. Basic Heating Control Application. | <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">Industrial Control Engineering Applications</p> <ul style="list-style-type: none"> • AEL-CM1. Logical Control Operations Application. • AEL-CM2. Application of Manual Starters and Velocity Commutators with Asynchronous Motors. • AEL-CM3. Automatic Control Operations II Application. • AEL-CM4. Automatic Control Operations with Contactors and Sensors IV Application. • AEL-MED. Industrial Installations Monitoring Application. <p style="text-align: center;">Fault Applications</p> <ul style="list-style-type: none"> • AEL-AD33. Single-Phase Installations Faults Application. • AEL-AD33T. Three-phase Installations Faults Application. <p style="text-align: center;">Relays Applications</p> <ul style="list-style-type: none"> • AEL-PRTS. Protective Relaying Application. • AEL-AE5. Protection Relays Control Application. <p style="text-align: center;">Loads Applications</p> <ul style="list-style-type: none"> • AEL-AI13-A. Electrotechnics Application Focused on RLC Circuits. |

AEL-2. HOME AUTOMATION SYSTEMS LAB

| AEL-2.1. Wired Systems | AEL-2.2. Wireless Systems |
|--|--|
| <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">General Wired Home Automation Systems</p> <ul style="list-style-type: none"> • AEL-AD1A. Robbery Alarm Station. • AEL-AD1B. Basic Robbery Alarm Station. • AEL-AD3A. Fire Alarm Station. • AEL-AD3B. Basic Fire Alarm Station. • AEL-AD15A. Position Control Station. • AEL-AD15B. Basic Position Control Station. • AEL-AD25A. Control Station for Home Electric Service through the telephone. • AEL-AD22. Flooding Control Station. • AEL-AD30. Gas Control Station. • AEL-AD31. Movement and Sound Detection and Control. • AEL-AD40. Remote Control Station Via Telephone. <p style="text-align: center;">KNX/EIB Systems</p> <ul style="list-style-type: none"> • AEL-KNX1. KNX/EIB Lighting and Shutter Control System. • AEL-KNX2. KNX/EIB Heating Control System. • AEL-KNX3. KNX/EIB Robbery Alarm System. • AEL-KNX4. KNX/EIB Fire Alarm System. • AEL-BCS. BacNet Systems. | <p style="text-align: center;"><u>Applications</u></p> <p style="text-align: center;">General Wireless Home Automation Systems</p> <ul style="list-style-type: none"> • AEL-AD28A. Integral Control Station of Home Electric Systems. • AEL-AD28B. Basic Control Station of Home Electric Systems. • AEL-AD28C. Elementary Control Station of Home Electric Systems. • AEL-AD23. Wireless Basic Control Station (RF). |
| <div style="border: 1px solid black; padding: 10px; display: inline-block;"> <p>See catalog of: AEL-2. Home Automation Systems Lab www.edibon.com/en/files/equipment/AEL-2/catalog</p> </div> | |

AEL-3. ELECTRICAL MACHINES LAB

AEL-3.1.

Transformers Applications

Applications

- AEL-SPTT. Single-Phase Transformer Application.
- AEL-TPTT. Three-Phase Transformer Application.
- AEL-AI13-D. Modular Application for Electrotecnics (Transformers).

AEL-3.2.

Motors Applications

Applications

AC Electrical Motors Applications

- AEL-EEEM. Energy Efficiency in Electrical Motors Application.
- AEL-EMSS. Electrical Machines Soft Starters Application.
- AEL-EMCF. Application Electrical Machines Control through Frequency Controller.
- AEL-AI13. Modular Application for Electrotecnics (RLC Circuits, Electrostatics, Motors, Transformers, Lighting).
- AEL-AI13-C. Modular Application for Electrotecnics (Motors).
- AEL-EMRP. Electrical Machines Relays Protection Application.
- AEL-SERIN/CA-1k. Computer Controlled Advanced Industrial Servo systems Application- 1 kW (for AC Motors).
- AEL-MMRT. Motor Management Relays Application.
- AEL-PRTS. Industrial Protective Relaying Training Application.
- AEL-ACEMT. AC Electrical Motors Application.
 - Option 1 (EMT7): Study of Three-Phase Asynchronous Motor of Squirrel cage.
 - Option 2 (EMT8): Study of Three-Phase Asynchronous Motor of wound rotor.
 - Option 3 (EMT9): Study of Three-Phase Dahlander Motor.
 - Option 4 (EMT10): Study of Asynchronous three-phase motor of two independent speeds.
 - Option 5 (EMT11): Study of Asynchronous single-phase motor with starting capacitor.
 - Option 6 (EMT12): Study of Universal Motor.
 - Option 7 (EMT16): Study of Asynchronous single-phase motor with starting and running capacitor.
 - Option 8 (EMT20): Study of Asynchronous single-phase motor with split phase.
 - Option 9 (EMT21): Study of Three-Phase Reluctance Motor.
- AEL-ACINA. Application of AC Three-Phase Induction Motor of Squirrel Cage.
- AEL-ACDHA. Application of AC Dahlander Three-Phase Induction Motor.
- AEL-ACWRA. Application of AC Three-Phase Induction Motor of Wound Rotor.
- AEL-ACLA. Application of AC Linear Motor Operations.
- AEL-ACRLA. Application of AC Three-Phase Reluctance Motor.
- AEL-ACSPA. Application of Asynchronous Single-Phase Motor with Split Phase.
- AEL-AI12. Modular Application (AC Motors).
- AEL-IMSU. General Application of AC Induction Motor.
- AEL-ACEMA. AC Electrical Motors Applications.
 - Option 1 (EMT7): Study of Three-Phase Asynchronous Motor of Squirrel cage.
 - Option 2 (EMT8): Study of Three-Phase Asynchronous Motor of wound rotor.
 - Option 3 (EMT9): Study of Three-Phase Dahlander Motor.
 - Option 4 (EMT10): Study of Asynchronous three-phase motor of two independent speeds.
 - Option 5 (EMT11): Study of Asynchronous single-phase motor with starting capacitor.
 - Option 6 (EMT12): Study of Universal Motor.
 - Option 7 (EMT16): Study of Asynchronous single-phase motor with starting and running capacitor.
 - Option 8 (EMT20): Study of Asynchronous single-phase motor with split phase.
 - Option 9 (EMT21): Study of Three-Phase Reluctance Motor.
- AEL-EEA. Alternator Study Application.
- AEL-EGMG24. Motor-Generator Group.

DC Electrical Motors Applications

- AEL-DCEMT. DC Electrical Motors Applications.
 - Option 1 (EMT1): Study of DC Machine with independent excitation.
 - Option 2 (EMT2): Study of DC Machine with Series excitation.
 - Option 3 (EMT3): Study of DC Machine with shunt excitation.
 - Option 4 (EMT4): Study of DC Machine with Compound excitation.
 - Option 5 (EMT5): Study of all types of DC Machines.
- AEL-DCSHT. DC Shunt Excitation Motor Application.
- AEL-DCSEA. Application of DC Series Motor.
- AEL-DCSHA. Application of DC Shunt Motor.
- AEL-DCCOA. Application of DC Compound Motor.
- AEL-DCSPA. Application of DC Separately Excited Motor.
- AEL-DCGEA. Application of DC Generator.
- AEL-DCPMA. Application of DC Permanent Magnet Motor.
- AEL-DCBRA. Application of DC Brushless Motor.
- AEL-DCEMA. DC Electrical Motors Applications.
 - Option 1 (EMT1): Study of DC Machine with independent excitation.
 - Option 2 (EMT2): Study of DC Machine with Series excitation.
 - Option 3 (EMT3): Study of DC Machine with shunt excitation.
 - Option 4 (EMT4): Study of DC Machine with Compound excitation.
 - Option 5 (EMT5): Study of all types of DC Machines.
 - Option 6: (EMT15): Study of Permanent Magnet DC Motor.
 - Option 7: (EMT1): Study of DC Generator.
- AEL-UMA. Application of Universal Motor.
- AEL-STMA. Application of Stepper Motor.

Electrical Motors Faults Applications

- AEL-ESAM. Faults Simulation Application in Electrical Motors.
- AEL-ESAT. Faults Simulation Application in Transformers.

AEL-4. ELECTROMECHANICAL CONSTRUCTIONS LAB

**AEL-4.1.
Electrical Machines Construction**

Applications

Dissectible and Configurable Electrical Motors Application

- AEL-EMT-KIT. Advanced Dissectible and Configurable Electrical Machines.

Wiring & Construction of Motors, Generators and Transformers

- AEL-MGTC. Motors, Generators and Transformers Construction Application.
- AEL-TPTC. Three-Phase Transformer Construction Kit.

Disassembly Motors

- AEL-DMG-KIT. Disassembly Motors-Generators Kit.
- AEL-DIM-KIT. 4 Disassembly Induction Motors Kit.

**AEL-4.2.
Electrical Motors Construction**

Applications

Cut Away Electrical Motors

- EMT1-S. Cut away DC independent excitation motor-generator.
- EMT2-S. Cut away DC series excitation motor-generator.
- EMT3-S. Cut away DC shunt excitation motor-generator.
- EMT4-S. Cut away DC compound excitation motor-generator.
- EMT5-S. Cut away DC shunt-series compound excitation motor.
- EMT6-S. Cut away AC synchronous three-phase motor alternator.
- EMT7-S. Cut away asynchronous three-phase motor of squirrel cage.
- EMT8-S. Cut away asynchronous three-phase motor with wound rotor.
- EMT9-S. Cut away Dahlander three-phase motor.
- EMT10-S. Cut away asynchronous three-phase motor of two independent speeds.
- EMT11-S. Cut away asynchronous single-phase motor with starting capacitor.
- EMT12-S. Cut away universal motor.
- EMT14-S. Cut away repulsion motor, single-phase with short circuited brushes.
- EMT15-S. Cut away DC permanent magnet motor.
- EMT16-S. Cut away asynchronous single-phase motor with starting and running capacitor.
- EMT17-S. Cut away asynchronous three-phase motor of squirrel cage with "Y" connection.
- EMT18-S. Cut away DC Brushless motor.
- EMT19-S. Cut away stepper motor.
- EMT20-S. Cut away asynchronous single-phase motor with split phase.
- EMT21-S. Cut away three-phase reluctance motor.
- EMT22-S. Cut away single-phase shaded pole motor.

Transparent and Functional Electrical Motors

- AEL-FTM. Transparent and Functional Motors Application
- AEL-EMT1-T. Transparent and functional DC independent excitation motor-generator.
- AEL-EMT2-T. Transparent and functional DC series excitation motor-generator.
- AEL-EMT3-T. Transparent and functional DC shunt excitation motor-generator.
- AEL-EMT4-T. Transparent and functional DC compound excitation motor-generator.
- AEL-EMT5-T. Transparent and functional DC shunt-series compound excitation motor-generator.
- AEL-EMT6-T. Transparent and functional AC synchronous three-phase motor alternator.
- AEL-EMT7-T. Transparent and functional asynchronous three-phase motor of squirrel cage.
- AEL-EMT8-T. Transparent and functional asynchronous three-phase motor with wound rotor.
- AEL-EMT9-T. Transparent and functional Dahlander three-phase motor.
- AEL-EMT10-T. Transparent and functional asynchronous three-phase motor of two independent speeds.
- AEL-EMT11-T. Transparent and functional asynchronous single-phase motor with starting capacitor.
- AEL-EMT12-T. Transparent and functional universal motor.
- AEL-EMT14-T. Transparent and functional repulsion motor, single-phase with short circuited brushes.
- AEL-EMT16-T. Transparent and functional asynchronous single-phase motor with starting and running capacitor.
- AEL-EMT17-T. Transparent and functional asynchronous three-phase motor of squirrel cage with "Y" connection.
- AEL-EMT20-T. Transparent and functional asynchronous single-phase motor with split phase.
- AEL-EMT21-T. Transparent and functional three-phase reluctance motor.
- AEL-EMT22-T. Transparent and functional single-phase shaded pole motor.

See catalog of: **AEL-4. Electromechanical Constructions Lab**
www.edibon.com/en/files/equipment/AEL-4/catalog

AEL-5. POWER SYSTEMS AND SMART GRID TECHNOLOGY LAB

**AEL-5.1.
Generation Applications**

Applications

Basic Synchronization Applications

- AEL-MOSC. Manual Operations of Synchronization Circuits.

Advanced Synchronization Applications

- AEL-EESD. Advanced Digital Synchronization Application.

Wind Energy

- AEL-WPP. Wind Power Plants with Double Feed Induction Generator.
- AEL-WPT. Wind Power Application with Permanent Magnets Synchronous Generator.
- AEL-WPPI. Wind Power Plants with Induction Generator.

Photovoltaic Energy

- AEL-PHVG. Photovoltaic Application with Connection to Grid.

Fuel Cell Energy

- AEL-FCLL. Fuel Cell Energy Application.

Power Plants

- AEL-EPP. Energy Power Plants Application.
- AEL-HPPP. Hydroelectric Power Plants Application with Pelton Turbine.
- AEL-MEPD. Marine Electrical Power Distribution System.
- TDEGC. Computer Controlled Diesel Engine Electricity Generator.

Basic Smart Grid Power Systems

- AEL-BSG. Basic Smart Grid Application.
- AEL-BSGC. Basic Smart Grid Application, with SCADA.

Microgrid Series

- AEL-MGR. Micro-Grids Power System Series.

**AEL-5.2.
Distribution and Transmission Applications**

Applications

Distribution and Transmission Applications

- AEL-AE1A. Aerial Line Model.
- AEL-TI-01. Analysis of Three-phase Power Lines.
- AEL-TI-02. Distribution Transformer with Motor Regulation.
- AEL-TI-03. Arc suppression Coil.
- AEL-TI-04. Underground Transmission lines.
- AEL-TI-05. Parallel and Series Transmission Lines.
- AEL-TI-06. Analysis of flow power on Transmission Lines.
- AEL-TI-07. Transmission Systems with Synchronous Generator.
- AEL-SST-01. Basic Operations in Switching Transmission Substation Application.
- AEL-SST-02. Switching Substation Protection Application.
- AEL-HVDC. High Voltage DC Transmission Lines.

**AEL-5.3.
Loads Applications**

Applications

Basic Load Controller Applications

- AEL-MRPC. Manual Reactive Power Compensation.
- AEL-ARPC. Automatic Reactive Power Compensation.
- AEL-EECFP. Advanced Power Factor Compensation.
- AEL-APFC. Single-phase Automatic Power Factor Compensation.
- AEL-DLT. Dynamic Loads Application.

Advanced Loads Control

- AEL-FUSG. Final User Smart Grid Application.
- AEL-FUSG-M. Final User Smart Grid-Smart Meter Application.
- AEL-FUSG-E. Final User Smart Grid-Smart Energy Application.
- AEL-FUSG-N. Final User Smart Grid-Net Metering Application.

**AEL-5.4.
Protection Relays Applications**

Applications

Fundamental Concepts

- AEL-CTFP. Current Transformer Fundamentals for Protections Devices.
- AEL-VTFP. Voltage Transformer Fundamentals for Protections Devices.

Protection Applications Relays

- ERP. Protection Relays Test Application.
- ERP-CBM. Cybersecurity Module.

Protection Systems for Generators

- AEL-GPRE. Generator Protection Relay Application.

Protection Systems for Transmission and Distribution Lines

- AEL-TPT-01. Overcurrent Time Protection Relay for Lines.
- AEL-TPT-02. Directional Overcurrent Protection Relay for Transmission Lines.
- AEL-TPT-03. Overvoltage and Undervoltage Protection Relay.
- AEL-TPT-04. Directional Power Protection Relay.
- AEL-TPT-05. Earth-Fault Voltage Protection Relay.
- AEL-TPT-06. Parallel Transmission Lines Protection Relay.
- AEL-TPT-07. High Speed Distance Protection Relay.

**AEL-5.5
Cybersecurity Applications**

Applications

- ERP-CBM. Cybersecurity Module.

**AEL-5.6.
Available "Smart Grid Power Systems"**

Applications

- APS12. Advanced Mechanical, Electrical and Smart Grid Power Systems (Utilities).
- AEL-MPSS-01. Modular Smart Grid Power Systems Simulator, with Automatic Control Generation, Transmission Line, Loads and Protection Relays, with SCADA.
- AEL-MPSS-02. Modular Smart Grid Power Systems Simulator, with Automatic Control Generation, Transmission Line and Loads, with SCADA.
- AEL-MPSS-03. Modular Smart Grid Power Systems Simulator, with Manual Control Generation, Transmission Line, Loads and Protection Relays, with SCADA.
- AEL-MPSS-04. Modular Smart Grid Power Systems Simulator, with Manual Control Generation, Transmission Line and Loads, with SCADA.
- AEL-CPSS-01S. Smart Grid Power Systems Application, with Automatic Control Generation, Transmission Line and Loads.
- AEL-CPSS-02S. Smart Micro-Grids Power Systems Application, with Automatic Control Generation and Loads.
- AEL-CPSS-03S. Smart Grid Power Systems Application with Two Parallel Generators, Two Distribution Lines and Loads, with SCADA.

See catalog of: **AEL-5. Power Systems and Smart Grid Technology Lab**
www.edibon.com/en/files/equipment/AEL-5/catalog

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



C/ Julio Cervera, 10-12-14. Móstoles Tecnológico.
28935 MÓSTOLES. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363 Fax: 34-91-6198647
E-mail: edibon@edibon.com WEB site: www.edibon.com

Issue: ED01/18
Date: August/2018

REPRESENTATIVE: