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 ↳ PRODUCTS  
 ↳ 40.- ELECTRICITY

### INTRODUCTION

Automation is the use of various control systems for operating equipment with minimal or reduced human intervention. The biggest benefit of automation is that it saves money, energy and materials, providing a good quality and precision in the processes. Programmable logic controllers (PLC) are installed in systems automation and they are used for automation of typically industrial electromechanical processes, such as control of machinery on factory assembly lines, amusement rides, or light fixtures. PLCs are used in many machines, in many industries.



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



Certificate and Worlddidac Member

## GENERAL DESCRIPTION

The Motor Management Relays Trainer "AEL-MMRT" has been designed by Edibon in order to study the behavior of three-phase induction motors when they are managed with a PLC.

This trainer allows the students learning the main operations and programs (through the PLC), in order to carry out different functions such as direct starting, star-delta starting, starting with a frequency controller, forward/reverse operation, countercurrent breaking, and protection relays management.

The AEL-MMRT includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- N-REL09. Time Electronic Relay against Overcurrents (1.2 - 7 A).
- N-REL47. Thermal Relay Module.
- EMT7B/1K. 1kVA three-phase Asynchronous motor of squirrel cage.
- N-SERV1K. 1 kW Servomotor Module.
- MED65. Digital Multimeter.
- N-EALD. Network Analyzer Unit with Computer Data Acquisition
- N-CON02. 3-pole Contactor (220 Vac). (3 units)
- N-EME-PLCE. Electrical Machines PLC Unit.

Expansion learning software:

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

Option A:

This application needs the following racks.

- 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.

## SPECIFICATIONS

The trainer includes the following modules:

- **N-ALI01. Industrial Power Supply.**

Supply voltage: 400 VAC, 3 PH+N+G.

ON-OFF removable key.

Output voltage connections:

Three-Phase + Neutral: 400 VAC.

Single-Phase: 230 VAC.

Three-Phase supply hose with IP44 3PN+E 32A 400V connecting plug.

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



N-ALI01

- **N-REL09. Time Electronic Relay against Overcurrents (1.2 - 7 A).**

Electronic thermal relay.

Overload protection.

Range 1.2 - 7 A.

Reset and test function.

1 NONC contact.

Temporization.



N-REL09

- **N-REL47. Thermal Relay Module.**

Nominal voltage for power contacts: 400 VAC.

Nominal voltage for the control coil: 24 VAC.

Contacts:

One three-phase Normally Open Contact (NO) for power circuit

Ground terminal.



N-REL47

- **EMT7B/1K. 1 kW Three-Phase Asynchronous Motor of Squirrel Cage.**

Nominal power: 1 KW.

Speed: 1405 r.p.m.

Nominal torque: 7,48 Nm

Performance:

75,5 % (at 50% of full load).

77,8 % (at 75% of full load).

76,7 % (at 100% of full load).

Power Factor: 0,8.

Nominal current:

4,5 A (at 230 VAC).

2,7 A (at 380 VAC).

2,6 A (at 400 VAC).



EMT7/B

- **N-SERV1K. 1 kW Servomotor Module.**

Dynamic and static four-quadrant operation.

Speed and torque displays.

Four-quadrant monitor.

Thermal monitoring of the machine under test.

Testing for the presence of a shaft cover.

Connection voltage: 400 V.

Frequency: 50 Hz.

Maximum power output: 10 kVA.

Maximum speed: 4000 r.p.m.

Maximum torque 30 Nm.

Temperature monitoring.



N-SERV1K

## Specifications

- **MED65. Digital Multimeter.**

Digital multimeter of about 3 ½ digits, with double-jack ending cables of about 4 mm to facilitate interconnections.

With this digital multimeter we will be able to measure:

- Voltage.
- Current.
- Resistance.
- Capacitors capacity.
- Temperature.



MED65

- **N-EALD. Network Analyzer Unit with Computer Data Acquisition.**

ON-OFF switch.

Supply voltage: 400 VAC.

Input terminals: Input connection with the measurement point.

Output terminals: Output connection with the measurement point.

Digital outputs: Three digital outputs are used for pulses or alarms, or for combining both.

RS-485 Communication port.

Fuses: 3x10 A.

Network Analyzer Display. It shows:

- Active, reactive and apparent power.
- Active, reactive and apparent energies.
- Lines and phase currents.
- Line and phase voltages.
- Frequencies.
- Power Factor.



N-EALD

- **N-CON02. 3-Pole Contactor (220 VAC).**

Nominal voltage for power contacts: 380 VAC.

Nominal voltage for control contacts: 220 VAC.

Nominal voltage for the control coil: 220 VAC.

Contacts:

- One three-phase Normally Open Contact (NO) for power circuit.
- Three Normally Open Contacts (NO) for control circuit.
- Two Normally Close Contacts (NC) for control circuit.

Ground terminal.



N-CON02

- **N-EME-PLCE. Electrical Machines PLC Unit.**

PLC.

Power supply: 24 VAC.

Digital inputs:

- 4 x Push buttons with lamps.
- 4 x Switches with lamps.
- 4 x Digital outputs with lamps.



N-EME-PLCE

- **All necessary cables to realize the practical exercises are included.**

**Cables and Accessories**, for normal operation.

**Manuals:**

This unit is **supplied with the following manuals**: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Studying of configuration of various motor protection systems.
- 2.- Studying of motor protection switches.
- 3.- Studying of motor protection relays.
- 4.- Studying of thermistor protection circuits.
- 5.- Load protection for disconnecting the power supply to the motor.
- 6.- Configuration and operation of the installation (commissioning software and hardware).
- 7.- Programming the main functions through PLC software: Direct starter motor, start-delta starting, starting of polarity-switchable motors, etc.
- 8.- Measurement of power and RMS values.
- 9.- Loads Experiments.

### REQUIRED SERVICES

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

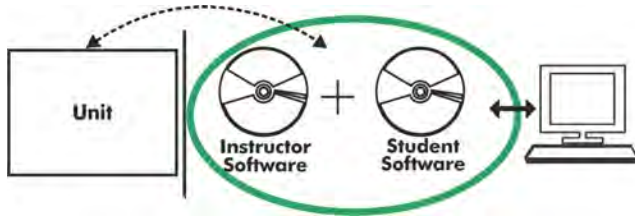
### DIMENSIONS AND WEIGHTS

AEL-MMRT:

- Dimensions: 640 x 320 x 920 mm. approx.  
(25.19 x 12.59 x 36.22 inches approx.)
- Weight: 35 Kg. approx.  
(77 pounds approx.)

## Optional

### AEL-MMRT/ICAI. Interactive Computer Aided Instruction Software System:



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

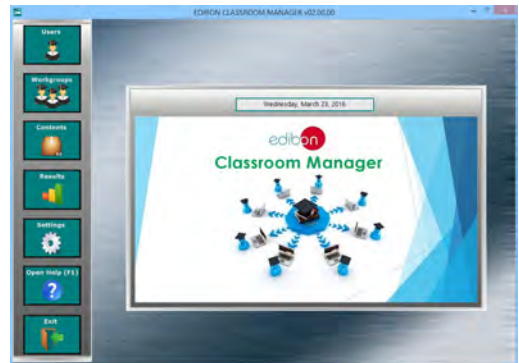
### Instructor Software

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

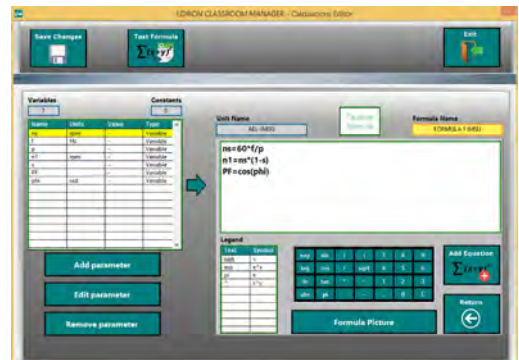
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

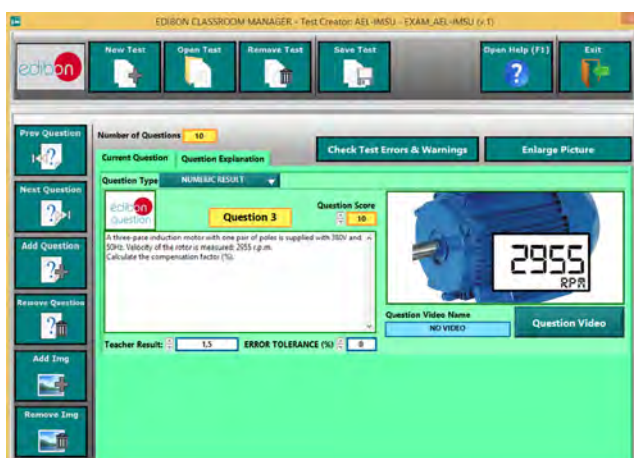
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



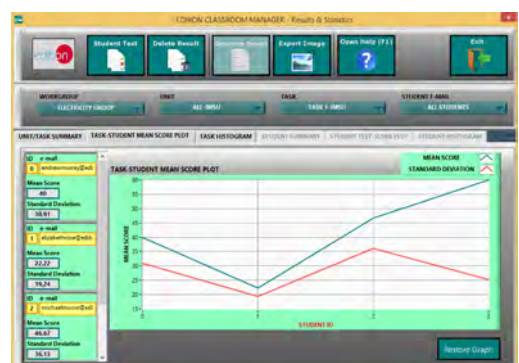
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



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



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



Optional  
Student Software

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

ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are provided by EDIBON to allow the students start working from the first session. Reports and statistics are available to know their progression at any time, as well as explanations for every exercise to reinforce the theoretically acquired technical knowledge.

Innovative features:

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

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

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



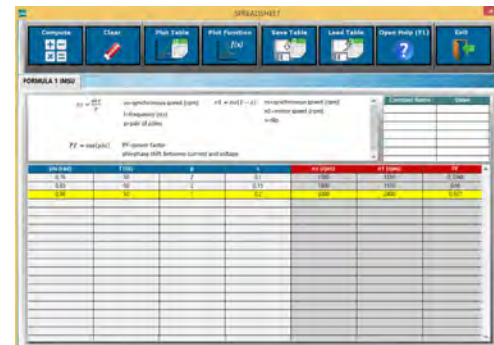
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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



C/ Del Agua, 14. Polígono Industrial San José de Valderas.  
28918 LEGANÉS. (Madrid). ESPAÑA - SPAIN.  
Tel: 34-91-6199363 Fax: 34-91-6198647  
E-mail: edibon@edibon.com Web: [www.edibon.com](http://www.edibon.com)

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REPRESENTATIVE:

