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 ↳ PRODUCTS  
 ↳ 40.- ELECTRICITY

### INTRODUCTION

An electrical motor is such an electromechanical device which converts electrical energy into a mechanical energy. In case of three phase AC motor operations, most widely used motor is three phase induction motor. This type of motor does not require any starting device because it has the capacity of self-starting. However, when it is required to control the induction motor, it is necessary to add different elements such as circuit breakers, timers, thermal relays, and many other devices which allow controlling and protecting these electrical machines. The AEL-CM3 application has been designed by Edibon in order to instruct the students about the most important operations of alternating current motors.



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 AEL-CM3 Automatic Control Operations application 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. Three-Pole Contactor Module (4 units).
- N-REL47. Thermal Relay Module.
- N-REL30. Synchronization Relay Module (2 units).
- N-TRANS03. Three-Phase Autotransformer Module.
- EMT7. Asynchronous Three-Phase Motor of Squirrel Cage.
- FLYW. Flywheel.

Optional learning software:

In addition, Edibon provides optional 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.

## SPECIFICATIONS

The trainer includes the following modules:

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

Supply voltage: 400 VAC, 3PH+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, 25A, 300mA AC 6KA.



N-ALI01

- **N-ALI03. AC Auxiliary Power Supply.**

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

Output voltage:

Single-Phase 24VAC/12VAC.

24 VDC.

0-24VDC through potentiometer.



N-ALI03

- **N-PUL02. Emergency Stop Push-Button Module (24 VAC).**

One emergency push-button to connect or disconnect the control circuit.

Nominal voltage: 24 VAC.

Contacts:

One Normally Open Contact (NO).

One Normally Close Contact (NC).

Ground terminal.



N-PUL02

- **N-PUL48. Three Double Chamber Push-Buttons Module.**

Two independent chambers.

Nominal voltage: 24 VAC.

Three double chamber push-buttons (green and red).

Contacts:

Three Normally Open Contacts (NO) for green switch.

Three Normally Close Contacts (NC) for red switch.

Ground terminal.



N-PUL48

- **N-LAM02. Three Auxiliary Lamps Module.**

Nominal voltage: 24 VAC.

Three lamps (red, yellow and green).

Ground terminal.



N-LAM02

- **N-CON01. Three-Pole Contactor Module (4 units).**

Nominal voltage for power contacts: 400 VAC.

Nominal voltage for control contacts: 24 VAC.

Nominal voltage for the control coil: 24VAC.

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-CON01

• **N-REL47. Thermal Relay Module.**

Nominal voltage for power contacts: 400 VAC.

Nominal voltage for the control coil: 24VAC.

Contacts:

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

Ground terminal.



N-REL47

• **N-REL30. Synchronization Relay Module (2 units).**

Nominal voltage for power contacts: 400 VAC.

Nominal voltage for control contacts: 24 VAC.

Nominal voltage for the control coil: 24 VAC.

Contacts:

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

Three auxiliary contacts:

One instantaneous Normally Open Contact (NO).

One time Normally Open Contact (NO).

One time Normally Close Contact (NC).

Ground terminal.



N-REL30

• **N-TRANS03. Three-Phase Autotransformer Module.**

Three-phase autotransformer.

Nominal supply voltage: 400 VAC (3PH).

Nominal output voltage: 3 x 230 VAC (3PH+N).

Nominal power: 1 kVA.

Free configuration (delta, star and zig-zag).

Start/stop commutator for instantaneous connection/disconnection of the grid transformer.

Fuses: 3x5 A.



N-TRANS03

• **EMT7. Asynchronous Three-Phase Motor of Squirrel Cage.**

Nominal power: 370 W.

Nominal voltage: 3x 230/400 VAC Δ/Y.

Frequency: 50/60 Hz.

Number of poles: 2.

RPM: 2730 r.p.m.

Nominal current: 1,67/ 0,97 A.



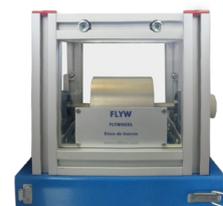
EMT7

• **FLYW. Flywheel.**

Weight: 2 kg.

Maximum recommended speed: 4000 r.p.m

Moment of inertia: 0,0025 kgm<sup>2</sup>.



FLYW

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

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

**Manuals:**

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

## EXERCISES AND PRACTICAL POSSIBILITIES

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

### REQUIRED SERVICES

- Electrical supply: single phase, 220 V./50 Hz. or 110 V./60 Hz.

### DIMENSIONS AND WEIGHTS

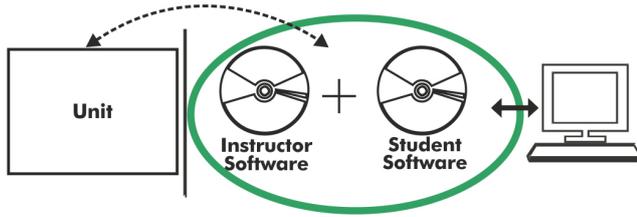
AEL-CM3:

-Dimensions: 1380 x 840 x 2010 mm. approx.  
(54.33 x 33.07 x 79.13 inches approx.).

-Weight: 75 Kg. approx.  
(165 pounds approx.).

## Optional

### AEL-CM3/ICAI. Interactive Computer Aided Instruction Software System:



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

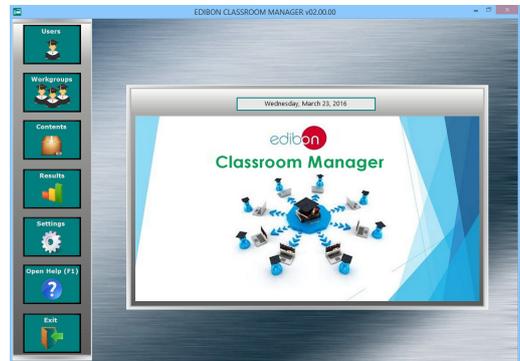
### Instructor Software

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

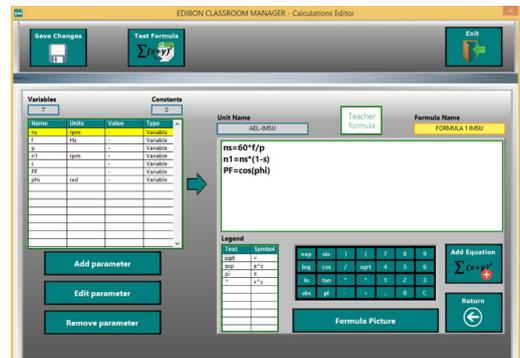
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

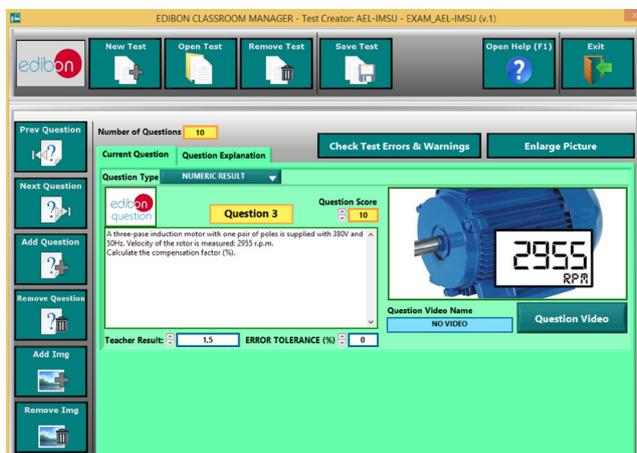
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



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



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



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



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

Optional  
**Student Software**

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

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

Innovative features:

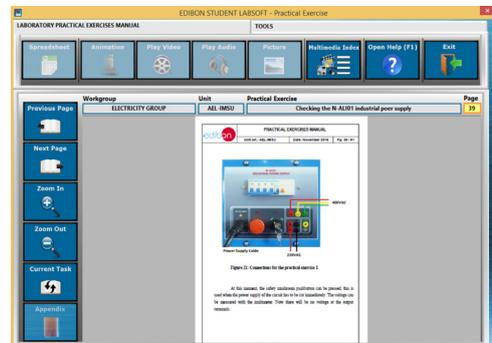
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.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

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

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



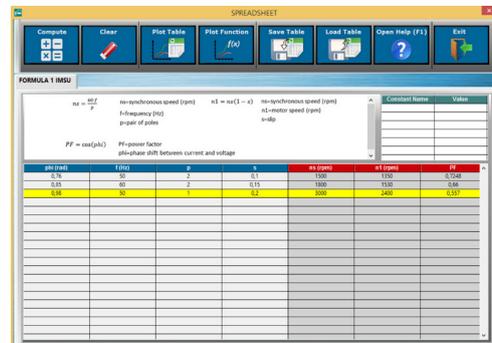
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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



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REPRESENTATIVE:

