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 ↳ PRODUCTS
 ↳ 40.- ELECTRICITY

INTRODUCTION

Three-Phase Induction Motors of Squirrel Cage require an effective and efficient control in industrial processes and electrical installations where system reliability is essential. Manual start-delta starters, direct starters, advanced frequency controllers and many other devices are employed according to the installation complexity and requirements.



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 "General Applications of AC Induction Motors", AEL-IMSU, is an application designed by Edibon in order to study several starting and control methods of Three-Phase Induction Motors of Squirrel Cage in industrial installations.

These motors are the most employed machines in the industry. For this reason, this application studies in depth different performed operations with these electric machines: manual star-delta starter operation, direct starter with inversion operation, study of advanced controls in electric machines with variable speed controller, etc.

This application includes an Eddy Current Brake to study the induction motor response against different load conditions. Eddy Current Brake includes a DC variable power supply with which the user can control the braking torque. When the braking torque is increased, the power consumption of the induction motor is increased too, the Power Factor changes, etc. In order to analyze the power consumption of the induction motor a network analyzer is included to show the main electrical parameters which are relevant in industrial installations: voltages, currents, frequencies, Power Factor, active power, reactive power, apparent power, etc.

The AEL-IMSU includes the following modules:

- N-ALI01. Industrial Power Supply.
- N-WCA. Advanced AC Motor Speed Controller.
- N-ARR01. Manual Star-Delta Starter.
- N-ARR13 Direct Starter with Inversion.
- N-WCC/M. DC Motor Speed Controller (Middle option).
- N-ARR12. Direct Starter.
- N-TRANS03. Three-Phase Autotransformer.
- FRECP. Eddy Current Brake.
- N-EALD. Network Analyzer Unit with Computer Data Acquisition.
- EMT7. Asynchronous Three-Phase Motor of Squirrel Cage.

Optional testing software:

- EM-SCADA. Control and Data Acquisition System Software for Electrical Machines, with SCADA.

Optional learning software:

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

Option A:

This application needs the following racks:

- 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 Main 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-VVCA. Advanced AC Motors speed controller**

Supply voltage: 230 VAC.

Nominal power: 0,75 kW.

PWM output voltage connections:

Three-Phases: 230 VAC.

Digital inputs control panel: 5 configurable digital inputs.

Analog inputs control panel:

0-10V analog input for speed control.

4-20mA analog input for speed control.

10K, potentiometer for the induction motor control speed.

2 relay outputs for alarms configuration: 2 outputs NO/NC.

50 mA, 2 transistor outputs for alarms configuration.

Setting and visualization display of the machine parameters.



N-VVCA

- **N-ARR01. Manual Star-Delta starter**

Nominal voltage: 400 VAC.

Maximum contacts current: 10A.

Star-Delta three positions commutator:

0: Open circuit.

Y: Star connection.

Δ : Delta connection.



N-ARR01

- **N-ARR13. Direct starter with inversion**

Nominal voltage: 400 VAC.

Maximum contacts current: 10A.

Three positions commutator:

0: Open circuit.

1: Direct connection.

2: Reverse connection.



N-ARR13

Specifications

- **N-VVCC/M. DC Motor Speed Controller (intermediate option)**

Supply voltage: 230 VAC.

Variable output voltage: 0-300 VCC.

Fuse: 2 A.



N-VVCC/M

- **N-ARR12. Módulo Arrancador Directo**

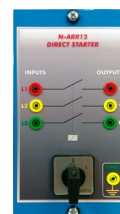
Nominal voltage: 400 VAC.

Maximum contacts current: 10A.

Two positions commutator (ON-OFF):

0: Open circuit.

1: Closed circuit



N-ARR12

- **N-TRANS03. Three-phase Autotransformer 400/230 VAC, 1 kVA, 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

- **FRECP. Eddy Current Brake**

Maximum supply voltage: 60 VCC.

Nominal current: 1,67 A.

Maximum current: 1,8 A.

Maximum braking torque: 1,4 Nm.



FRECP

- **N-EALD. Network Analyzer Unit with 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

Specifications

- **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.

Speed: 2730 rpm.

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



EMT7

- **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.- Advanced programming of a Variable Frequency Controller.
 - 2.- Manual control speed of the induction motor with the frequency controller.
 - 3.- Forward and Reverse operations with the induction motor and the frequency controller.
 - 4.- Programming of the acceleration time of the induction motor with the frequency controller.
 - 5.- Programming of the deceleration time of the induction motor with the frequency controller.
 - 6.- Programming different conditions with digital inputs in the frequency controller to simulate different real situations in the industry.
 - 7.- Programming the speed response of the induction motor with the frequency controller.
 - 8.- Study of load consumption of the induction motor changing the braking torque.
 - 9.- Study of different alarms that can be programmed in the frequency controller.
 - 10.- Manual star-delta starter operation.
 - 11.- Direct starter with inversion operation.
 - 12.- Direct starter operation.
- Some practical exercises possibilities with the EM-SCADA:
- 13.- Visualization of torque/current VS speed of the induction motor with manual star/delta starter.
 - 14.- Visualization of torque/current VS speed of the induction motor with the frequency controller.
 - 15.- Visualization of torque/current VS speed of the induction motor with direct starter.
 - 16.- Comparison of graphs with different starting types.

REQUIRED SERVICES

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

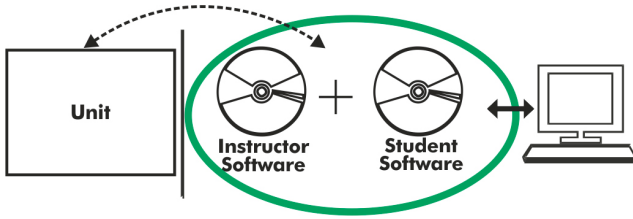
DIMENSIONS AND WEIGHTS

AEL-IMSU:

- Dimensions: 1380 x 840 x 2010 mm. approx.
(54.33 x 33.07 x 79.13 inches approx.).
- Weight: 85 Kg. approx.
(187 pounds approx.).

Optional

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



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

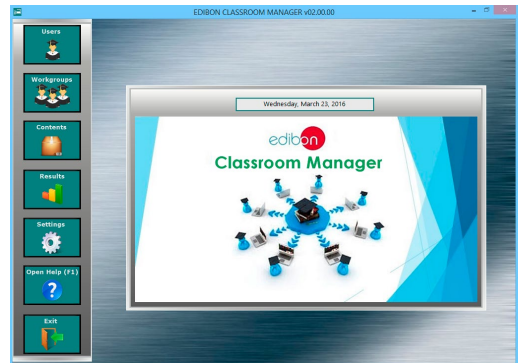
Instructor Software

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

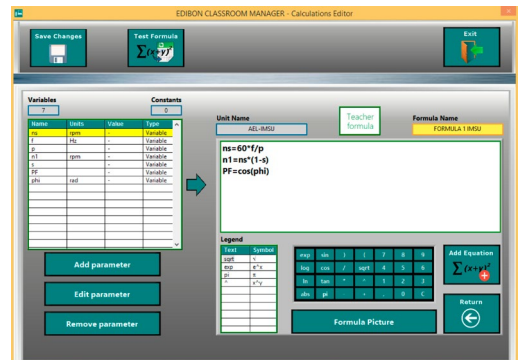
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

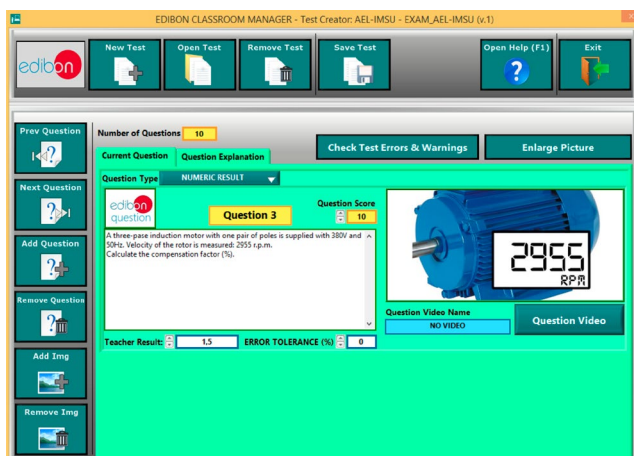
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



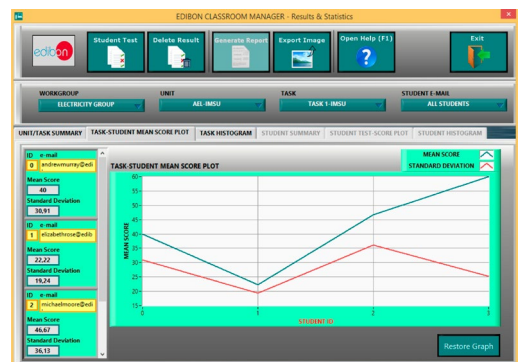
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



ECAL. EDIBON Calculations Program Package - Formula Editor Screen



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



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

Optional
Student Software

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

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

Innovative features:

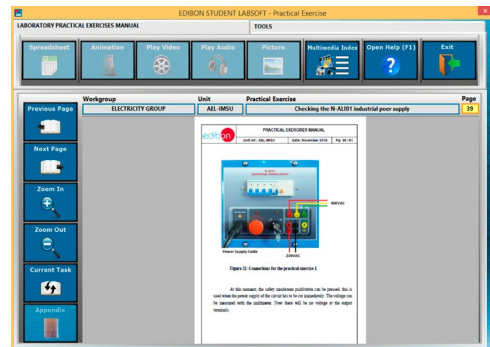
- **Student Log-In & Self-Registration.**
- **Existing Tasks checking & Monitoring.**
- **Default contents & scheduled tasks available to be used from the first session.**
- **Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- **Evaluation Methods to prove your knowledge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

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

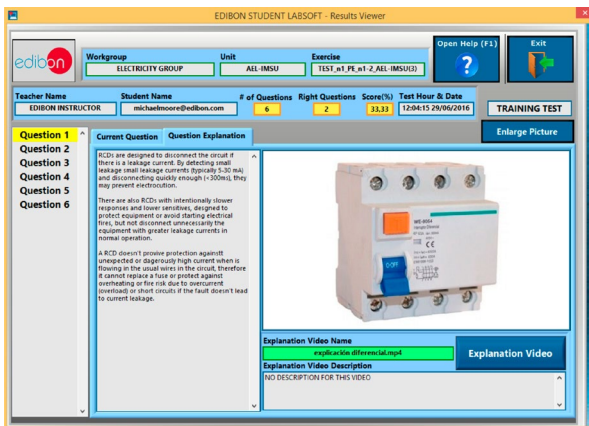
www.edibon.com/en/files/expansion/ICAI/catalog



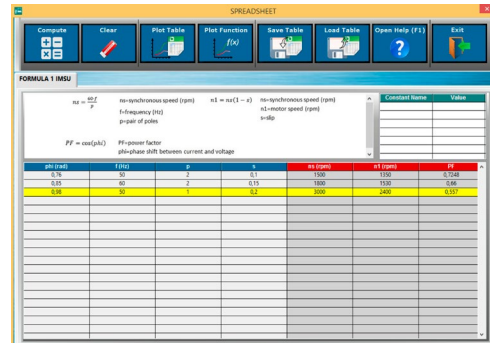
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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



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REPRESENTATIVE:

