



GENERAL DESCRIPTION

The AEL-MOSC Manual Operations of Synchronization Circuits Application has been designed by Edibon to demonstrate the basic principles and the need for synchronization. With power being generated by multiple sources, there is a need to have this power in sync. The frequencies, phase shifts and voltages may vary greatly. If these outputs are not properly synchronized the grid may be damaged.

The AEL-MOSC consists of a series of modules to teach the students the basic synchronization methods using the "lamps method".

With the AEL-MOSC the student will learn the electricity fundamental laws in order to understand the maneuvers of synchronization. One important module included in this application is the synchronoscope. It compares the frequency and voltage from the grid with generator's one. A network analyzer is provided too. It displays electrical characteristics such as volts, amps, watts, Vars, VA, power factor, and frequency.

The AEL-MOSC includes the following modules:

- N-ALI01. Industrial Main Power Supply.
- EMT7B/1K. 1kVA three-phase Asynchronous motor of squirrel cage.
- EMT6B/1K. 1kVA three-phase Synchronous generator.
- N-VVCA/M. AC Motor Speed Controller.
- N-VVCC/M. DC Motor Speed Controller.
- N-ASY/B. Basic Synchronization Module.
- N-EALD. Network Analyzer Unit with Computer Data Acquisition.
- N-REL08. Time Overcurrent Electronic Relay (0.3 -1.5 A).

Optional learning software:

In addition, Edibon provides optional software (AEL-MOSC/ICAL) 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-MOSC 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.



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

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

• **EMT7B/1K. 1 kVA three-phase Asynchronous motor of squirrel cage.**

Nominal power: 1kW.

RPM: 1405 rpm.

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).



EMT7B/1K

• **EMT6B/1K. 1kVA three-phase Synchronous generator.**

Nominal power: 1 kW.

Nominal voltage: 3x 400/230 VAC Y/ Δ.

Frequency: 50/60 Hz.

Number of poles: 4.

RPM: 1500 rpm.

Nominal current: 2,1/3,65A Y/ Δ.

Nominal excitation current: 4A AC ; 11A DC.



EMT6B/1K

• **N-WCA/M. AC Motor Speed Controller (Intermediate option).**

Supply voltage: 230 VAC

Nominal power: 0,4 kW.

PWM output voltage connections:

Three-Phases: 230 VAC

10K, potentiometer for the induction motor control speed.

Setting and visualization display of the machine parameters.



N-WCA/M

• **N-WCC/M. DC Motor Speed Controller (Intermediate option).**

Supply voltage: 230 VAC.

Variable output voltage: 0-300 VCC.

Fuse: 2 A



N-WCC/M

Specifications

- N-ASY/B. **Basic Synchronization Module.**

Voltage: 400V.

Digital Synchronoscope.

Synchronization switch.

Double frequency meter.

Double voltmeter.



N-ASY/B

- 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-REL08. **Time Overcurrent Electronic Relay (0.3 -1.5 A).**

Nominal voltage: 400 VAC.

Maximum Current: 5A.

Terminals:

Input terminals:

Line and Neutral terminal.

Output terminals:

Line and Neutral terminal.

Ground terminal.

Contacts:

One Normally Open Contact (NO).

One Normally Close Contact (NC).

Common point of normally close/open contacts.

Fuse: 10A.



N-REL08

- **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.- Commissioning of group generation.
- 2.- Main connections for the synchronization module to perform the appropriate readings of the phases angles.
- 3.- "Dark" synchronising circuit.
- 4.- "Light" synchronising circuit.
- 5.- Active power generation.
- 6.- Inductive reactive power generation.
- 7.- Capacitive reactive power generation.

REQUIRED SERVICES

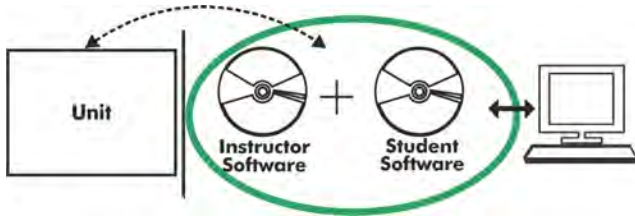
- Electrical supply: single phase, 220 V./50 Hz. or 110 V./60 Hz.

DIMENSIONS AND WEIGHTS

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



Without 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.

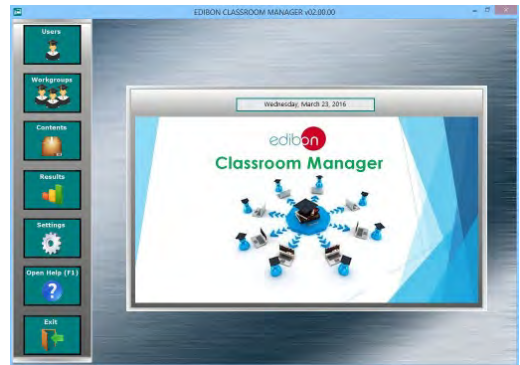
Instructor Software

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

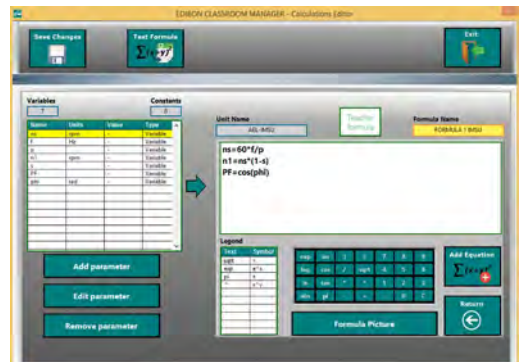
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

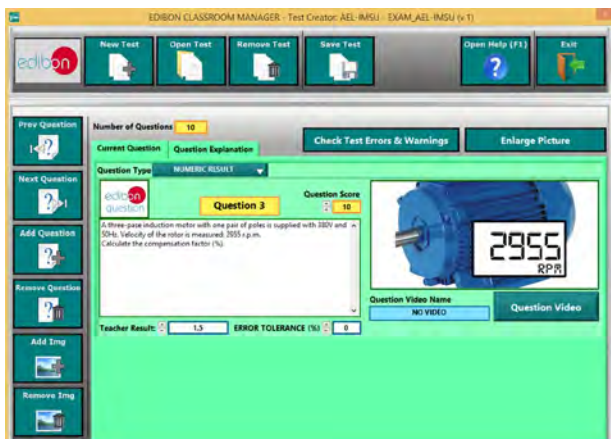
- User Data Base Management.**
- Administration and assignment of Workgroup, Task and Training sessions.**
- Creation and Integration of Practical Exercises and Multimedia Resources.**
- Custom Design of Evaluation Methods.**
- Creation and assignment of Formulas & Equations.**
- Equation System Solver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



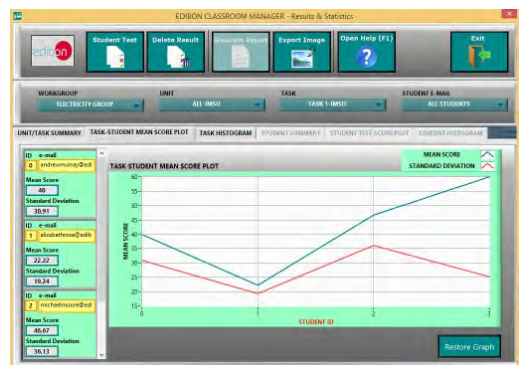
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application main screen



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

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/products/catalogues/en/units/electricity/ICAI-Electricity/ICAI-Electricity.pdf



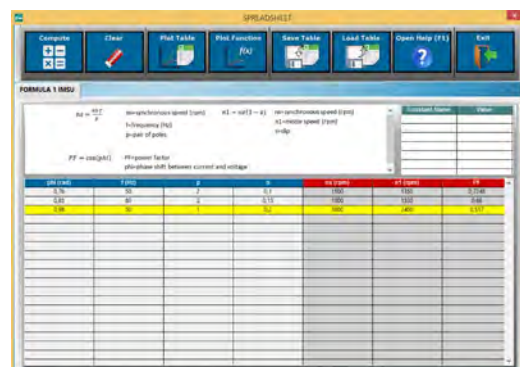
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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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