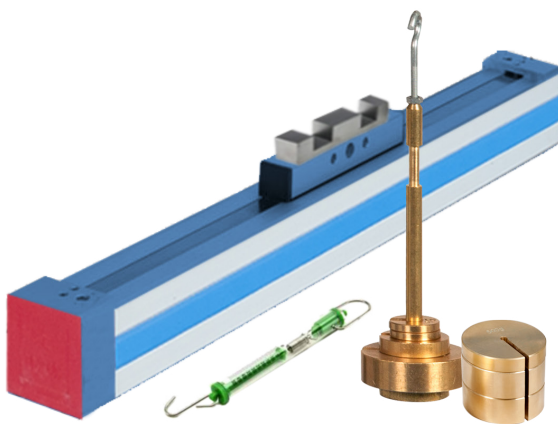




INTRODUCTION

A linear motor is an electric motor that has its stator and rotor “unrolled” so that instead of producing a torque (rotation) it produces a linear force along its length. However, linear motors are not necessarily straight.

Many designs have been put forward for linear motors, falling into two major categories, low-acceleration and high-acceleration linear motors.

Low-acceleration linear motors are suitable for maglev trains and other ground-based transportation applications. High-acceleration linear motors are normally rather short, and are designed to accelerate an object to a very high speed.

High-acceleration linear motors are typically used in studies of hypervelocity collisions, as weapons, or as mass drivers for spacecraft propulsion. They are usually of the AC linear induction motor (LIM) design with an active three-phase winding on one side of the air-gap and a passive conductor plate on the other side. The low-acceleration, high speed and high power motors are usually of the linear synchronous motor (LSM) design, with an active winding on one side of the air-gap and an array of alternate-pole magnets on the other side. These magnets can be permanent magnets or energized magnets. The Shanghai Transrapid motor is an LSM.



Transrapid Shanghai Maglev train

GENERAL DESCRIPTION

The Application of AC Linear Motor Operations, "AEL-ACLA", has been designed by EDIBON to study how AC linear induction motors (LIM) work.

This application includes all necessary to understand the basic principles of linear motors. On the one hand, it has a variable power supply, which allows to control the voltage to progressively accelerate the machine and analyze voltages and currents. In addition, the application has a system of variation of the air gap, thus influencing the force of magnetic attraction. This force can be measured with the included dynamometer. Also this application has two limit switches to automatically switch the direction of the linear motor.

This application also includes a set of weights to measure the force exerted by the linear motor.

The "AEL-ACLA" includes the following elements:

- N-VPS01. 3PH AC Power Supply Module.
- EMT23. AC Linear Induction Motor.
- DM. Dynamometer.
- SET B. Brass Hook and Mass Set 2 kg.

The application "AEL-ACLA" 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.

SPECIFICATIONS

The application "AEL-ACLA" includes the following elements:

- **N-VPS01. 3PH AC Power Supply Module.**

ON / OFF removable key.

Supply voltage: 3 x 400 VAC + N.

Emergency stop push-button.

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

Differential magnetothermal 4 poles, 25 A, 30 mA AC 6 KA.

Fuses: 3 x 6 A.

Motorized variable autotransformer:

Nominal power: 3000 VA.

Input voltage: 400 VAC.

Fixed output voltage: 3 x 400 VAC + N.

Variable output voltage:

0 – 450 VAC (3 PH + N).

0 – 240 VDC.

Nominal current: 2 A.

Three-position switch with automatic return:

Position I: Voltage reduction.

Position 0: Constant voltage.

Position II: Voltage increase.

DC ammeter: 0 – 5 A.

AC ammeter: 0 – 5 A.

DC voltmeter: 0 – 300 V.

AC voltmeter: 0 – 500 V.

Autotransformer.

Nominal power: 3000 VA.



N-VPS01

- **EMT23. AC Linear Induction Motor.**

Stationary rail:

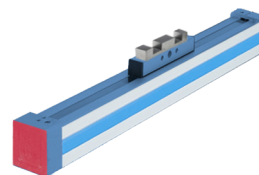
Length: 1.5 m.

Air gap: adjustable 1 – 5 mm.

Moveable motor:

Maximum voltage: 230 VAC.

Maximum current: 1.5 A.



EMT23

- **DM. Dynamometer.**

Force: 50 N.

Wheel to modify the tension.

Pulley.

Outer diameter: 136 mm.

Inner diameter: 125 mm.



DM

- **SET B. Brass Hook and Mass Set 2 kg.**

Each "B Type" set includes:

Six weights of 200 g. (0.44 pounds)

Six weights of 100 g. (0.22 pounds)

Two weights of 50 g. (0.11 pounds)

Two weights of 20 g. (0.044 pounds)

Two weights of 10 g. (0.022 pounds)

One support hook of 100 g. (0.22 pounds)



SET B

- **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

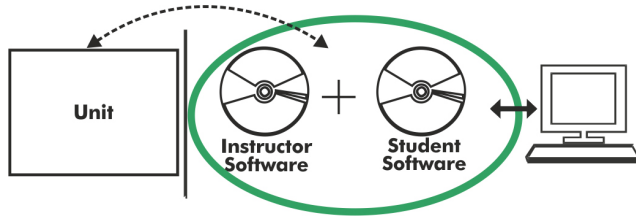
- | | |
|--|--|
| 1.- Basic practice for the study of the magnetism principles applied to linear induction machines. | 5.- Study of the Lorentz Force principle. |
| 2.- Speed control of a linear induction motor. | 6.- Study of the electric and mechanical parameters. |
| 3.- Inversion of the operation of a linear induction motor. | 7.- Compare the linear induction motor with the rotary motors. |
| 4.- Study of the linear induction motor force with a dynamometer. | |

REQUIRED SERVICES

- | |
|---|
| - Electrical supply: three-phase, 380 VAC – 400 VAC/50 Hz or 190 VAC – 240 VAC/60 Hz, 1 kW. |
|---|

DIMENSIONS AND WEIGHTS

- | |
|--|
| AEL-ACLA: |
| Modules in Rack: |
| - Dimensions: 640 x 320 x 670 mm approx.
(25.19 x 12.59 x 26.27 inches approx.) |
| - Weight: 35 kg approx.
(77 pounds approx.) |

AEL-ACLA/ICAI. Interactive Computer Aided Instruction Software:

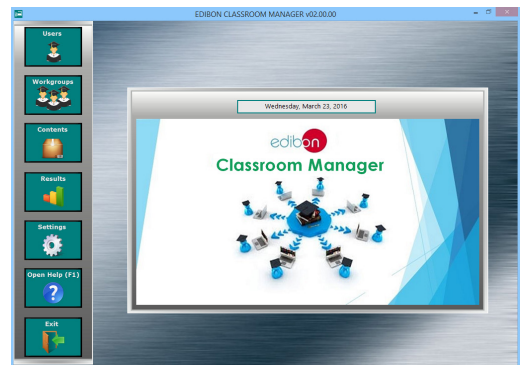
With no physical connection between unit and computer, this complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM-SOF) totally integrated with the Student Software (EDIBON Student Labsoft -ESL-SOF). Both are interconnected so that the teacher knows at any moment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

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

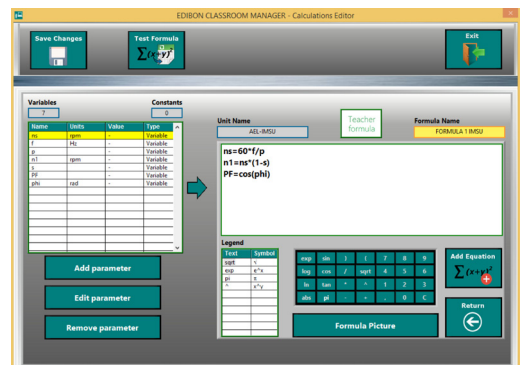
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

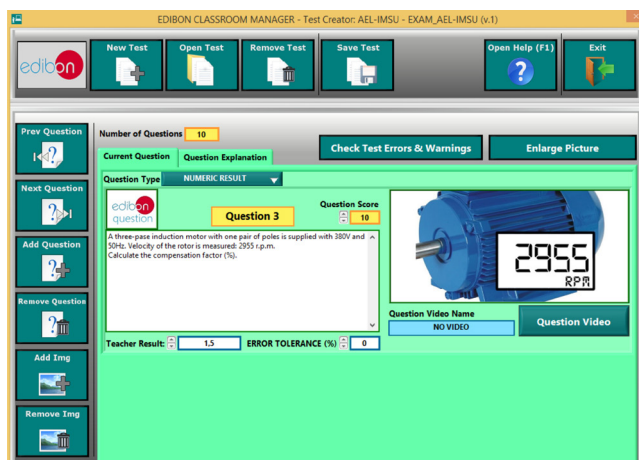
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



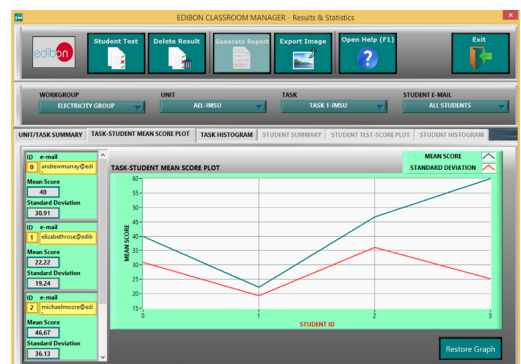
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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).

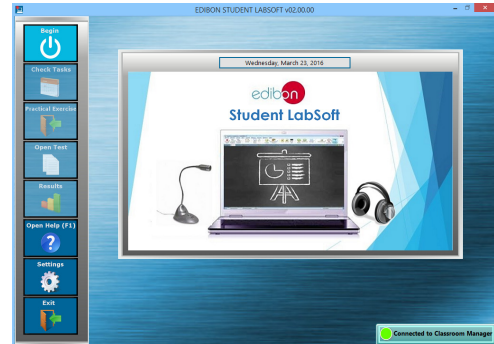
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are 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:

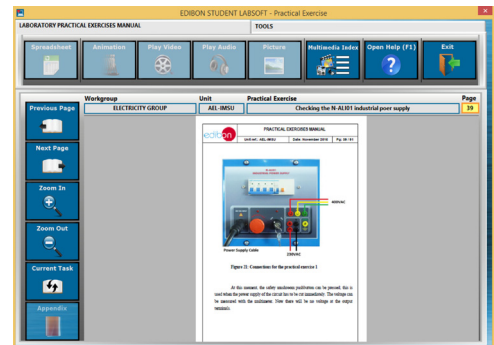
- Student Log-In & Self-Registration.
- Existing Tasks checking & Monitoring.
- Default contents & scheduled tasks available to be used from the first session.
- Practical Exercises accomplishment by following the Manual provided by EDIBON.
- Evaluation Methods to prove your knowledge and progression.
- 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/interactive-computer-aided-instruction-software



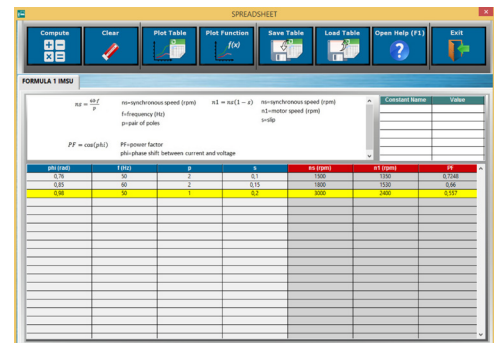
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

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



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REPRESENTATIVE:

