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 ↳ PRODUCTS
 ↳ 40. - ELECTRICITY

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.



Transrapid Shanghai Maglev train

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.



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 Applications 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. The variable power supply allows to vary the voltage and thus the user can start the machine softly and voltage and current can be analyzed. The AEL-ACLA consists of a linear induction motor which allows changing the air gap and the tractive force. This force can be measured with the dynamometer. In addition, this application has two limit switches installed at the end of the rail to commutate automatically the phases and change the direction of the linear motor.

One of the advantages of the application AEL-ACLA is the combination of power and rail length of the motor. The student can deepen in the knowledge of great importance linear motors such as the mentioned Sanghai Transrapid. Besides, the dynamometer and the Hall sensor modules allow study two of the most important parameters of this type of motor: torque and position.

The AEL-ACLA includes the following modules:

- N-VPS01. AC 3PH Variable Power Supply.
- EMT23. Hysteresis Motor.
- DMM. Dynamometer.

Additional and recommended elements:

- WEI. Set of Weights.
- Hall sensor.

Expansion learning software:

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

Option A:

This application needs the following racks:

- N-RACK-B (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 application includes the following modules and elements:

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

ON-OFF removable key.

Input Voltage: 400 VAC, 3 PH + N.

Output Voltage:

0...450 VAC.

0...240 VDC.

Maximum current: 2 A.

Frequency: 50/60 Hz.

Wheel to regulate the voltage.

Three lamps.

Measurement commutators:

One commutator to measure the voltage:

6 positions: L1-N ; L2-N ; L3-N ; L1-L2 ; L1-L3 ; L2-L3

One commutator to measure the current:

3 positions: I1, I2, I3.

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

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



N-VPS01

- **EMT23. Hysteresis Motor.**

Stationary rail:

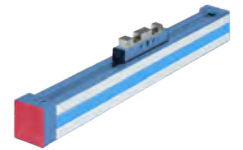
Length: 1.5 m.

Air gap: adjustable 1-5 mm.

Moveable motor:

Maximum voltage: 230 VAC.

Maximum current: 1.5 A.



EMT23

- **DMM. Dynamometer.**

Force: 50 N.

Wheel to modify the tension.

Pulley.

Outer diameter: 136 mm.

Inner diameter: 125 mm.



DMM

Additional and recommended elements:

- **WEI. Set of weights.**

Material: iron.

Wight: 1 kg and 2 kg.



WEI

- **Hall sensor.**

Supply Voltage: 4 to 10 V.

Supply Current: 3.5 mA.

Output type: Differential.

Output voltage: 0.25 V to 2 V.

Sensitivity: -130 to +130 gauss; 0.75 to 1.06 mV/gauss.

Vo in output connectors of the module: 0.0-1V for Vs=5 VDC.

- **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.
- 2.- Speed control of a linear induction motor.
- 3.- Inversion of the operation of a linear induction motor.
- 4.- Study of the linear induction motor force with a dynamometer.
- 5.- Study of the Lorentz Force principle.
- 6.- Study of the electric and mechanical parameters.
- 7.- Determinate the position of the linear induction motor with a Hall sensor (additional and recommended).
- 8.- Compare the linear induction motor with the rotary motors.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

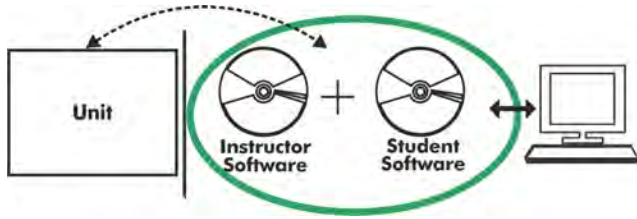
AEL-ACLA:

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.)

Optional

AEL-ACLA/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.

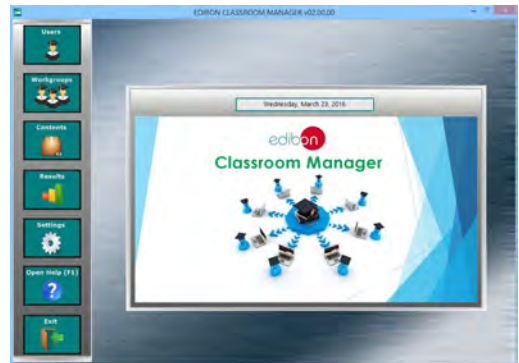
Instructor Software

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

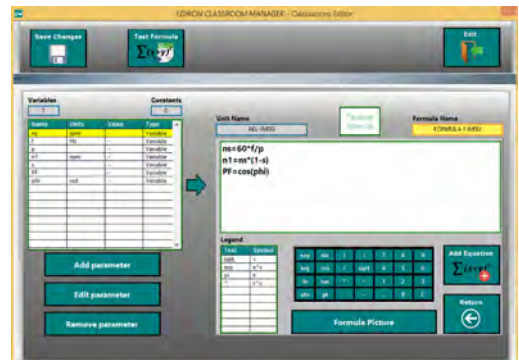
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

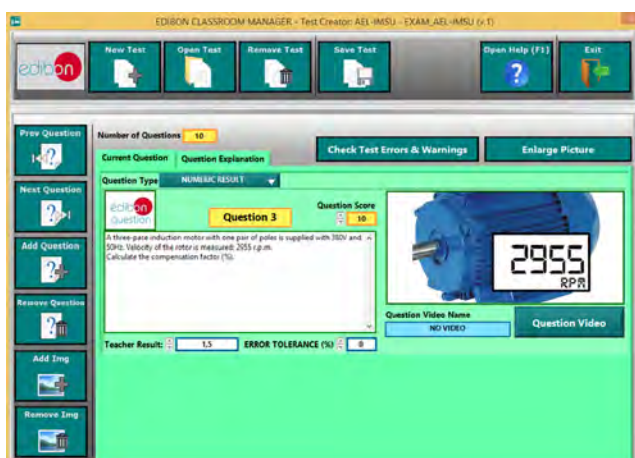
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



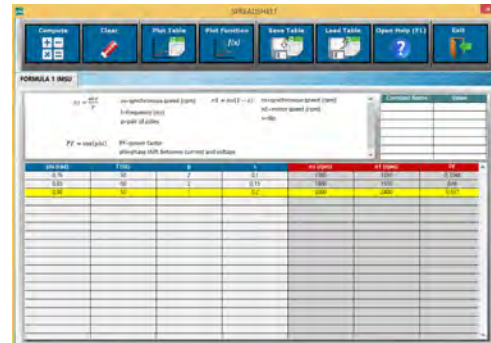
ESL-SOF. EDIBON Student LabSoft (Student Software)
Application Main Screen



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:

