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 ↳ PRODUCTS
 ↳ 40.- ELECTRICITY

INTRODUCTION

The electric motors are devices capable of transforming electrical energy into mechanical energy. The squirrel cage motors are very used in industrial installations due to its great robustness, reliability and low cost. The starting current consumed by these motors is very high, being harmful to the machine and the protections. The soft starters aim at reducing these currents close to the nominal values. For this purpose it is very important to know several operations carried out with these electrical machines.



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 Application of AC Three-Phase Induction Motor of Squirrel Cage, "AEL-ACINA", is designed for the study of the main operations performed in the industrial field with three-phase squirrel cage induction motors. The student will learn the most important operations of these electrical machines faithfully by using commutators, timers and contactors.

The AEL-ACINA includes the following modules:

- N-ALI01. Industrial Power Supply.
- N-PUL48. 3 Double Chamber PushButtons.
- N-LAM02. Auxiliary Lamps.
- N-CON01. 3-pole Contactor (24 VAC). (4 units).
- N-ARR01. Manual Star-Delta Starter.
- N-REL30. Synchronization Relay. (3 units)
- N-ALI03. AC Auxiliary Power Supply.
- EMT7. Asynchronous three-phase motor of squirrel cage.
- N-TRANS03. Three-phase Autotransformer.
- FLYW. Flywheel.
- N-ARR13. Direct Starter with Inversion.

Additional and recommended measurement instrumentation modules:

- Digital Instrumentation:

- N-EALD. Network Analyzer Unit with Computer Data Acquisition.

- Analog Instrumentation:

- N-MED10. AC Ammeter (0-5 A).
- N-MED22. AC Voltmeter (0-400 VAC).
- N-MED33. 3-phase balance Wattmeter 440 V.
- N-MED31. 3-Phase Phasemeter 400 V.
- N-MED39. 3-Phase Balanced Varmeter 440 V.

If the Option A (modules mounted on rack) is chosen, the rack/s required will depend on the optional modules requested by the customer.

Expansion learning software:

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

Option A:

This application needs the following racks:

- N-RACK-A.
- 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 includes the following modules:

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

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



N-ALI01

- **N-PUL48. 3 Double Chamber Push-Buttons.**

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. Auxiliary Lamps.**

Nominal voltage: 24 VAC.

Three lamps (red, yellow and green).

Ground terminal.



N-LAM02

- **N-CON01. 3-poles Contactor (220 VAC). (4 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 Normally Open Contacts (NO) for control circuit.

Two Normally Close Contacts (NC) for control circuit.

Ground terminal.



N-CON01

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

Nominal voltage: 400 VAC.

Maximum contacts current: 10 A.

Star-Delta three positions commutator:

0: Open circuit.

Y: Star connection.

Δ: Delta connection.



N-ARR01

- **N-REL30. Synchronization Relay Module. (3 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

Specifications

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

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

Output voltage:

Single-Phase 24 VAC/12 VAC.

24 VDC.

0-24 VDC through potentiometer.



N-ALI03

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

Nominal power: 370 W.

Nominal voltage: 3 x 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

- **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.

Transformer connection: YY0.

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

Fuses: 3 x 5 A.



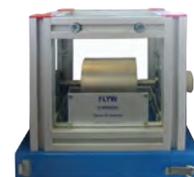
N-TRANS03

- **FLYW. Flywheel.**

Weight: 2 kg

Maximum recommended speed: 4000 r.p.m.

Moment of inertia: 0,0025 kgm²



FLYW

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

Nominal voltage: 400 VAC.

Maximum contacts current: 10 A.

Three positions commutator:

0: Open circuit.

1: Direct connection.

2: Reverse connection.



N-ARR13

Additional and recommended measurement instrumentation modules:

- **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: 3 x 10 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

- N-MED10. **AC Ammeter (0-5 A).**

Measurement range: 0-5 A.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED10

- N-MED22. **AC Voltmeter (0-400 VAC).**

Measurement range: 0-400 VAC.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED22

- N-MED33. **3-Phase Wattmeter 440 V.**

Nominal voltage 440 VAC.

Terminals:

Measurement Terminals.

Ground Terminal.



N-MED33

- N-MED31. **3-Phase Phasemeter 400 V.**

3 phasemeter.

400 Vac.

CAP 0.5-1-0.5 IND.

Accuracy 1.5 % of 90°.

50 or 60 Hz.



N-MED31

- N-MED39. **3-Phase Balanced Varmeter 440 V.**

3 phase balanced varmeter.

440 VAC.

Range: 0 - 300 Var

Scale 90°.

Accuracy 1.5%.

50 or 60 Hz.



N-MED39

• 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 Industrial Main Power Supply (N-ALI01). | 6.- Manual reversing operations of three-phase induction motor. |
| 2.- Checking the AC Auxiliary Main Power Supply (N-ALI03). | 7.- Automatic star-delta starter of three-phase induction motor. |
| 3.- Checking the lamps. | 8.- Automatic star-delta reversing circuit of three-phase induction motor. |
| 4.- Study of the control elements of alternating current motors. | 9.- Use of the flywheel. |
| 5.- Manual star-delta circuit of three-phase induction motor. | |

REQUIRED SERVICES

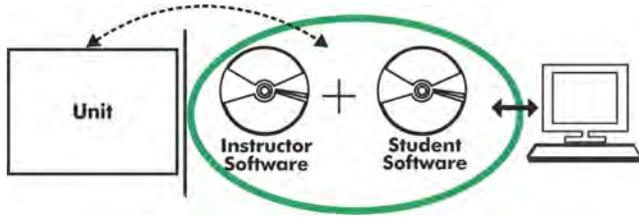
- Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 20 Kw.

DIMENSIONS AND WEIGHTS

- AEL-ACINA:
- 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-ACINA/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.

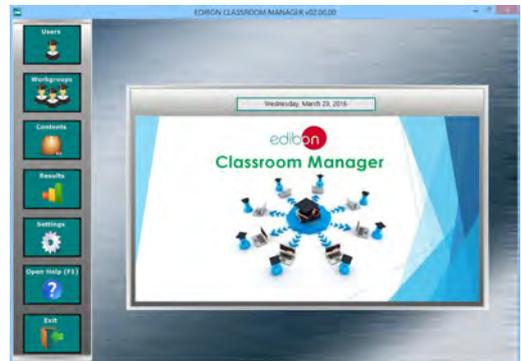
Instructor Software

- 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:

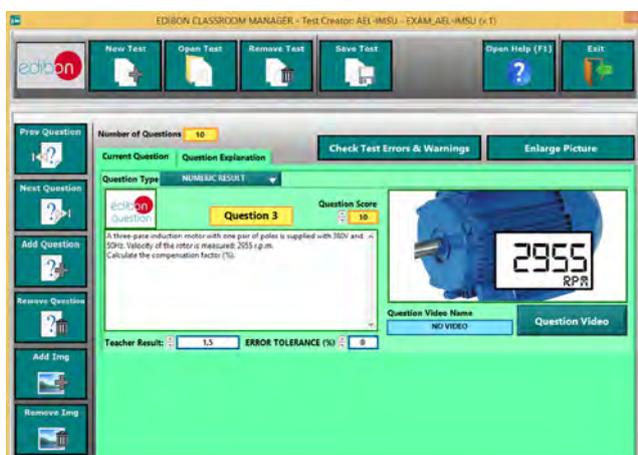
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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

Student Software

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

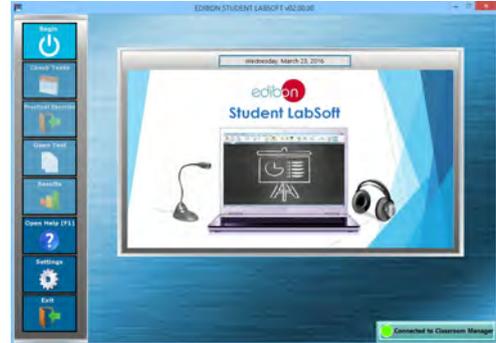
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are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



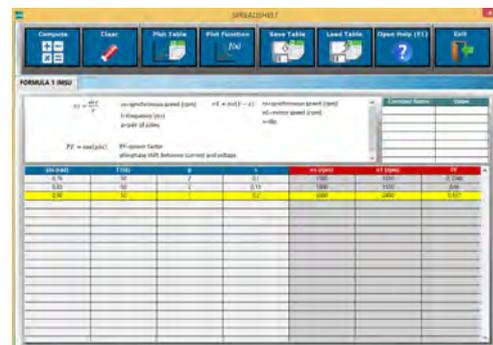
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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:

