edibon

Engineering and Technical Teaching Equipment

Dissectible Motors-Generators Application

AEL-DMG-KIT

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↳PRODUCTS
↳4.- ELECTRICITY









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)

"Worlddidac Quality Charter" and Platinum Member of Worlddidac

INTRODUCTION

The electric machines are devices capable of transforming mechanical energy in electrical energy and vice versa. Depending on the direction of energy conversion, a reversible electric machine can work as a motor providing mechanical energy or as an electrical energy generator. The suitable assembly of the electrical machines is fundamental to achieve an optimal performance over their useful life.

GENERAL DESCRIPTION

The Dissectible Motors-Generators Application, "AEL-DMG-KIT", has been designed by EDIBON for the training at theoretical-practical level about the assembly of the following electric motors: DC Compound with Shunt-Series Motor-Generator, Asynchronous Three-Phase Motor-Alternator, Asynchronous Three-Phase Motor of Squirrel Cage, Asynchronous Three-Phase Motor of Wound Rotor, Dahlander Three-Phase Motor, Asynchronous Three-Phase Motor of Two Independent Speeds, Asynchronous Single-Phase Motor with Starting Capacitor, Universal Motor, DC Permanent Magnet Motor, Asynchronous Single-Phase Motor with Starting and Running Capacitor, Asynchronous Three-Phase Motor of Squirrel Cage with "Y" Connection, DC Brushless Motor, Asynchronous Single-Phase Motor with Split Phase, Three-Phase Reluctance Motor, Three-Phase Shaded Pole Motor.

This Dissectible Motors-Generators Application offers several levels of training, which will provide the user of the knowledge and the essential skills about the assembly of electric motors and generators. For this purpose, the application includes a specific manual explaining, at theoretical level, the relative aspects to the electric machines. The theme covers from the construction process of each motor to the functional principles of the same. Furthermore, a set of included and optional modules are provided in order to put into practice all the theoretical concepts previously studied in the manual, as the construction from scratch of an electric machine, step by step, until its whole assembly.

One of the advantages of "AEL-DMG-KIT" is the large variety of electric machines available to be assembled. This allows to obtain a wide and practical formation about assembly procedures of the electric motors most used in the industry. In addition, once the electric motor is assembled, it can be put into operation with the optional modules offered in each option.

The AEL-DMG-KIT application includes the following elements:

- N-ALI01. Industrial Main Power Supply.
- MED65. Digital Multimeter. (2 units).
- C-TB01. Toolbox 1.

Required elements. At least one kit is required:

DMG-K1: Dissectible of DC Independent Shunt-Series-Compound Excitation Motor-Generator kit.

- EMT5-D. Dissectible DC shunt/series/compound excitation motor-generator.
- N-VVCC/M. DC Motor Speed Controller. (Intermediate option).
- N-REV. Single Phase Variable Resistor.

DMG-K2: Dissectible of AC Synchronous Three-Phase Motor Alternator kit.

- EMT6-D. Dissectible Independent excitation 3PH synchronous motor-generator.
- N-VVCA/M AC Motor Speed Controller. (Intermediate option).
- N-VVCC/M DC Motor Speed Controller. (Intermediate option).

DMG-K3: Dissectible of Asynchronous Three-Phase Motor of Squirrel Cage kit.

- EMT7-D. Dissectible 3PH squirrel-cage induction motor.

DMG-K4: Dissectible of Asynchronous Three-Phase Motor with Wound Rotor.

- EMT8-D. Dissectible 3PH wound induction motor.

DMG-K5: Dissectible of Dahlander Three-Phase Motor kit.

- EMT9-D. Dissectible dahlander motor, 2 speeds.

DMG-K6: Dissectible of Asynchronous Three-Phase Motor of Two Independent Speeds kit.

- EMT10-D. Disectible 3PH squirrel-cage induction motor, 2 speeds.

DMG-K7: Dissectible of Asynchronous Single-Phase Motor with Starting Capacitor kit.

- EMT11-D. Dissectible single-phase squirrel-cage induction motor with starting capacitor.

DMG-K8: Dissectible of Universal Motor kit.

- EMT12-D. Dissectible universal motor.
- N-REV. Single Phase Variable Resistor.

DMG-K9: Dissectible of Asynchronous Single-Phase Motor with Starting and Running Capacitor kit.

- EMT16-D. Dissectible single-phase squirrel-cage induction motor with starting capacitor.

DMG-K10: Dissectible of DC Brushless Motor kit.

- EMT18-D. Dissectible of DC Brushless Motor.
- N-ALI03. AC Auxiliary Power Supply.

DMG-K11: Dissectible of Asynchronous Single-Phase Motor with Split Phase kit.

- EMT20-D. Dissectible Single-phase Squirrel-cage induction Motor with split phase.

DMG-K12: Dissectible of Three-phase Reluctance Motor kit.

- EMT21-D. Dissectible 3PH Reluctance Motor.

DMG-K13: Dissectible of Single-phase Shaded Pole Motor kit.

- EMT22-D. Dissectible Single-phase Shaded Pole Motor.

The application AEL-DMG-KIT can be mounted on rack (option A) or on rail (option B):

Option A:

This application needs the following rack:

- 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

- 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, 25 A, 300 mA AC 6KA.


N-ALI01

- MED65. **Digital Multimeter. (2 units).**

  This module has a digital multimeter of about 3 ½ digits, with double-jack ending cables of about 4 mm to facilitate interconnections.
  With this digital multimeter we will be able to measure:
  Voltage.
  Current.
  Resistance.
  Capacitors capacity.
  Temperature.


MED65

- C-TB01. **Toolbox 1.**

  Set of allen keys of nine pieces.
  Nylon hammer.
  Set of flat screwdriver.
  Set of phillips screwdriver.


C-TB01

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

  Supply voltage: 230 VAC.
  Variable output voltage: 0 - 300 VCC.
  Fuse: 2 A.


N-VCC/M

- N-VCA/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-VCA/M

- N-REV. **Single Phase Variable Resistor.**

  Variable resistor of 150 Ohm.
  Maximum power: 500 W.
  Potentiometer.
  Terminals:
  Three terminals to choose all resistance or variable resistance.
  Fuse: 2 A.


N-REV

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

  Supply voltage (Single-Phase): 230 VAC PH+N+G.
  Output voltage:
  Single-Phase 24 VAC/12 VAC.
  24 VDC.
  0 - 24 VDC through potentiometer.


N-ALI03

- EMT5-D. **Dissectible DC shunt/series/compound excitation motor-generator.**
  Nominal power: 300 W.
  Armature voltage: 200 VDC.
  Excitation voltage: 230 VDC.
  Armature current: 1,5 A.
  Excitation current: 0,4 A.
  Speed: 3400/7500 r.p.m.


EMT5-D

- EMT6-D. **Dissectible Independent excitation 3PH synchronous motor-generator.**
  Nominal power: 250 W.
  Nominal output voltage: 3x 400 VAC.
  Frequency: 50/60 Hz.
  Speed: 3000 r.p.m.
  Nominal output current: 1 A.
  Nominal excitation current: 0,25 A.


EMT6-D

- EMT7-D. **Dissectible single-phase squirrel-cage induction motor with starting capacitor.**
  Nominal power: 370 W.
  Nominal voltage: 3x 230/400 VAC Δ/Y.
  Frequency: 50/60 Hz
  Number of poles: 2.
  Speed: 2730 r.p.m.
  Nominal current: 1,67/ 0,97 A.


EMT7-D

- EMT8-D. **Dissectible 3PH wound induction motor.**
  Nominal power: 300 W.
  Nominal voltage: 3x 230/400 VAC Δ/Y.
  Frequency: 50/60 Hz.
  Number of poles: 2.
  Speed: 2870 r.p.m.
  Nominal current: 1/ 0,5 A.


EMT8-D

- EMT9-D. **Dissectible dahlander motor, 2 speeds.**
  Nominal power: 370 W.
  Nominal voltage: 3x 400 VAC.
  Frequency: 50/60 Hz.
  Number of poles: 4.
  Speed: 1400/2800 r.p.m.
  Nominal current: 1,2 / 1,55 A.


EMT9-D

- EMT10-D. **Disectible 3PH squirrel-cage induction motor, 2 speeds.**
  Nominal power: 240/370 W.
  Nominal voltage: 3x 400 VAC.
  Frequency: 50/60 Hz.
  Speed: 900/1420 r.p.m.
  Nominal current: 1,05 / 1,35 A.


EMT10-D

- EMT11-D. **Dissectible single-phase squirrel-cage induction motor with starting capacitor.**
  Nominal power: 370 W.
  Nominal voltage: 3 x 230 VAC.
  Frequency: 50/60 Hz
  Speed: 2780 r.p.m.
  Nominal current: 2,53 A.


EMT11-D

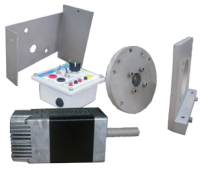
- EMT12-D. **Dissectible universal motor.**
  Supply voltage: 110-240 VAC/ VDC.
  Power: 230 W.
  Speed: 9000 r.p.m.

EMT12-D

- EMT16-D. **Dissectible single-phase squirrel-cage induction motor with starting capacitor.**
  Supply voltage: 110-220V.
  Nominal power: 370 W.
  Speed: 2780 r.p.m.
  Frequency: 50/60 Hz.
  Armature current: 1,85 A.

EMT16-D

- EMT18-D. **Dissectible DC brushless motor.**
  Nominal power: 80 W.
  Nominal voltage: 24 V DC.
  Nominal current: 3,3 A.
  Speed: 3250 r.p.m.



EMT18-D

- EMT20-D. **Dissectible single-phase squirrel-cage induction motor with split phase.**
  Supply voltage: 220 V.
  Power: 370 W.
  Speed: 2780 r.p.m.
  Frequency: 50 Hz.
  Armature current: 2,53 A.

EMT20-D

- EMT21-D. **Dissectible 3PH reluctance motor.**
  Nominal power: 300 W.
  Nominal voltage: 3x 400 VAC.
  Frequency: 50/60 Hz.
  Speed: 3000 r.p.m.
  Nominal current: 1,4 A.

EMT21-D

- EMT22-D. **Dissectible Single-Phase Shaded Pole Motor.**
  Nominal power: 34 W.
  Nominal voltage: 230/240 V.
  Frequency: 50/60 Hz.
  Speed: 1550 r.p.m.

EMT22-D

- **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.- Complete step by step assembly of DC Independent Shunt-Series Compound Excitation Motor-Generator.

2.- Put into operation the DC Independent Shunt-Series Compound Excitation Motor-Generator.

3.- Complete step by step assembly of AC Synchronous Three-Phase Motor Alternator.

4.- Put into operation the AC Synchronous Three-Phase Motor Alternator.

5.- Complete step by step assembly of Asynchronous Three-Phase Motor of Squirrel Cage.

6.- Put into operation the Asynchronous Three-Phase Motor of Squirrel Cage.

7.- Complete step by step assembly of Asynchronous Three-Phase Motor with Wound Rotor.

8.- Put into operation the Asynchronous Three-Phase Motor with Wound Rotor.

9.- Complete step by step assembly of Dahlander Three-Phase Motor.

10.- Put into operation the Dahlander Three-Phase Motor.

11.- Complete step by step assembly of Asynchronous Three-Phase Motor of Two Independent Speeds.

12.- Put into operation the Asynchronous Three-Phase Motor of Two Independent Speeds.

13.- Complete step by step assembly of Asynchronous Single-Phase Motor with Starting Capacitor.

14.- Put into operation the Asynchronous Single-Phase Motor with Starting Capacitor.

15.- Complete step by step assembly of Universal Motor.

16.- Put into operation the Universal Motor.

17.- Complete step by step assembly of DC Permanent magnet motor.

18.- Put into operation the DC Permanent magnet motor.

19.- Complete step by step assembly of Asynchronous Single-Phase Motor with Starting and Running Capacitor.

20.- Put into operation the Asynchronous Single-Phase Motor with Starting and Running Capacitor.

21.- Complete step by step assembly of Asynchronous Three-Phase Motor of Squirrel Cage with "Y" Connection.

22.- Put into operation the Asynchronous Three-Phase Motor of Squirrel Cage with "Y" Connection.

23.- Complete step by step assembly of DC Brushless Motor.

24.- Put into operation the DC Brushless Motor.

25.- Complete step by step assembly of Asynchronous Single-Phase Motor with Split Phase.

26.- Put into operation the Asynchronous Single-Phase Motor with Split Phase.

27.- Complete step by step assembly of Three-Phase Reluctance Motor.

28.- Put into operation the Three-Phase Reluctance Motor.

29.- Complete step by step assembly of Single-Phase Shaded Pole Motor.

30.- Put into operation the Single-Phase Shaded Pole Motor.

- Several other exercises can be done and designed by the user.

REQUIRED SERVICES

- Electrical supply: three-phase, 380V/50 Hz or 208V/60 Hz, 1 kW.

DIMENSIONS AND WEIGHTS

EMT5-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT6-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT7-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT8-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT9-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg. approx. (11 pounds approx.)

EMT10-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT11-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT12-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT16-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg. approx. (11 pounds approx.)

EMT18-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT20-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

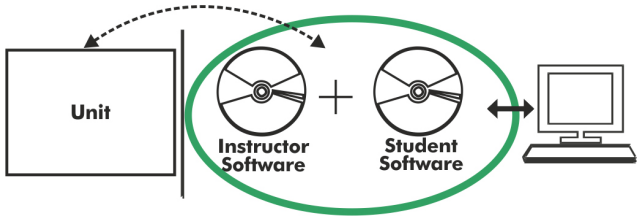
EMT21-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

EMT22-D:
- Dimensions: 330 x 400 x 300 mm approx. (12.99 x 15.74 x 11.81 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

C-TB01:
- Dimensions: 311 x 168 x 130 mm approx. (12.24 x 6.61 x 5.11 inches approx.)
- Weight: 5 Kg approx. (11 pounds approx.)

Optional

AEL-DMG-KIT/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.

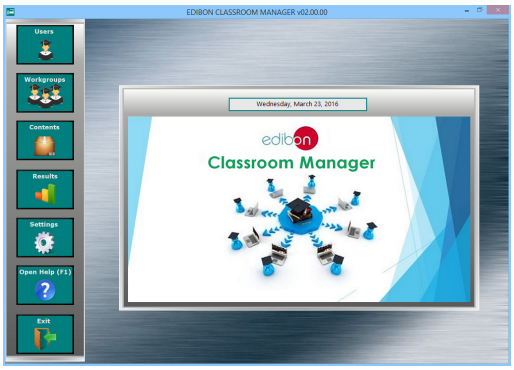
Instructor Software

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

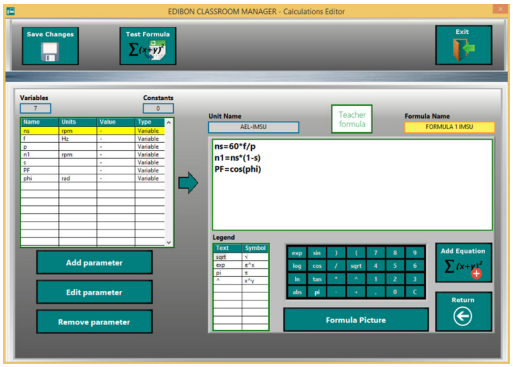
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

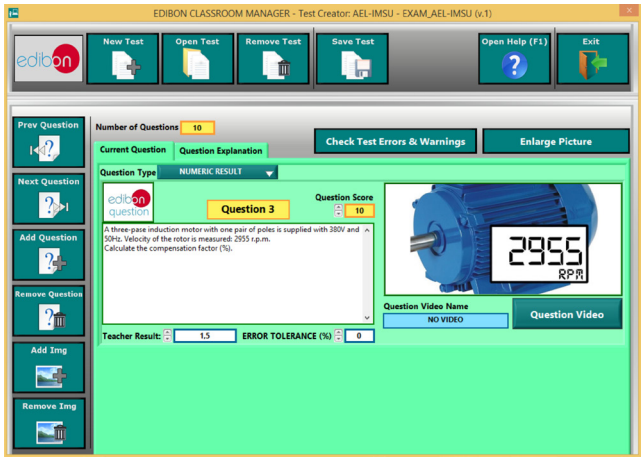
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation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



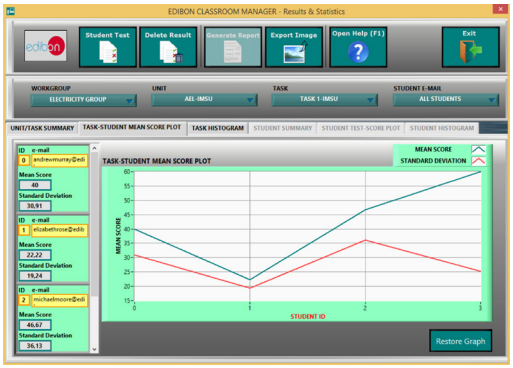
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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

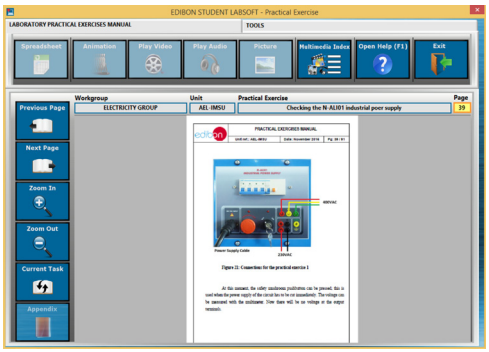
- ESL-SOF. **EDIBON Student Labsoft** (**Student Software**).

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.**

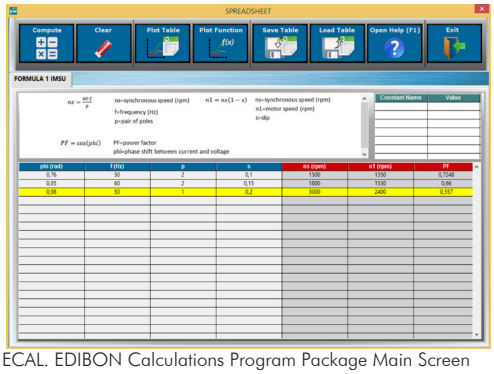
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen

For more information see **ICAI** catalogue. Click on the following link:
www.edibon.com/en/files/expansion/ICAI/catalog

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.

C/ Julio Cervera, 10-12-14. Móstoles Tecnológico.
28935 MÓSTOLES. (Madrid). ESPAÑA - SPAIN.
Tel.: 34-91-6199363 Fax: 34-91-6198647
E-mail: edibon@edibon.com Web: **www.edibon.com**

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REPRESENTATIVE: