edibon

Engineering and Technical Teaching Equipment

1 kW AC Industrial Servomotor Application

AEL-SERIN/CA-1KW

www.edibon.com
↳PRODUCTS
↳2.- ELECTRONICS AND 6.- MECHATRONICS, AUTOMATION & COMPUMECHATRONICS

INTRODUCTION

A servomotor is a rotary actuator that allows for precise control of angular, velocity and acceleration. It consists of a suitable motor coupled to a sensor to get a control position, speed and torque by means of an external control system based on pulse width modulation (PWM).

Among the numerous industrial applications of servomotors it is worth pointing out robotics, printers, control systems, manufacturing systems or machines which require high accuracy (milling machines, metal press, etc.).

LRQA CERTIFIED ISO 9001
Certificate of Approval of the Quality Management System

CE
European Union Certificate
(total safety)

UL CSA
UL and CSA Regulations
(All our products are manufactured according to current UL and CSA regulations)

LRQA CERTIFIED ISO 14001
Certificate of Approval of the Environmental Management System

WQC worlddidac
Worlddidac Association Certificate of Membership

GENERAL DESCRIPTION

The 1 kW AC Industrial Servomotor Application, "AEL-SERIN/CA-1KW", has been designed EDIBON to study the working principle and control of industrial servomotors.

The "AEL-SERIN/CA 1-KW" allows the user to acquire knowlegde and experience in the control of the mechanical parameters of a servomotor. For this purpose, the application includes a servomotor along with its control module and two digital meters to monitor speed and torque values throughout the whole process.

In addition, once this knowledge has been acquired the user will be able, if desired, to carry out manual tests for rotating electrical machines with the goal of setting different operating conditions to obtain its characteristic curves and parameters.

In order to carry out advanced electrodynamic tests for rotating electrical machines, it is recommended to acquire the Control and Data Acquisition System Software for Electrical Machines, "EM-SCADA". This advanced software allows monitoring waveforms for voltage, current, torque and speed for the in-depth study of the electrical machines to be tested.

The application "AEL-SERIN/CA-1KW" includes the following elements:

- N-SERV1K. 1 kW Servomotor Module.
- N-ALI01. Industrial Main Power Supply Module.
- N-DMC01. Torque and Speed Measurement Module 1.

Additional recommended elements (Not included):

- EM-SCADA. Control and Data Acquisition System Software for Electrical Machines.
- AEL-DCEMA. DC Electrical Motors Application.
- AEL-ACEM. AC Three-Phase Induction Motors Application.

The application "AEL-SERIN/CA-1KW" 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 "AEL-SERIN/CA-1KW" application includes the following elements:

- N-SERV1K. **1 kW Servomotor Module.**
  - Dynamic and static operating regime in four quadrants.
  - Speed and torque signals.
  - Power supply terminals: 3 x 400 VAC.
  - Frequency: 50 / 60 Hz.
  - Nominal power: 1 kW.
  - Maximum power: 3 kW.
  - Maximum speed: 5000 rpm.
  - Nominal torque: 3.18 Nm.
  - Maximum torque: 9.55 Nm.
  - Temperature control.
  - Speed control potentiometer.
  - Torque control potentiometer.
  - Mode selection switch: torque/speed control.
  - Motor turning reversal switch.

N-SERV1K

- N-ALI01. **Industrial Main Power Supply Module.**
  - Supply voltage: 400 VAC, 3PH + N.
  - ON / OFF removable key.
  - Output voltage connections:
    - Three-Phase + Neutral: 400 VAC.
    - Single-Phase: 230 VAC.
  - Three-Phase supply hose with IP44 3PN + E 32 A 400 V connecting plug.
  - Differential magnetothermal 4 poles, 25 A, 300 mA AC 6 KA.
  - Emergency stop push-button.

N-ALI01

- N-DMC01. **Torque and Speed Measurement Module 1.**
  - Digital torque meter:
    - Torque signal connector.
    - Auxiliary contact NO.
  - Digital speed meter:
    - Speed signal connector.
    - Auxiliary contact NO.
  - IP66 protection.

N-DMC01

Additional recommended elements (Not included):

- EM-SCADA. **Control and Data Acquisition System Software for Electrical Machines.**
  - Power supply: 230 VAC.
  - Input signals:
    - Current signal (x2).
    - RMS current signal (x2).
    - Voltage signal (x2).
    - RMS voltage signal (x2).
    - Torque and speed signals.
  - Output signals:
    - Torque control signal for the servomotor.
    - Speed control signal for the servomotor.
  - The three softwares are part of the SCADA system.
  - Compatible with actual Windows operating systems. Graphic and intuitive simulation of the process in screen. Compatible with the industry standards.
  - Registration and visualization of all process variables in an automatic and simultaneous way.
  - Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.
  - Management, processing, comparison and storage of data.
  - It allows the registration of the alarms state and the graphic representation in real time.
  - Comparative analysis of the obtained data, after the process and modification of the conditions during the process.
  - Open software, allowing the teacher to modify texts, instructions. Teacher's and student's passwords to facilitate the teacher's control on the student, and allowing the access to different work levels.
  - This unit allows the 30 students of the classroom to visualize simultaneously all the results and the manipulation of the unit, during the process, by using a projector or an electronic whiteboard.

EM-SCADA

- **AEL-DCEMA. DC Electrical Motors Application.**

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

- N-ALI02. **Domestic Main Power Supply Module.**
  - Supply voltage (single–phase): 230 VAC, 1PH + N.
  - ON / OFF removable key.
  - Output voltage connections:
    - Two single-phase: 230 VAC.
    - Single-phase supply hose with connecting plug.
  - Differential magnetothermal 2 poles, 25 A, 30 mA AC 6 KA.
  - Emergency stop push-button.


N-ALI02

- N-ALI03. **AC Auxiliary Power Supply (24 Vac) Module.**
  - Voltage supply (single-phase): 230 VAC, 1PH + N.
  - Output voltage:
    - Single–Phase 24 VAC / 12 VAC.
    - 24 VDC.
    - 0 – 24 VDC through potentiometer.


N-ALI03

- N-PUL48. **Three Double Chamber Push-Buttons Module.**
  - 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.


N-PUL48

- N-CON01. **Three-Pole Contactor Module (24 VAC). (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:
    - 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.


N-CON01

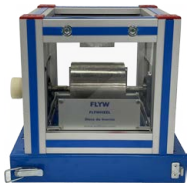
- N-VVCC/M. **DC Motor Speed Controller (Intermediate option) Module.**
  - Supply voltage: 230 VAC.
  - Variable output voltage: 0 – 300 VDC.
  - Fuse: 2 A.


N-VVCA/M

- N-LAM02. **Auxiliary Lamps Module.**
  - Nominal voltage: 24 VAC.
  - Three lamps (red, yellow and green).


N-LAM02

- FLYW. **Flywheel.**
  - Weight: 2 kg.
  - Recommended maximum speed: 4000 rpm.
  - Moment of inertia: 0.0025 kgm^2.


FLYW

- N-MED17. **DC Voltimeter Module (0-200 V).**
  - Measurement range: 0 – 200 VDC.
  - Terminals:
    - Measurement terminals.


N-MED17

- N-MED05. **DC Amperimeter Module (0-1.5 A).**

  Measurement range: 0 – 200 VDC.

  Terminals:

  Measurement terminals.

N-MED05

- MED65. **Digital Multimeter.**

  Digital multimeter with 3 ½ digits, with 4 mm double connector termination cables to facilitate interconnections.

  With this digital multimeter we can measure:

  Voltage.

  Current.

  Resistance.

  Capacitors capacity.

  Temperature.

MED65

Required elements (at least one) (Not included):

EMT1-DC-KIT: DC Independent Excitation Motor-Generator Study Kit.

- EMT1. DC **Independent Excitation Motor-Generator.**

  Nominal power: 250 W.

  Armature voltage: 200 VDC.

  Excitation voltage: 190 VDC.

  Armature current: 1.5 A.

  Excitation current: 0.3 A.

  Speed: 3000 rpm.

  Shaft height: 71 mm.

EMT1

- N-REV. **Single Phase Variable Resistor Module. (2 units).**

  Variable resistor: 150 Ohm.

  Maximum power: 500 W.

  Potentiometer.

  Terminals:

  Three terminals to choose all resistance or variable resistance.

  Fuse: 2 A.

N-REV

EMT2-DC-KIT: DC Series Excitation Motor-Generator Study Kit.

- EMT2. **DC Series Excitation Motor-Generator.**

  Nominal power: 300 W.

  Armature voltage: 200 VDC.

  Armature current: 1.5 A.

  Speed: 7500 rpm.

  Shaft height: 71 mm.

EMT2

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

  Variable resistor: 150 Ohm.

  Maximum power: 500 W.

  Potentiometer.

  Terminals:

  Three terminals to choose all resistance or variable resistance.

  Fuse: 2 A.

N-REV

EMT3-DC-KIT: DC Shunt Excitation Motor-Generator Study Kit.

- EMT3. **DC Shunt excitation Motor-Generator.**

  Nominal power: 300 W.
  Nominal voltage: 200 VDC.
  Nominal current: 1.5 A.
  Speed: 3400 rpm.
  Shaft height: 71 mm.

EMT3

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

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

N-REV

EMT4-DC-KIT: DC Compound Excitation Motor-Generator Study Kit.

- EMT4. **DC Compound Excitation Motor-Generator.**

  Nominal power: 250 W.
  Armature voltage: 200 VDC.
  Armature current: 1.5 A.
  Excitation current: 0.3 A.
  Speed: 3000 rpm.
  Shaft height: 71 mm.

EMT4

- N-REV. **Single Phase Variable Resistor Module. (2 units).**

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

N-REV

EMT5-DC-KIT: DC Shunt/Series/Compound Excitation Motor-Generator Study Kit.

- EMT5. **DC Shunt/Series/Compound Excitation Motor-Generator.**

  Nominal power: 300 W.
  Armature voltage: 200 VDC.
  Excitation voltage: 230 VDC.
  Armature current: 1.5A.
  Excitation current: 0.4 A.
  Speed: 3400 / 7500 rpm.
  Shaft height: 71 mm.

EMT5

- N-REV. **Single Phase Variable Resistor Module. (2 units).**

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

N-REV

EMTGEN-DC-KIT: Independent Excitation DC Generator Study Kit.

- EMT7. **3PH Squirrel-Cage Motor.**

  Nominal power: 370 W.
  Nominal voltage: 3 x 230 / 400 VAC Δ/Y.
  Frequency: 50 / 60 Hz.
  Number of poles: 2.
  Speed: 2730 rpm.
  Nominal current: 1.67 / 0.97 A.
  Shaft height: 71 mm.

EMT7

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

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

N-REV

- N-REF. **Single Phase Fixed Resistor Module.**

  Resistor value: 150 Ohm.
  Maximum power: 500 W.
  Selector:
    Position 0: Circuit opened.
    Position 1: Circuit closed.
  Fuse: 2 A.

N-REF

- N-VVCA/M. **AC Motor Speed Controller (Intermediate option) Module.**

  ON / OFF Switch.
  Supply voltage: 230 VAC.
  Nominal power: 750 W.
  PWM output voltage connections:
    Three-phases: 230 VAC.
  10 K, potentiometer for the induction motor control speed.
  Setting and visualization display of the machine parameters.

N-VVCA/M

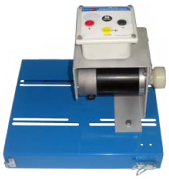
- EMT1. **DC Independent Excitation Motor-Generator.**

  Nominal power: 250 W.
  Armature voltage: 200 VDC.
  Excitation voltage: 190 VDC.
  Armature current: 1.5 A.
  Excitation current: 0.3 A.
  Speed: 3000 rpm.
  Shaft height: 71 mm.

EMT1

- EMT15. **DC Permanent Magnet Motor.**

  Nominal power: 300 W.
  Nominal voltage: 200 VDC.
  Nominal current: 0.5 A.
  Speed: 3400 rpm.
  Shaft height: 71 mm.



EMT15

Specifications

- **AEL-ACEM. Industrial Main Power Supply Module.**

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

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

N-ALI01

Supply voltage: 400 VAC, 3PH + N.
ON / OFF removable key.
Output voltage connections:
Three-Phase + Neutral: 400 VAC.
Single-Phase: 230 VAC.
Three-Phase supply hose with IP44 3PN + E 32 A 400 V connecting plug.
Differential magnetothermal 4 poles, 25 A, 300 mA AC 6 KA.
Emergency stop push-button.

- N-ALI03. **AC Auxiliary Power Supply (24 Vac) Module.**

N-ALI03

Voltage supply (single-phase): 230 VAC, 1PH + N.
Output voltage:
Single–Phase 24 VAC / 12 VAC.
24 VDC.
0 – 24 VDC through potentiometer.

- N-PUL48. **Three Double Chamber Push-Buttons Module.**

N-PUL48

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.

- N-CON01. **Three-Pole Contactor Module (24 VAC). (4 units).**

N-CON01

Nominal voltage for power contacts: 400 VAC.
Nominal voltage for control contacts: 24 VAC.
Nominal voltage for the control coil: 24 VAC.
Contacts:
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.

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

N-REL30

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).

- N-TRANS03. **Three-Phase Autotransformer 400/230 VAC, 1 kVA, Module.**

N-TRANS03

Three-phase autotransformer.
Nominal supply voltage: 400 VAC (3 PH).
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-LAM02. **Auxiliary Lamps Module.**
  Nominal voltage: 24 VAC.
  Three lamps (red, yellow and green).


N-LAM02

- N-MED09. **AC Ammeter Module (0-2.5 A).**
  Measurement range: 0 – 2.5 A.
  Terminals:
    Measurement terminals.


N-MED09

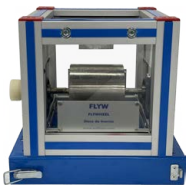
- N-ARR13. **Direct Starter with Inversion Module**.
  Nominal voltage: 400 VAC.
  Maximum contacts current: 10 A.
  Three position switch:
    0: Open circuit.
    1: Direct connection.
    2: Reverse connection.


N-ARR13

- MED65. **Digital Multimeter.**
  Digital multimeter with 3 ½ digits, with 4 mm double connector termination cables to facilitate interconnections.
  With this digital multimeter we will be able to measure:
    Voltage.
    Current.
    Resistance.
    Capacitors capacity.
    Temperature.


MED65

- FLYW. **Flywheel.**
  Weight: 2 kg.
  Maximum recommended speed: 4000 rpm.
  Moment of inertia: 0.0025 kgm^2.


FLYW

Required elements (at least one) (Not included):

EMT6-AC-KIT. Independent Excitation 3PH Synchronous Motor-Generator Study Kit.

- EMT6. **Independent Excitation 3PH Synchronous Motor-Generator.**
  Nominal power: 250 W.
  Nominal output voltage: 3 x 400 VAC.
  Frequency: 50 / 60 Hz.
  Speed: 3000 rpm.
  Nominal output current: 1 A.
  Nominal excitation current: 0.25 A.
  Shaft height: 71 mm.


EMT6

- N-VVCC/M. **DC Motor Speed Controller (Intermediate option) Module.**
  Supply voltage: 230 VAC.
  Variable output voltage: 0 – 300 VDC.
  Fuse: 2 A.


N-VVCC/M

- EMT7. **3PH Squirrel-Cage Motor.**
  Nominal power: 370 W.
  Nominal voltage: 3 x 230 / 400 VAC Δ / Y.
  Frequency: 50 / 60 Hz.
  Number of poles: 2.
  Speed: 2730 rpm.
  Shaft height: 71 mm.


EMT7

- N-VVCA/M. **AC Motor Speed Controller (Intermediate Option) Module.**

  ON / OFF Switch.
  Supply voltage: 230 VAC.
  Nominal power: 750 W.
  PWM output voltage connections:
  Three-phases: 230 VAC.
  10 K, potentiometer for the induction motor control speed.
  Setting and visualization display of the machine parameters.


N-VVCA/M

- N-REFTI. **Three-phase Independent Resistor Module.**

  Nominal voltage: 400 VAC.
  Resistor value: 3 x 150 Ohm.
  Nominal power: 3 x 352 W.
  Manual commutator to switch ON / OFF the resistors.
  Fuses: 3 x 5 A.
  Terminals:
  Three input terminals (3PH).
  Three output terminals (3PH).


N-REFTI

EMT7-AC-KIT. 3PH Squirrel Cage Motor Study Kit.

- EMT7. **3PH Squirrel-Cage Motor.**

  Nominal power: 370 W.
  Nominal voltage: 3 x 230 / 400 VAC Δ / Y.
  Frequency: 50 / 60 Hz.
  Number of poles: 2.
  Speed: 2730 rpm.
  Shaft height: 71 mm.


EMT07

- N-ARR01. **Star-Delta Manual Start Module.**

  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-TRANS03. **Three-Phase Autotransformer 400/230 VAC, 1 kVA, 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

EMT8-AC-KIT. 3PH Wound Rotor Motor Study Kit.

- EMT8. **3PH Wound Motor.**

  Nominal power: 300 W.
  Nominal voltage: 3 x 230 / 400 VAC Δ / Y.
  Frequency: 50 / 60 Hz.
  Number of poles: 2.
  Speed: 2870 rpm.
  Nominal current: 1 / 0.5 A.
  Shaft height: 71 mm.


EMT8

- N-TRANS03. **Three-Phase Autotransformer 400/230 VAC, 1 kVA, 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

- N-ARR01. **Star-Delta Manual Start Module.**

  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-REFTI. **Three-phase Independent Resistor Module.**

  Nominal voltage: 400 VAC.
  Resistor value: 3 x 150 Ohm.
  Nominal power: 3 x 352 W.
  Manual commutator to switch ON / OFF the resistors.
  Fuses: 3 x 5 A.
  Terminals:
    Three input terminals (3PH).
    Three output terminals (3PH).


N-REFTI

EMT9-AC-KIT. Dahlander Motor, two speeds Study Kit.

- EMT9. **Dahlander Motor, Two Speeds.**

  Nominal power: 370 W.
  Nominal voltage: 3 x 400 VAC.
  Frequency: 50 / 60 Hz.
  Number of poles: 4 / 2.
  Speed: 1400 / 2800 rpm.
  Nominal current: 1.2 / 1.55 A.
  Shaft height: 71 mm.


EMT9-SCADA

- N-ARR07. **Manual Dahlander Switch Module, Two Speeds.**

  Nominal voltage: 400 VAC.
  Maximum contacts current: 10 A.
  Three positions commutator:
    0: Open circuit.
    1: Low speed.
    2: High speed.


N-ARR07

EMT10-AC-KIT. 3PH Squirrel-Cage Motor, Two Speeds Study Kit.

- EMT10. **3PH Squirrel-Cage Motor, Two Speeds.**

  Nominal power: 240 / 370 W.
  Nominal voltage: 3 x 400 VAC.
  Frequency: 50 / 60 Hz.
  Speed: 900 / 1420 rpm.
  Nominal current: 1.05 / 1.35 A.
  Shaft height: 71 mm.


EMT10

- N-ARR09. **Manual Switch for Independent Windings, Two Speeds Module.**
  Nominal voltage: 400 VAC.
  Maximum contacts current: 10 A.
  Three positions commutator:
  0: Open circuit.
  1: Winding 1.
  2: Winding 2.


N-ARR09

EMT12-AC-KIT. Universal Motor Study Kit.

- EMT12. **Universal Motor.**
  Supply voltage: 110 – 240 VAC / VDC.
  Power: 230 W.
  Speed: 9000 rpm.


EMT12

- N-REV. **Single-Phase Variable Resistor Module.**
  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-VVCC/M. **DC Motor Speed Controller (Intermediate option) Module.**
  Supply voltage: 230 VAC.
  Variable output voltage: 0 – 300 VDC.
  Fuse: 2 A.


N-VVCC/M

- EMT11. **1PH Squirrel-Cage Motor with Starting Capacitor.**
  Nominal power: 370 W.
  Nominal voltage: 3 x 230 VAC.
  Frequency: 50 / 60 Hz.
  Speed: 2780 rpm.
  Nominal current: 2.53 A.
  Shaft height: 71 mm.


EMT11

- EMT16. **1PH Squirrel-Cage Motor with Starting and Running Capacitor.**
  Supply voltage: 110 – 220 VAC.
  Power: 370 W.
  Speed: 2780 rpm.
  Frequency: 50 / 60 Hz.
  Armature current: 1.85 A.
  Shaft height: 71 mm.


EMT16

- EMT20. **Asynchronous Single-Phase Motor with Split Phase.**
  Supply voltage: 220 VAC.
  Power: 370 W.
  Speed: 2780 rpm.
  Frequency: 50 Hz.
  Armature current: 2.53 A.
  Shaft height: 71 mm.


EMT20

- EMT21. **3PH Reluctance Motor.**
  Nominal power: 300 W.
  Nominal voltage: 3 x 400 VAC.
  Frequency: 50 / 60 Hz.
  Speed: 3000 rpm.
  Nominal current: 1.4 A.
  Shaft height: 71 mm.

EMT21

- **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.- Wiring and starting up the AC servomotor.

2.- Start/Stop operations of the servomotor.

3.- Speed control operation.

4.- Torque control operation.

5.- Warnings through alarm.

Additional practical possibilities with the additional recommended elements:

6.- Real time torque monitoring (EM-SCADA is required).

7.- Real time speed monitoring (EM-SCADA is required).

8.- Real time monitoring of current and voltage RMS values (EM-SCADA is required).

9.- Real time monitoring of current and voltage waveforms (EM-SCADA is required).

10.- Advanced electrodynamic study of the machine (EM-SCADA is required).

11.- Automatic braking test and monitoring of the results (EM-SCADA is required).

12.- Obtaining the characteristic curves of the machine (torque-speed, torque-current, etc) (EM-SCADA is required).

13.- Saving and comparison of results (EM-SCADA is required).

14.- Start-up of the electrical machine coupled to the servomotor (AEL-DCEMA and/or AEL-ACEM is required (at least one)).

15.- Introducing the braking torque (AEL-DCEMA and/or AEL-ACEM is required (at least one)).

16.- Monitoring of the electrical and mechanical parameters of the rotating machine under different operating conditions (AEL-DCEMA and/or AEL-ACEM is required (at least one)).

17.- Electrodynamic study of the machine (AEL-DCEMA and/or AEL-ACEM is required (at least one)).

18.- Obtaining the characteristic curves of the machine by means of manually controlled braking tests (torque-speed, torque-current, etc.) (AEL-DCEMA and/or AEL-ACEM is required (at least one)).

REQUIRED SERVICES

- Electrical supply: three-phase, 380 VAC – 400 VAC/50 Hz or 190 VAC – 240 VAC/60 Hz, 2 kW.

DIMENSIONS AND WEIGHTS

AEL-SERIN/CA-1kW:

- Dimensions: 640 x 320 x 320 mm approx.
  (19.29 x 12.99 x 12.99 inches approx.)
- Weight: 20 Kg approx.
  (44 pounds approx.).

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- EM-SCADA. Control and Data Acquisition System Software for Electrical Machines.
- AEL-DCEMA. DC Electrical Motors Application.
- AEL-ACEM. AC Three-Phase Induction Motors Application.

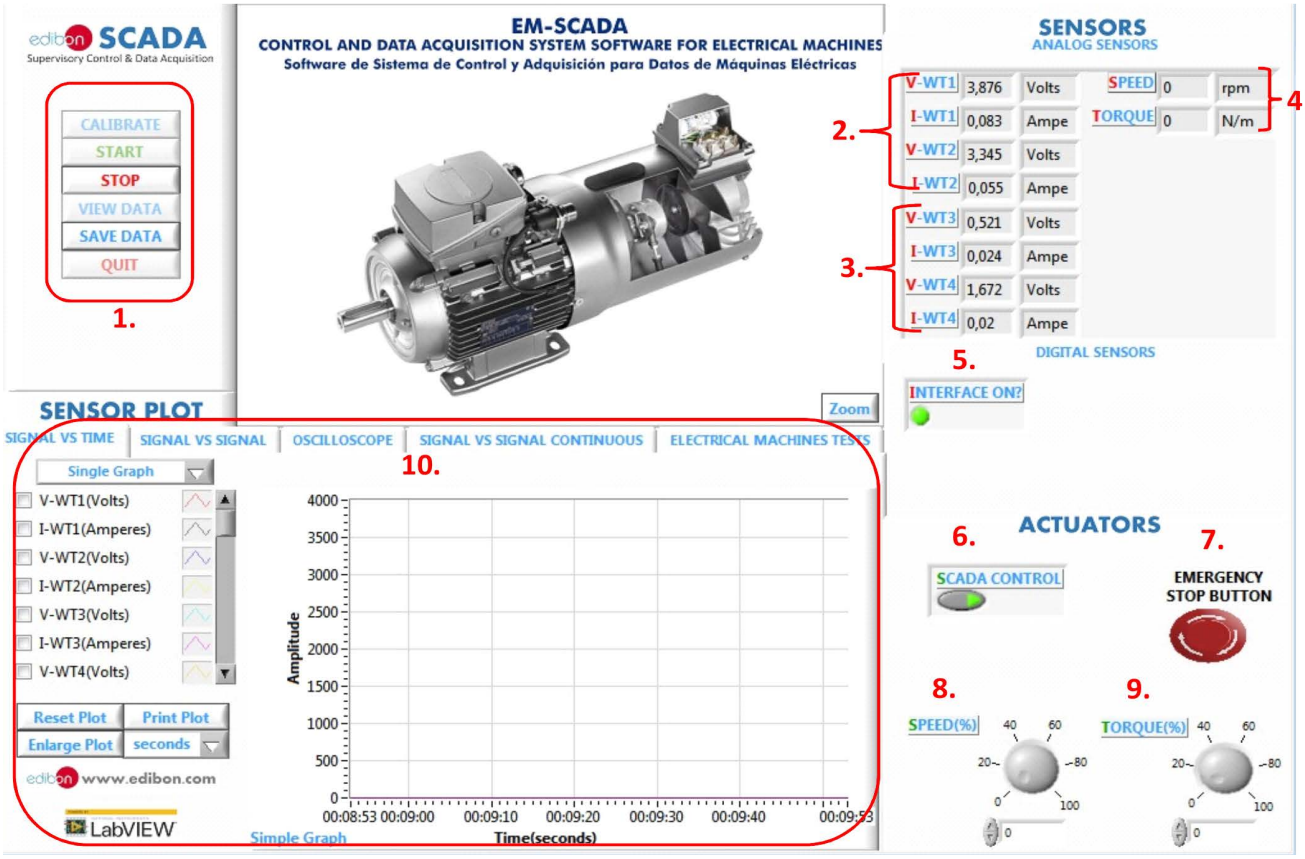
SIMILAR UNITS AVAILABLE

Offered in this catalog:

- AEL-SERIN/CA-1KW. 1 kW AC Industrial Servomotor Application.

Offered in other catalogs:

- AE-SMI. Servomotor Industrial Application.
- AE-BMI. Brushless Motor Industrial Application.
- SERIN/CC. Computer Controlled Advanced Industrial Servosystem Unit (for DC Motors).
- SERIN/CCB. Servosystems Basic Unit for DC Motors.
- SERIN/CA. Computer Controlled Advanced Industrial Servosystems Unit (for AC Motors).



① **Main menu.** Start-up, stop, view data, save data and quit.

② **RMS voltages and currents measurements.** It shows the effective values for the real time measured voltages and currents.

③ **Real voltages and currents measurements.** It shows the exact values for the real time measured voltages and currents.

④ **Torque and speed measurements.** It shows the machine torque and speed real time values.

⑤ **Interface connected warning switch.** The green pilot means the right operation of the control-interface box.

⑥ **SCADA control switch.** To enable the actuators control from the software.

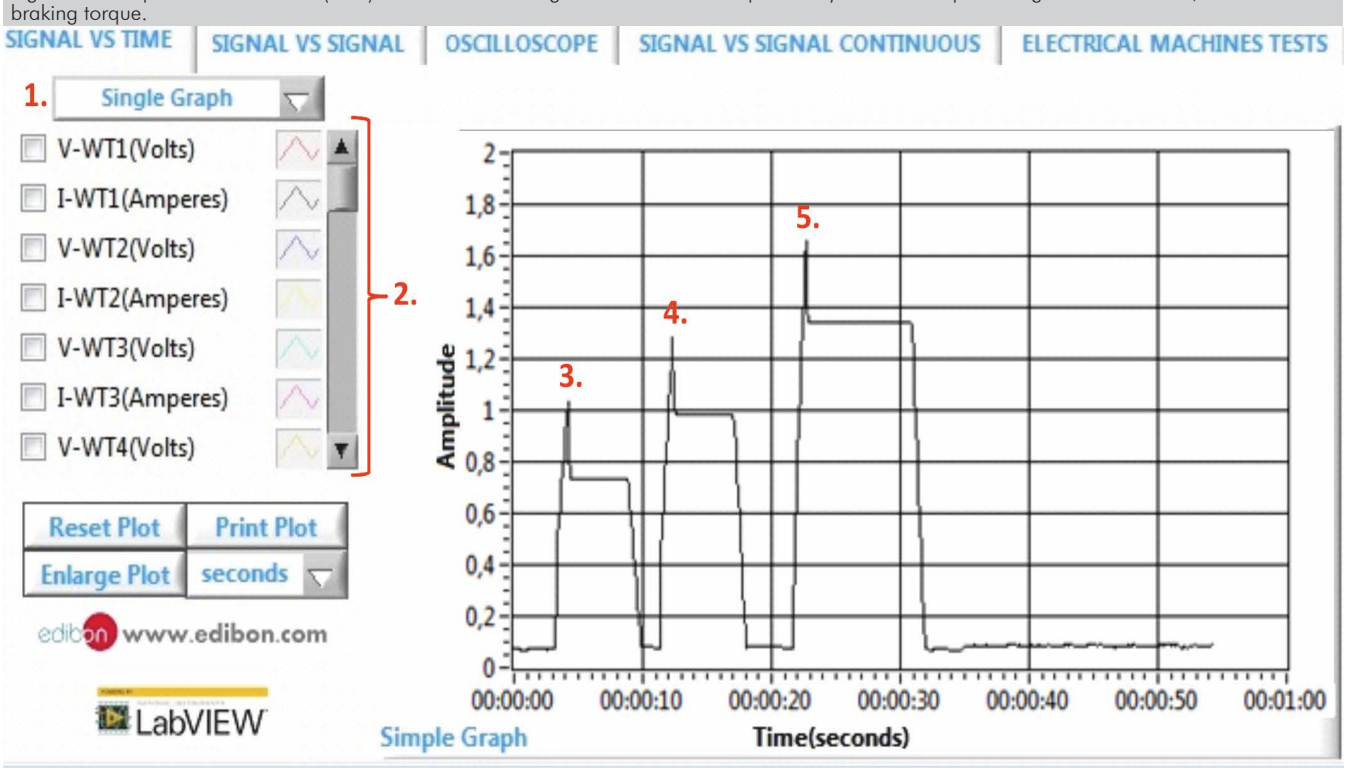
⑦ **Emergency stop buttton.**

⑧ **Speed actuator.** In order to set the desired speed value through the potentiometer or entering the exact value.

⑨ **Torque actuator.** In order to set the desired torque value through the potentiometer or entering the exact value.

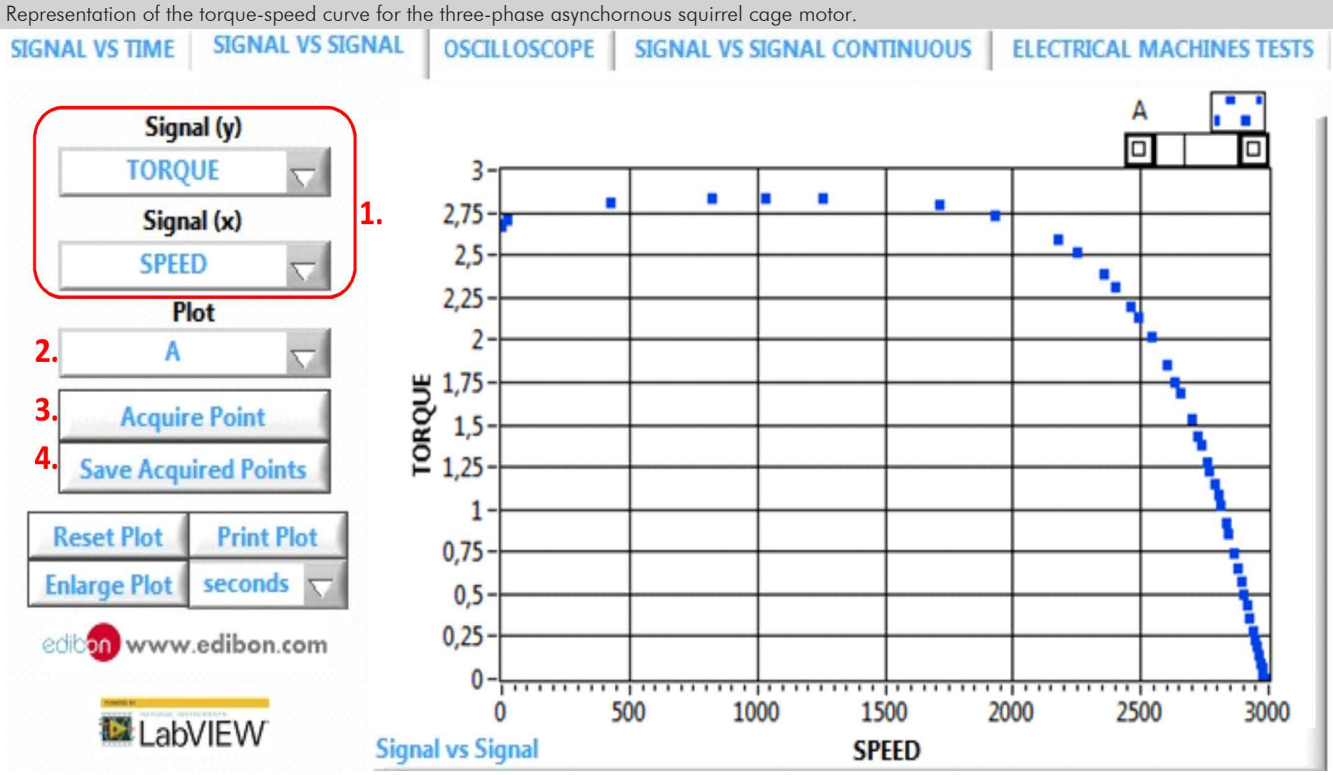
⑩ **Screen selector.**

Signal vs time plot of the effective (RMS) value of the starting current of the three-phase asynchronous squirrel-cage motor for 10%, 20% and 30% braking torque.



① **Type of graph selector.** Simple or several signals overlapping.
② **Parameters selection.** It allows choosing the parameters to be displayed and the setting for its display.
③ **Starting current with 10% of brake torque.**
④ **Starting current with 20% of brake torque.**
⑤ **Starting current with 30% of brake torque.**

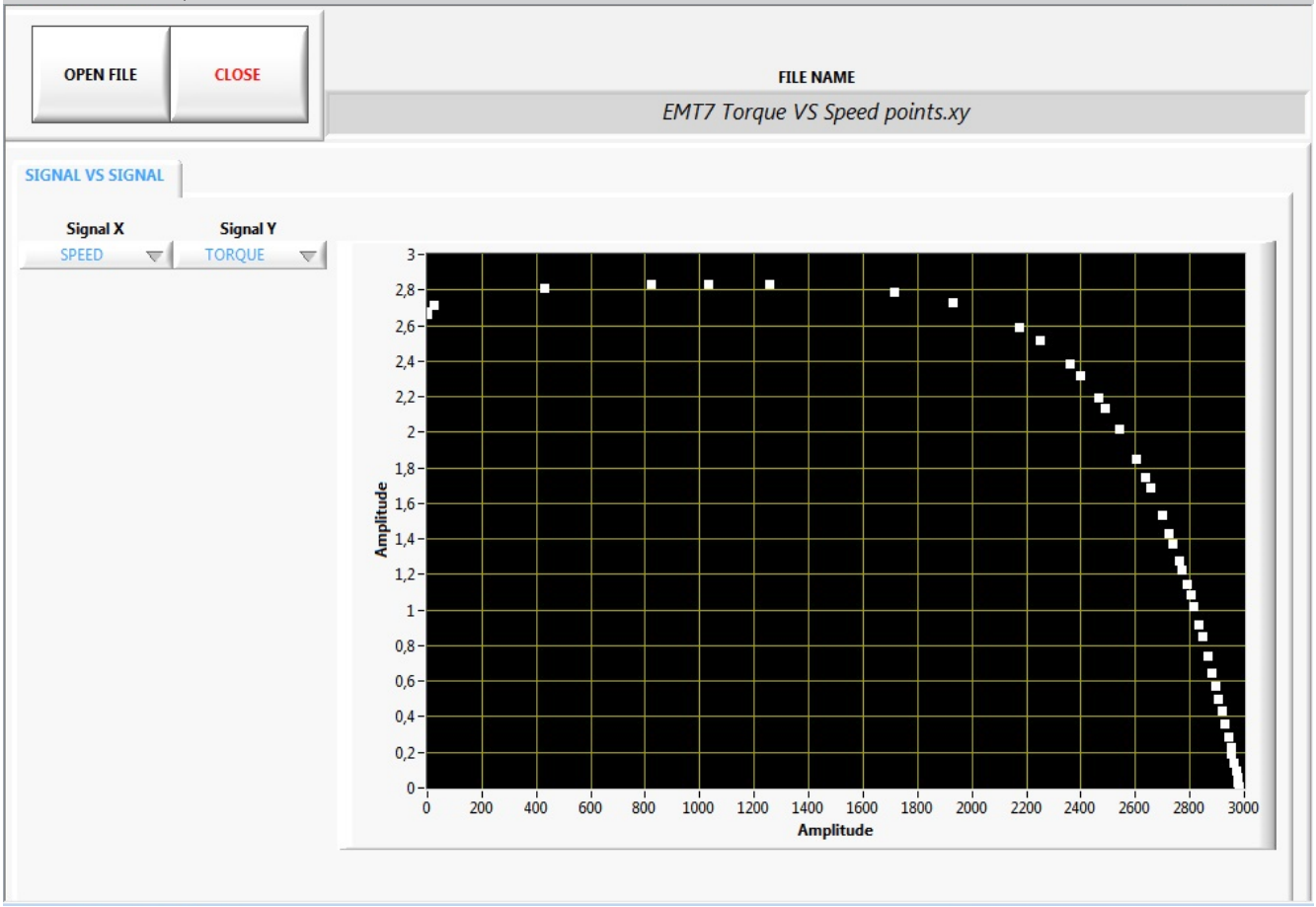
Representation of the torque-speed curve for the three-phase asynchornous squirrel cage motor.



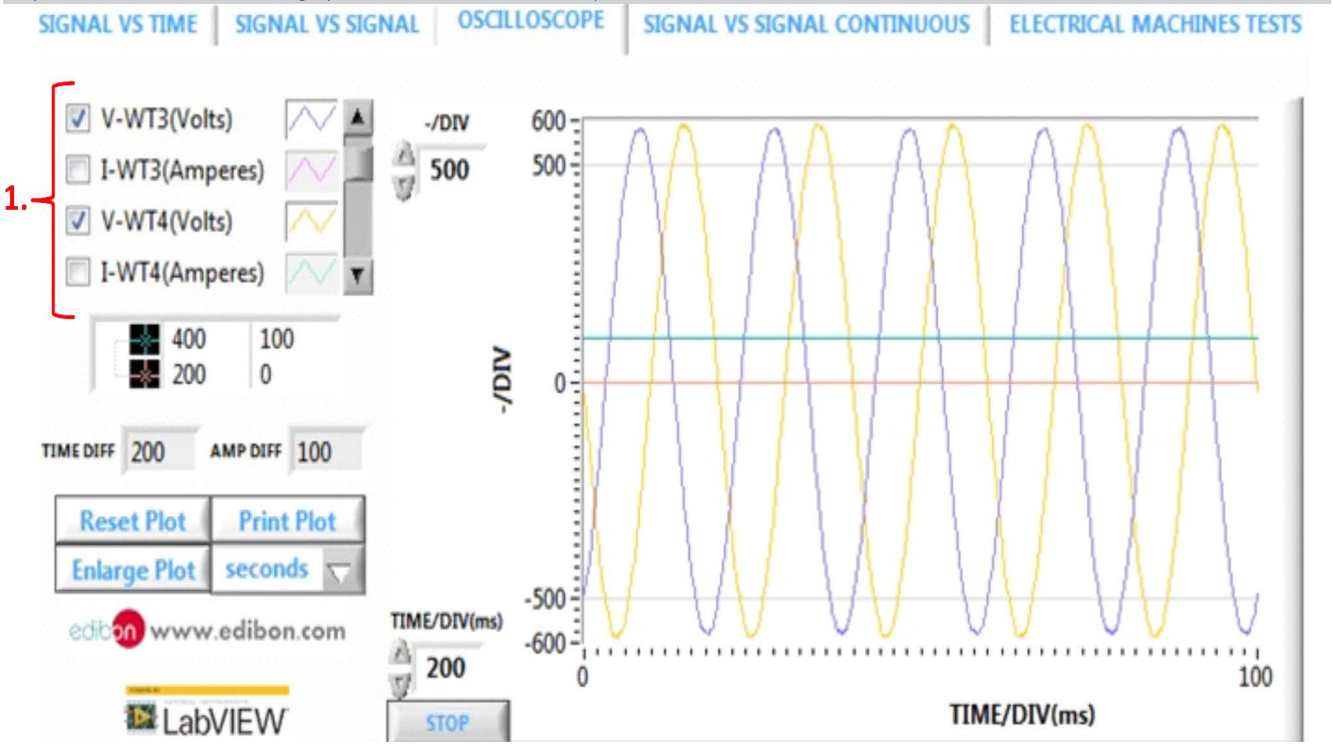
① **Axis signal selector.** It allows selecting the parameter to be monitored in each axis.
② **Type of graph selector.**
③ **Acquire points.** It allows displaying in the graph the point corresponding to the time when it is pressed.
④ **Save acquired points.** It allows saving the acquired points, which will start erasing automatically after 500 samples.

Some **real** results obtained from this unit with the software **EM-SCADA** (recommended)

Visualisation and representation of saved data.



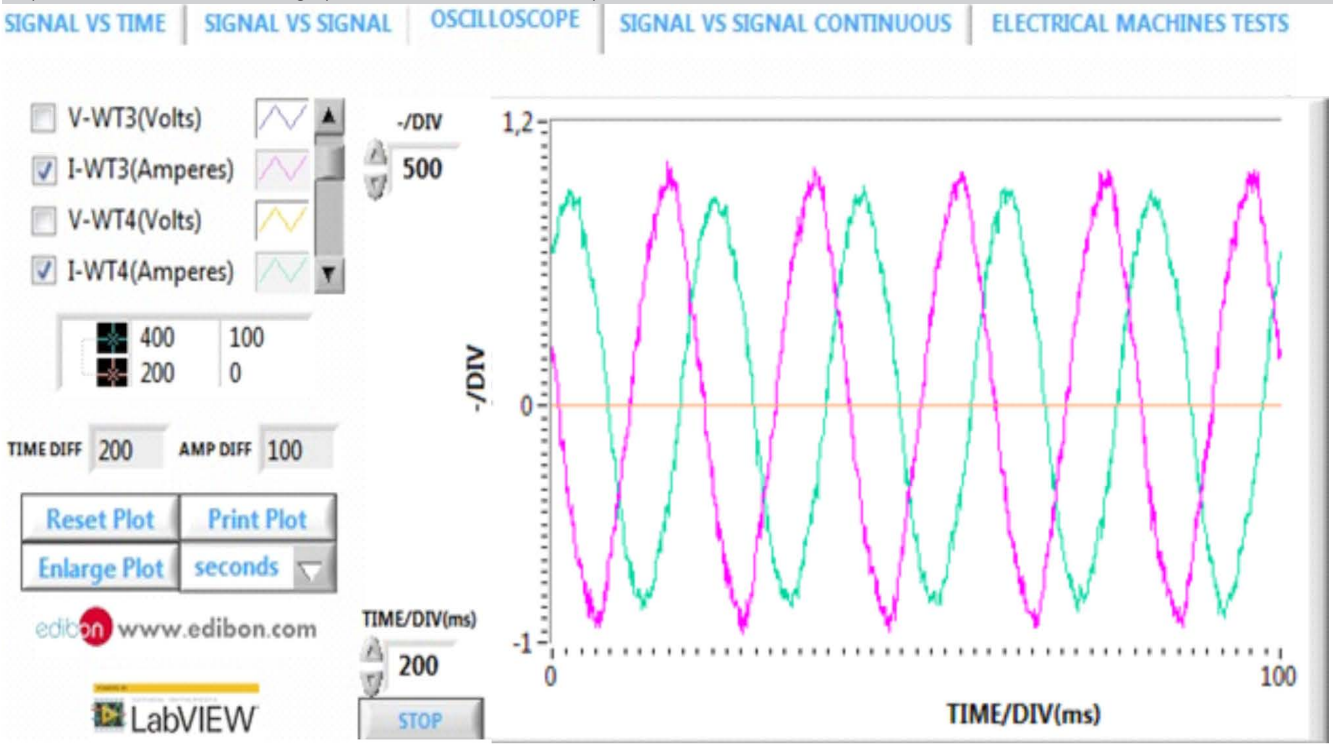
Representation of the waveform graph of the currents measured by the interface in real time.



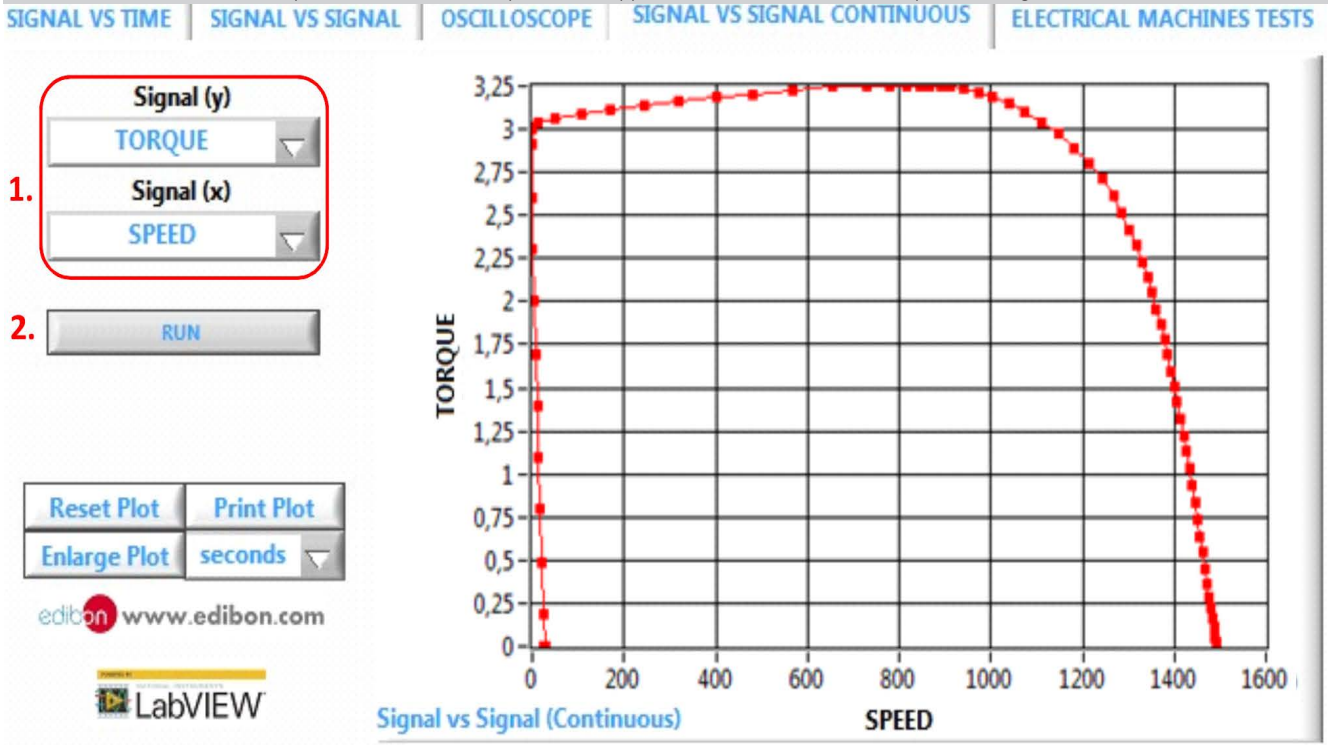
① **Parameters selector.** It allows choosing the parameters whose waveforms want to be displayed.

Some **real** results obtained from this unit with the software **EM-SCADA** (recommended)

Representation of the waveform graph of the currents measured by the interface in real time.



Representation of the torque-speed curve of the manual braking test with the two-speed three-phase asynchronous motor, first speed (1500 rpm). Notice that the motor nominal speed and maximum torque can be appreciated, as well as motor complete braking.

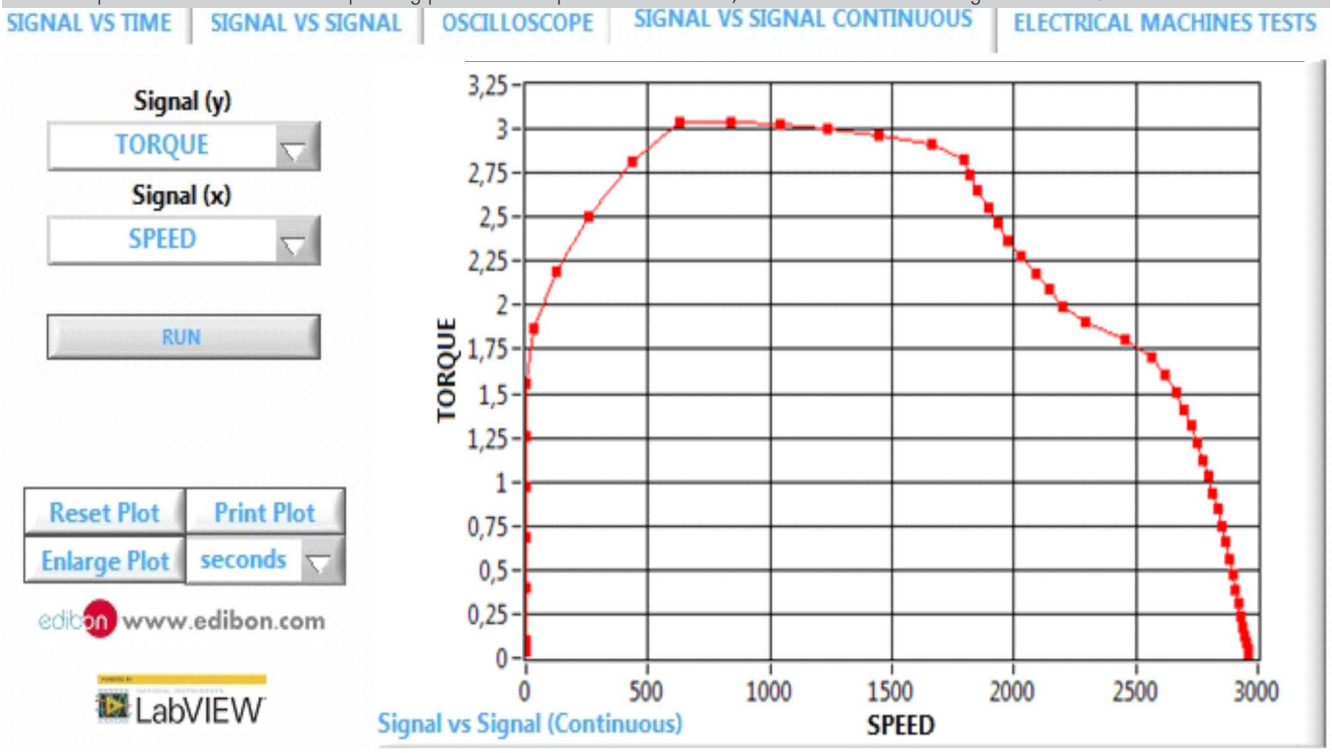


① **Axis signal selector.** It allows selecting the parameter to be monitored in each axis.

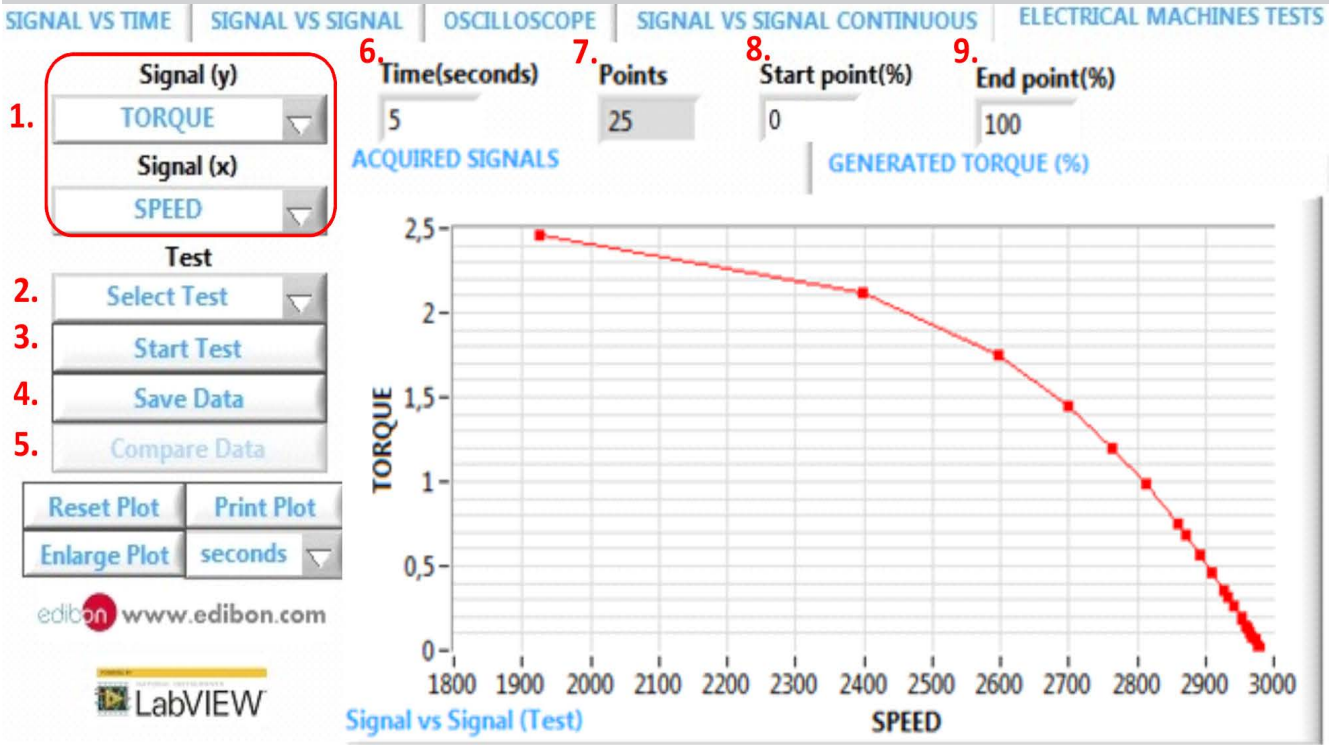
② **Run.** It allows starting the manual braking test.

Some **real** results obtained from this unit with the software **EM-SCADA** (recommended)

Representation of the torque-speed curve of the manual braking test with the single phase motor with starting and running capacitor. Notice the nominal speed of the motor and the operating point of the capacitor can be seen, as well as the total braking of the motor.



Obtained results for the automatic braking test with the three-phase asynchronous squirrel cage motor with delta connection, from 0 to 100% and exponetial braking ramp. Notice the nominal speed of the motor and how the exponential braking ramp is not sufficient for total braking of the electric motor.



① **Axis signal selector.** It allows selecting the parameter to be monitored in each axis.

② **Type of test selector.** It allows selecting the type of automatic braking test to be fulfilled: lineal, constant or exponential ramp.

③ **Iniciar test.**

④ **Save data.** It allows saving the obtained test results.

⑤ **Compare data.** It allows up to three different tests to be compared on the same graph, for which the user must have previously saved these results.

⑥ **Test time.** It allows selecting the length of the test to be fulfilled.

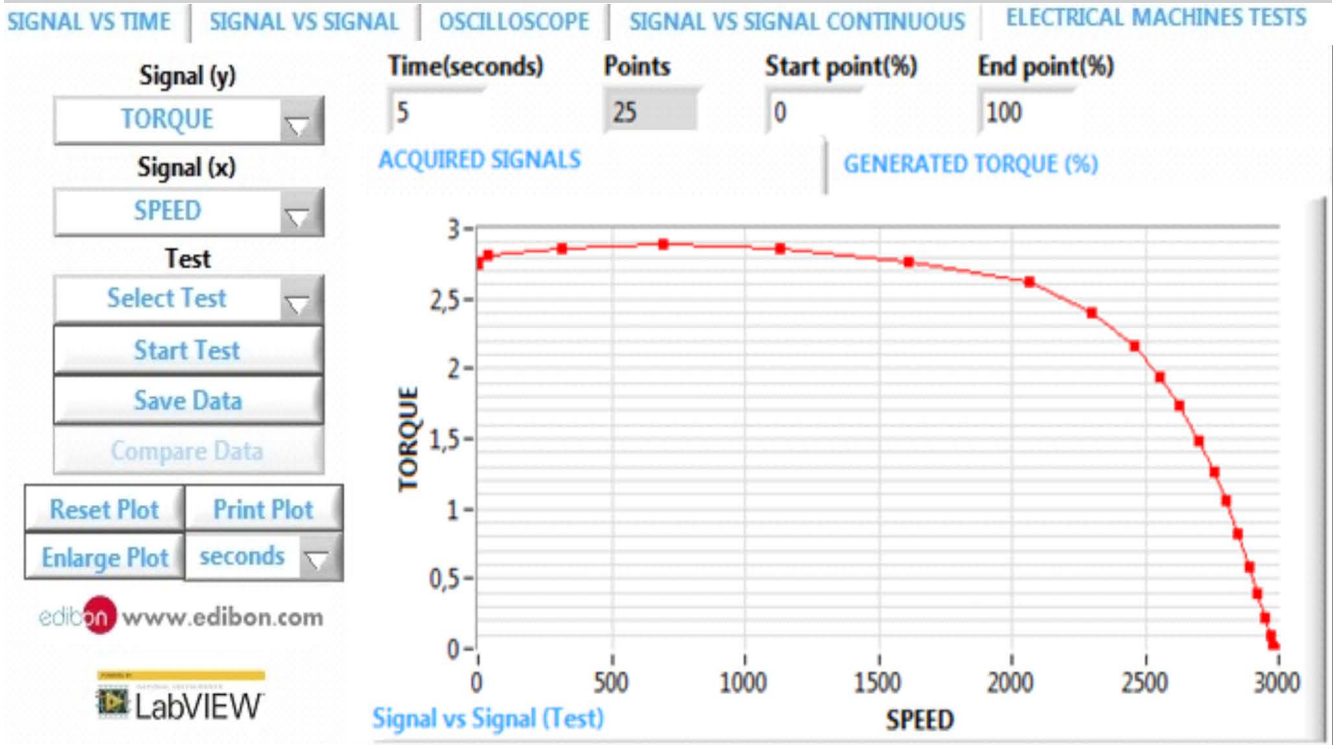
⑦ **Points.** It shows the number of points that will define the resulting plot.

⑧ **Start point.** It allows selecting (as a percentage) the start point for the test to be fulfilled.

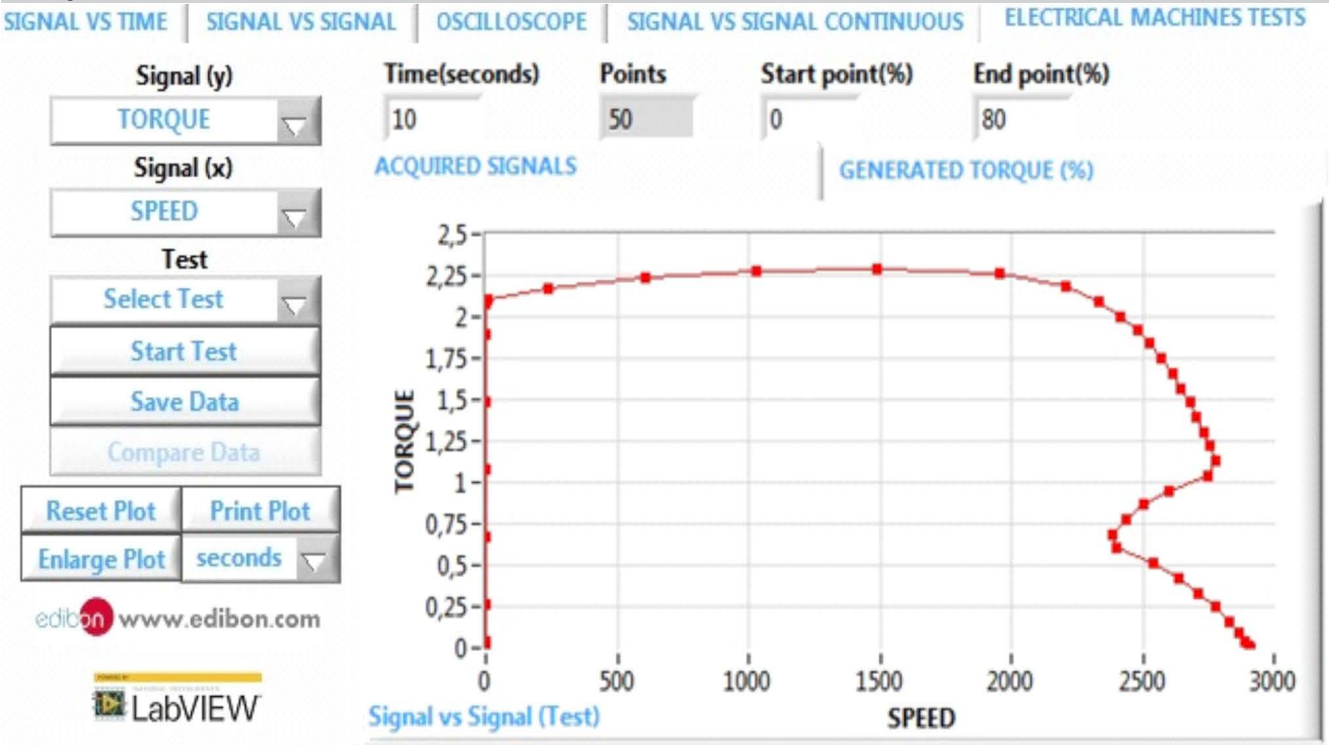
⑨ **End point.** It allows selecting (as a percentage) the end point of the test to be fulfilled.

Some **real** results obtained from this unit with the software **EM-SCADA** (recommended)

Obtained results for the automatic braking test with the three-phase asynchronous squirrel cage motor with delta connection, from 0 to 100% and linear braking ramp. Notice that the motor nominal speed and the maximum torque can be seen, as well as the motor complete braking.

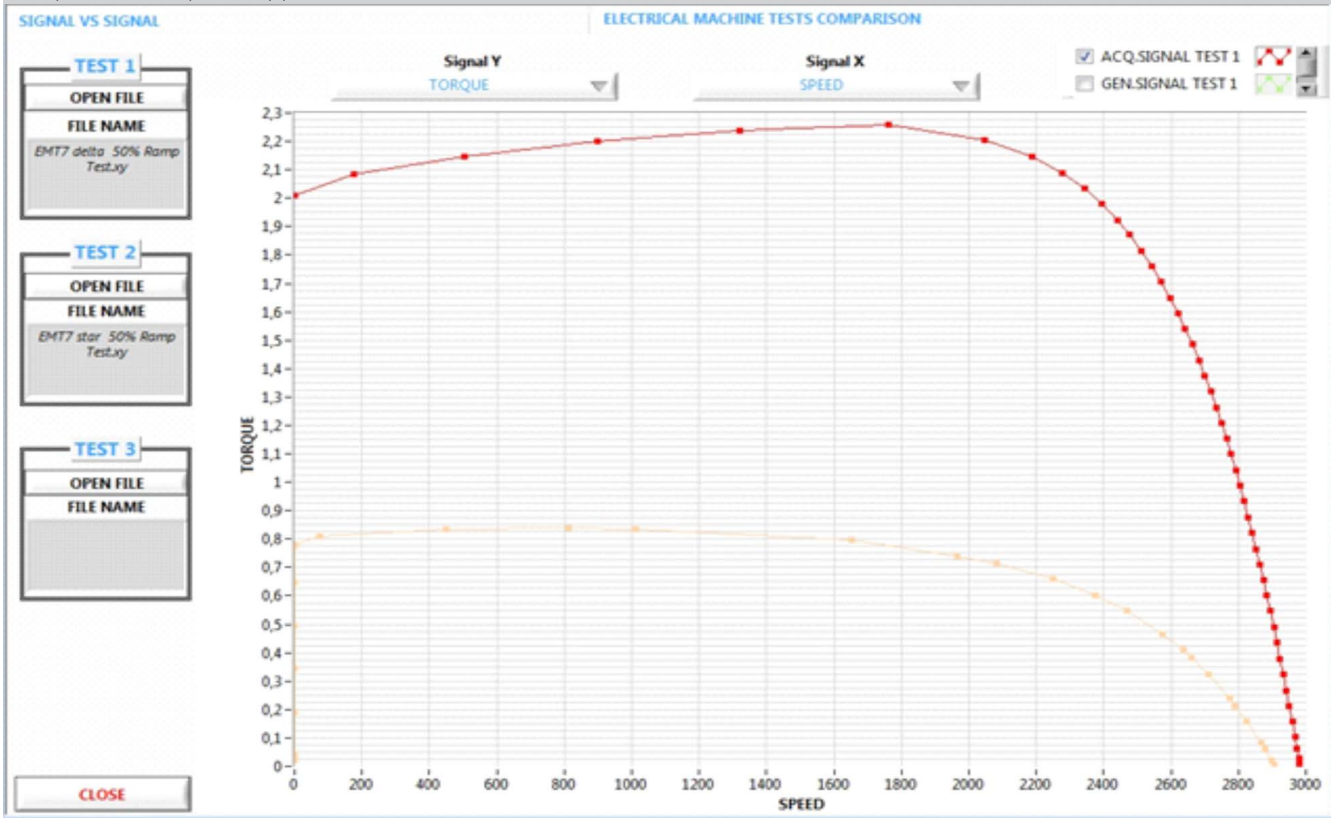


Obtained results for the automatic braking test with the three-phase asynchronous squirrel cage motor, with star-delta starting, from 0 to 80% and linear braking ramp. Notice that the condenser operating point condenser can be appreciated, as well as the motor nominal speed and its complete braking.

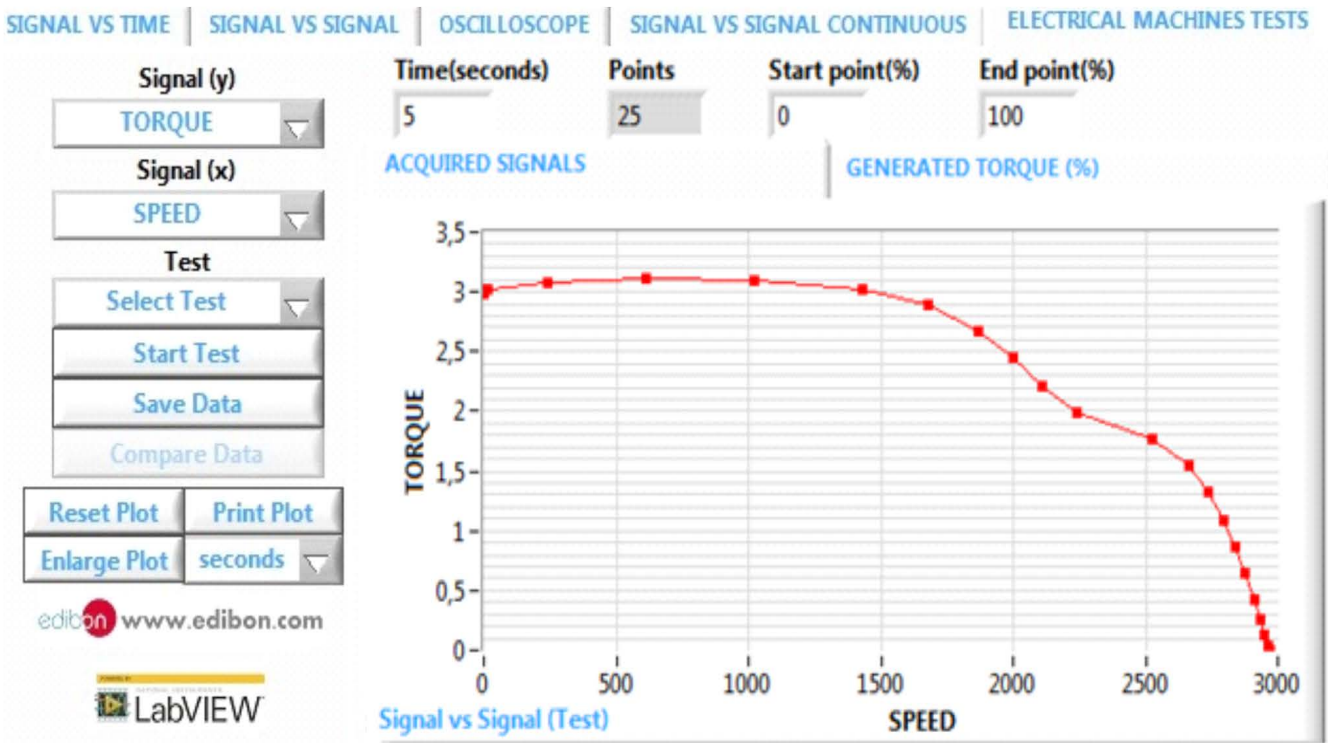


Some **real** results obtained from this unit with the software **EM-SCADA** (recommended)

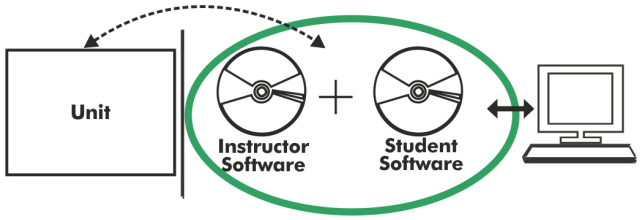
Comparison of two previously performed and stored tests.



Obtained results for the automatic braking test with the single-phase asynchronous motor with starting and running capacitor, from 0 to 100% and linear braking ramp. Notice the capacitor operating point and the effects on the machine parameters can be appreciated, as well as the motor nominal speed and its complete braking.



AEL-SERIN/CA-1KW/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.

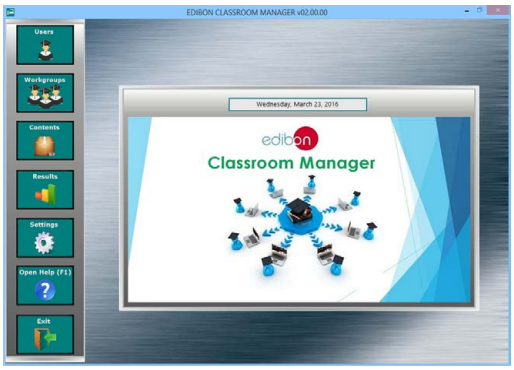
Instructor Software

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

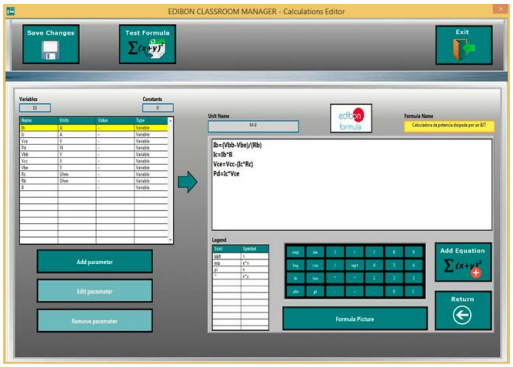
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

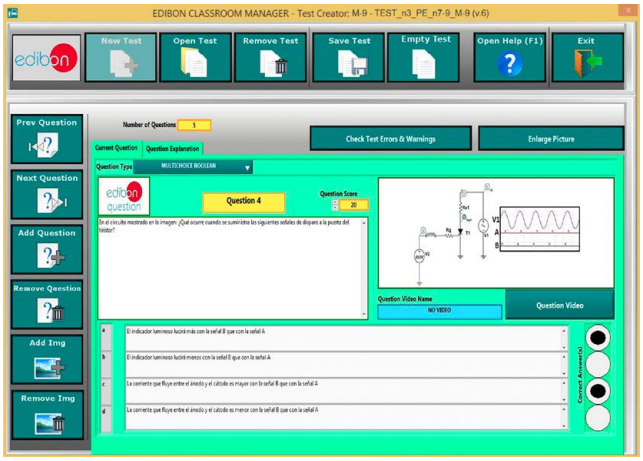
- **User Data Base Management.**
- **Administration and assignment of Workgroup, Task and Training sessions.**
- **Creation and Integration of Practical Exercises and Multimedia Resources.**
- **Custom Design of Evaluation Methods.**
- **Creation and assignment of Formulas & Equations.**
- **Equation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



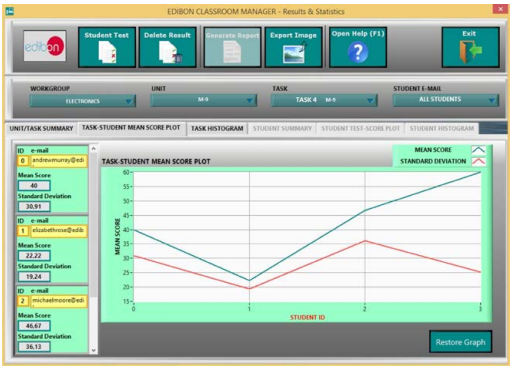
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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.

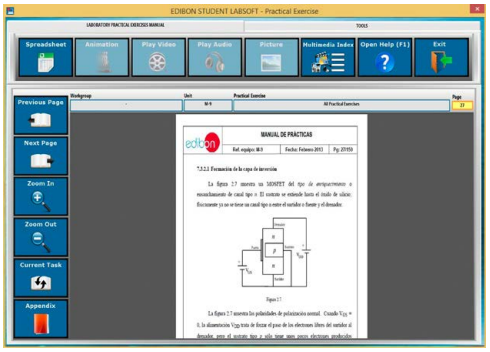
Innovative features:

- **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.**

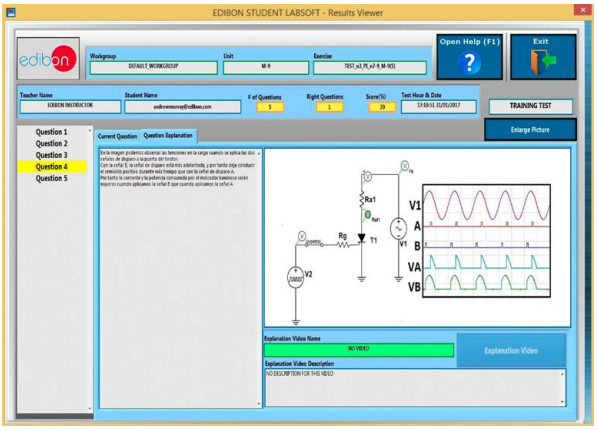
For more information see **ICAI** catalogue. Click on the following link:

www.edibon.com/en/interactive-computer-aided-instruction-software

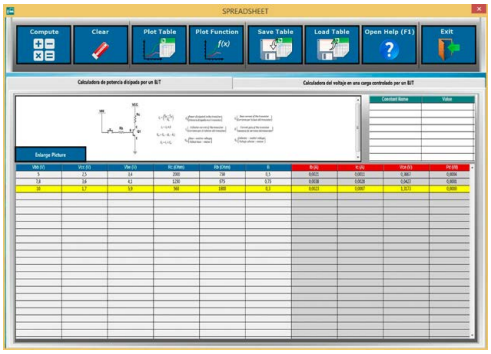
ESL-SOF. EDIBON Student LabSoft (Student Software) Application Main Screen



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.

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

Edition: ED01/24
Date: February/2024

REPRESENTATIVE: