



Unit: SMI-UB. Industrial Servomotor Base Unit

### Additional applications for working with the SMI-UB unit:



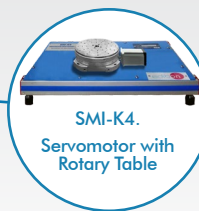
SMI-K1.  
Servomotor with  
Adjustable Brake



SMI-K2.  
Servomotor with  
Linear Axis



SMI-K3.  
Servomotor with  
Conveyor Belt



SMI-K4.  
Servomotor with  
Rotary Table



SMI-K5.  
Servomotor with  
Machine Press

## INTRODUCTION

Motion technology plays an important role in the industry, representing one of the main branches of automation. This technology has applications from the most basic industrial processes, such as the simple positioning systems, to the most complex systems, such as those related to robotics or aerospace engineering.

One of the most important systems in the motion technology is the servomotor control system. The servomotor control systems are designed to control the position, speed and torque of an automatic system with motion. This functionality allows the fully automatic operation of tools, machinery, transport systems, handling systems etc., obtaining precise and efficient operations.

The Servomotor Industrial Application, "AE-SMI", has been designed by EDIBON to study the servomotor control system with a real application. The "AE-SMI" unit has available a wide range of applications that contain real industrial systems, such as an automatic rotary table, a conveyor system or a machine press. The "AE-SMI" application can also work with a PLC unit, allowing the addition of a PLC control to a servomotor control system.



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

## GENERAL DESCRIPTION

The Servomotor Industrial Application, "AE-SMI", is designed to perform up to seven controls used in motion technology: position control, speed control, torque control, position and speed control, speed and torque control and the full-closed control (position, speed and torque control at the same time). The "AE-SMI" application allows the student to configure all the parameters involved in these controls, such as to adjust the PID control parameters, perform an auto-tuning of the control parameters, adjust the torque limit, adjust the speed limit, set the type of input control signal, configure alarms, set the home position, acceleration and deceleration of the system when it approaches the desired position, speed or torque point and a long etc.

The "AE-SMI" is a computerized system. The computer is used to configure and monitor the response and state of the servomotor control system, allowing the visualization of the current position, speed and torque value in a customizable time-dependent chart, the state of the digital and analog input and output signals, the type of chosen control, etc.

The "SMI-UB" is the base unit of the "AE-SMI", and there is a wide range of additional applications available, being at least one of them required to work with the "SMI-UB". The additional applications available are real examples of the industry systems: servomotor with adjustable brake, servomotor in a linear axis system, servomotor in a conveyor belt system, servomotor in a rotary table system and servomotor in a machine press.

The "SMI-UB" also allows the student to work with a programmable logic controller, PLC. The PLC receives the signals of the different sensors installed in each additional application and controls the servo system through digital and pulsed signals, allowing the addition of a PLC control to a servomotor system.

The elements included in the "SMI-UB" unit:

- N-ALI02. Domestic Main Power Supply Module.
- N-SMI-DRV. Servomotor Driver.
- N-MD-MT. Motor Driver Test Module.

Required element to operate with the "SMI-UB" unit:

- AEL-PC. Touch screen and computer or PC. PC to work with the equipment.

At least one of the following elements is required to work with the "SMI-UB" unit:

- SMI-K1. Industrial Servomotor with Adjustable Brake.
- SMI-K2. Industrial Servomotor with Linear Axis.
- SMI-K3. Industrial Servomotor with Conveyor Belt.
- SMI-K4. Industrial Servomotor with Rotary Table.
- SMI-K5. Industrial Servomotor with Machine Press.

Recommended elements to increase the functionality of the "SMI-UB" unit:

- AE-PLC-PAN-UB. PANASONIC PLC Base Unit.
- AE-PLC-SIE-UB. SIEMENS PLC Base Unit.
- AE-PLC-OMR-UB. OMRON PLC Base Unit.
- AE-PLC-MIT-UB. MITSUBISHI PLC Base Unit.
- AE-PLC-AB-UB. ALLEN BRADLEY PLC Base Unit.
- AE-PLC-SCH-UB. SCHNEIDER PLC Base Unit

**SMI-UB. Industrial Servomotor Base Unit**, is composed by the following modules:

- **N-ALI02. Domestic Main Power Supply Module.**

Supply voltage (Single-Phase): 220 VAC, PH+N+G.

ON-OFF removable key.

Output Voltage Connections:

Two Single-Phase: 220 VAC.

Single-Phase supply wire connecting plug.

Differential magnetothermal, 2 poles, 25A, 30mA AC 6KA.



N-ALI02

- **N-SMI-DRV. Servomotor Driver.**

Supply voltage (Single-Phase): 220 VAC PH+N+G.

Power output: 400 W.

USB connector to PC.

Low electromagnetic interference.

IGBT technology with PWM sinusoidal signal control.

High-resolution encoder with a resolution of 23 bits: 8388608 pulses per revolution.

Digital signals:

Six Multipurpose digital inputs: the signal association and the functions are configured with the software.

Each digital input channel has a green LED that indicates its state.

Ten Multipurpose digital outputs: the signal association and the functions are configured with the software. Each digital output channel has a green LED that indicates its state.

Two pulse digital inputs:

The digital inputs are inserted to adjust different available functions (speed value, torque value, position, etc.).

Very fast frequency response: up to 3.2 kHz bandwidth.

Six Pulse digital outputs from the encoder:

The encoder generated six signals that are available at the front panel to be tested.

The signals are two pairs for the channel A and B and their inverted signals (CH A, CH B, inverted CH A and inverted CH B). And one pair signals for the index and its inverted signal (CH Z and inverted CH Z).

Analog signals:

One analog input with a very high resolution ADC (16-bits), with a voltage range from 0V to 10V.

Two analog inputs with high resolution ADC (12-bits), with a voltage range from 0V to 10V.

Two analog outputs, with a voltage range from 0V to 10V.

Seven Different servomotor controls:

Position control.

Speed control.

Torque control.

Position control with speed control.

Position control with torque control.

Speed control with torque control.

Full-closed control (position, speed and torque control).



N-SMI-DRV

## Specifications

### • N-MD-MT. Motor Driver Test Module.

Supply voltage (Single-Phase): 220 VAC PH+N+G.

Ten Digital Signal Generators:

Five Switches.

Five Push buttons.

Every output has attached a green LED.

Output voltage levels of 0 VDC and 24 VDC.

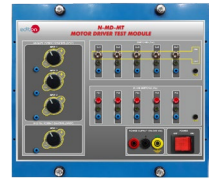
One Pulse Signal Generator:

One Encoder to generate a pulsed signal.

Three Analog Signal Generators:

Three Potentiometers.

Output voltage range from 0 V to +10 V.



N-MD-MT

### **SMI-UB/CCSOF. Computer Control+Data Acquisition+Data Management Software.**

Compatible with actual Windows operating systems.

The servomotor driver is connected to the PC with USB port .

Complete and industry level servomotor control software, but user-friendly and time-saving commissioning software.

It allows two types of functions:

Servomotor driver setting and commissioning:

Setting the servomotor control mode: position control, speed control, torque control, position control with speed control, position control with torque control, speed control with torque control and full-closed control (position, speed and torque control).

Setting the control adjustment: auto-tuning, manual control parameters adjustment, absolute encoder setup, zero position of the encoder, etc.

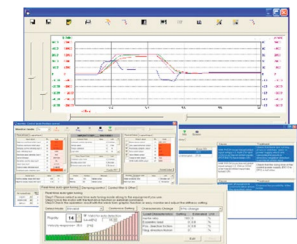
Setting the input control signal type: pulse signal, analog signal, etc.

Setting an internal logic, setting the signal display on the PC screen and setting the signals of the digital and analog outputs.

Monitoring and analysis:

The software displays a time-dependent chart with all relevant signals related to the servomotor to perform a complete analysis of the entire system: current system position, current servomotor speed, current servomotor torque, tracking error, system set point (position value, speed value or torque value), system configured limits (if there is a torque or speed limit configured) and analysis of the frequency characteristics of the servomotor (Bode diagram). The software also saves data for a later analysis.

It also shows the configured alarms status, the digital and analog input and output status, the control mode status, etc.



SMI-UB/CCSOF

**Additional applications for working with the SMI-UB unit:**

• **SMI-K1. Servomotor with Adjustable Brake.**

The Servomotor with Adjustable Brake, “SMI-K1”, contains the servomotor with an adjustable brake system to configure different loads (measuring the braking force with a dynamometer) and perform the position, speed and torque control under different circumstances. The servomotor also includes a position indicator to show the current position of the shaft.



SMI-K1

Specifications:

Servomotor:

- Nominal power: 400 W.
- Nominal torque: 1.27 Nm.
- Nominal speed: 3000 rpm.
- Maximum speed: 6000 rpm.
- Encoder: 23 bits used as absolute or incremental encoder.
- Low inertia servomotor.
- Oil seal with triple lip.
- Holding brake.
- Position indicator disc attached to the motor shaft.

Adjustable brake:

- Different configurable braking values.
- Analog dynamometer.

Dimensions: 450 x 300 x 150 mm. approx. (17.71 x 11.81 x 5.90 inches approx.).

Weight: 12 Kg approx. (26 pounds approx.).

• **SMI-K2. Servomotor with Linear Axis.**

The Servomotor with Linear Axis, “SMI-K2”, contains the servomotor attached to a linear axis system. The “SMI-K2” unit contains different loads to be attached to the carriage plate of the linear axis to perform the position, speed and torque control of a linear axis system under different circumstances. The linear axis also contains different position sensors to detect the current position of the linear axis system.



SMI-K2

Specifications:

Servomotor:

- Nominal power: 400 W.
- Nominal torque: 1.27 Nm.
- Nominal speed: 3000 rpm.
- Maximum speed: 6000 rpm.
- Encoder: 23 bits used as absolute or incremental encoder.
- Low inertia servomotor.
- Oil seal with triple lip.

Linear axis:

- Linear axis length: 1000 mm.
- Linear axis carriage: 100 mm.
- Four position sensors with 24 VDC power supply.
- Transmission system: toothed belt.

Dimensions: 1100 x 300 x 200 mm approx. (43.30 x 11.81 x 7.87 inches approx.).

Weight: 18 Kg approx. (39 pounds approx.).

**Additional applications for working with the SMI-UB unit:** (continuation)• SMI-K3. **Servomotor with Conveyor Belt.**

The Servomotor with Conveyor Belt, "SMI-K3", contains the servomotor attached to a linear conveyor belt system. The "SMI-K3" unit contains different pieces with different weights to be placed on the conveyor belt to perform the position, speed and torque control of a conveyor belt system under different circumstances. The conveyor belt also contains different position sensors to detect the current position of the pieces placed on the conveyor belt.



SMI-K3

Specifications:

Servomotor:

Nominal power: 400 W.

Nominal torque: 1.27 Nm.

Nominal speed: 3000 rpm.

Maximum speed: 6000 rpm.

Encoder: 23 bits used as absolute or incremental encoder.

Low inertia servomotor.

Oil seal with triple lip.

Conveyor belt:

Conveyor belt length: 1000 mm.

Three position sensors with 24 VDC power supply.

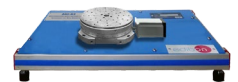
Transmission system: straight to the conveyor belt.

Dimensions: 1100 x 400 x 300 mm approx. (43.30 x 15.74 x 11.81 inches approx.).

Weight: 22 Kg approx. (48 pounds approx.).

• SMI-K4. **Servomotor with Rotary Table.**

The Servomotor with Rotary Table, "SMI-K4", contains the servomotor attached to a rotary table system. The "SMI-K4" unit contains different pieces with different weights to be placed on the rotary table to perform the position, speed and torque control of a rotary system under different circumstances. The rotary table also contains different position sensors to detect the current position of the table.



SMI-K4

Specifications:

Servomotor:

Nominal power: 400 W.

Nominal torque: 1.27 Nm.

Nominal speed: 3000 rpm.

Maximum speed: 6000 rpm.

Encoder: 23 bits used as absolute or incremental encoder.

Low inertia servomotor.

Oil seal with triple lip.

Rotary table:

Number of positions of the rotary table: 6 positions.

Two position sensors with 24 VDC power supply.

One inductive sensor with 24 VDC power supply.

Dimensions: 300 x 300 x 200 mm approx. (11.81 x 11.81 x 7.87 inches approx.).

Weight: 10 Kg approx. (22 pounds approx.).

**Additional applications for working with the SMI-UB unit:** (continuation)• SMI-K5. **Servomotor with Machine Press:**

The Servomotor with Machine Press, "SMI-K5", contains the servomotor attached to a Machine Press system. The "SMI-K5" unit contains a rubber piece to perform a real pressing process and it allows to perform the position, speed and torque control of a pressing process under different circumstances. The pressing machine also contains different position sensors to detect the current position of the pressing punch.



SMI-K5

## Specifications:

## Servomotor:

Nominal power: 400 W.

Nominal torque: 1.27 Nm.

Nominal speed: 3000 rpm.

Maximum speed: 6000 rpm.

Encoder: 23 bits used as absolute or incremental encoder.

Low inertia servomotor.

Oil seal with triple lip.

## Linear axis:

Linear axis length: 500 mm.

Three position sensors with 24 VDC power supply.

Transmission system: toothed belt.

Dimensions: 300 x 300 x 500 mm approx. (11.81 x 11.81 x 19.68 inches approx.).

Weight: 30 Kg approx. (66 pounds approx.).

**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

### Exercises and practical possibilities to be done with the SMI-K1, Industrial Servomotor with Adjustable brake:

- 1.- Servomotor Start/Stop operation.
- 2.- Angular position control of a free shaft.
- 3.- Configuration of reference position. Homing.
- 4.- Move the shaft to an absolute positions.
- 5.- Move the shaft to a relative positions.
- 6.- Shaft continuous rotation movements through an analog input.
- 7.- Change direction of rotation of the shaft.
- 8.- Rotation speed control.
- 9.- Rotation speed control through an analog input.
- 10.- Change of speed during a movement.
- 11.- Torque control.
- 12.- Study of torque control using different brake levels.
- 13.- Configuration of a sequence of movements.
- 14.- Analysis of the position, speed and torque graphs.

### Exercises and practical possibilities to be done with the SMI-K2, Industrial Servomotor with Linear Axis:

- 15.- Servomotor Start/Stop operation.
- 16.- Study of sensors on the linear axis system.
- 17.- Movement control in function of limit switches and transducers signals.
- 18.- Position control of the linear actuator.
- 19.- Configuration of reference position. Homing.
- 20.- Calibration of minimum and maximum point of linear actuator career.
- 21.- Move the carriage to an absolute position.
- 22.- Move the carriage to a relative positions.
- 23.- Carriage continuous movement through an analog input.
- 24.- Change direction of displacement of the linear actuator.
- 25.- Speed control of the linear actuator.
- 26.- Speed control of the linear actuator through an analog input.
- 27.- Change of speed during a movement.
- 28.- Acceleration and deceleration control for approaching points.
- 29.- Torque control of the linear actuator.
- 30.- Study of torque control using different loads.
- 31.- Configuration of a sequence of movements in the linear axis system.
- 32.- Analysis of the position, speed and torque graphs.

### Exercises and practical possibilities to be done with the SMI-K3, Industrial Servomotor with Conveyor Belt:

- 33.- Servomotor Start/Stop operation.
- 34.- Study of sensors on the conveyor belt system.
- 35.- Position control of the conveyor belt.
- 36.- Configuration of the reference position; Homing.
- 37.- Calibration of the minimum and the maximum point of the conveyor belt career.
- 38.- Move the conveyor belt to an absolute positions.
- 39.- Move the conveyor belt to a relative positions.
- 40.- Change direction of movement of the conveyor belt.
- 41.- Conveyor belt continuous movement through an analog input.
- 42.- Repetition of movements at defined positions.
- 43.- Speed control of the conveyor belt.
- 44.- Speed control of the conveyor belt through an analog input.
- 45.- Change of speed during a movement.

- 46.- Acceleration and deceleration control for approaching points.
- 47.- Torque control of the conveyor belt.
- 48.- Study of torque control using different loads.
- 49.- Configuration of a sequence of movements in the conveyor belt system.
- 50.- Analysis of the position, speed and torque graphs.

### Exercises and practical possibilities to be done with the SMI-K4, Industrial Servomotor with Rotary Table:

- 51.- Servomotor Start/Stop operation.
- 52.- Study of sensors on the rotary table system.
- 53.- Position control of the rotary table.
- 54.- Configuration of reference position. Homing.
- 55.- Calibration of the different positions of a rotary table.
- 56.- Move the rotary table to an absolute position.
- 57.- Move the rotary table to a relative position.
- 58.- Rotary table continuous rotation through an analog input.
- 59.- Change direction of rotation of the rotary table.
- 60.- Speed control of the rotary table.
- 61.- Speed control of the rotary table through an analog input.
- 62.- Change of speed during a movement.
- 63.- Acceleration and deceleration control for approaching points.
- 64.- Torque control of the rotary table.
- 65.- Study of torque control using different loads.
- 66.- Configuration of a sequence of movements in the rotary table system.
- 67.- Analysis of the position, speed and torque graphs.

### Exercises and practical possibilities to be done with the SMI-K5, Industrial Servomotor with Machine Press:

- 68.- Servomotor Start/Stop operation.
  - 69.- Study of sensors on the machine press.
  - 70.- Position control of the machine press.
  - 71.- Configuration of reference position. Homing.
  - 72.- Calibration of minimum and maximum desired position of the career of the machine press.
  - 73.- Move the punch of the machine press to an absolute position.
  - 74.- Move the punch of the machine press to a relative position.
  - 75.- Speed control of advance and retreat movements.
  - 76.- Acceleration and deceleration control for approaching points.
  - 77.- Torque control of the machine press.
  - 78.- Study of torque control using different pressing forces.
  - 79.- Configuration of a sequence of movements in the machine press.
  - 80.- Analysis of the position, speed and torque graphs.
- Several other exercises can be done and designed by the user.



## REQUIRED SERVICES

- Electrical supply: single-phase 200 VAC – 240 VAC/50 Hz or 110 VAC – 127 VAC/60 Hz.

## DIMENSIONS AND WEIGHTS

- SMI-UB:
- Dimensions: 640 x 320 x 670 mm approx.  
(25.19 x 12.59 x 26.37 inches approx.)
  - Weight: 20 Kg approx.  
(44 pounds approx.)

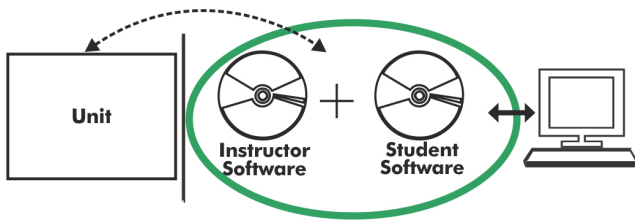
## ADDITIONAL APPLICATIONS (Not included)

- SMI-K1. Industrial Servomotor with Adjustable Brake.
- SMI-K2. Industrial Servomotor with Linear Axis.
- SMI-K3. Industrial Servomotor with Conveyor Belt.
- SMI-K4. Industrial Servomotor with Rotary Table.
- SMI-K5. Industrial Servomotor with Machine Press.
- AE-PLC-PAN. PANASONIC PLC Application.
- AE-PLC-SIE. SIEMENS PLC Application.
- AE-PLC-OMR. OMRON PLC Application.
- AE-PLC-MIT. MITSUBISHI PLC Application.
- AE-PLC-AB. ALLEN BRADLEY PLC Application.
- AE-PLC-SCH. SCHNEIDER PLC Application.

## SIMILAR UNITS AVAILABLE

- Offered in this catalogue:
- AE-SMI. Servomotors Industrial Application.
- Offered in other catalogue:
- AE-BMI. Brushless Motors Industrial Application.
  - AEL-SERIN/CA-1KW. 1 kW AC Industrial Servomotor Application.
  - SERIN/CC. Computer Controlled Advanced Industrial Servosystem Unit (for DC Motors).
  - SERIN/CCB. Servosystems Basic Trainer (for DC Motors).
  - SERIN/CA. Computer Controlled Advanced Industrial Servosystems Unit (for AC Motors).

**AE-SMI/ICAI. Interactive Computer Aided Instruction Software System:**



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.

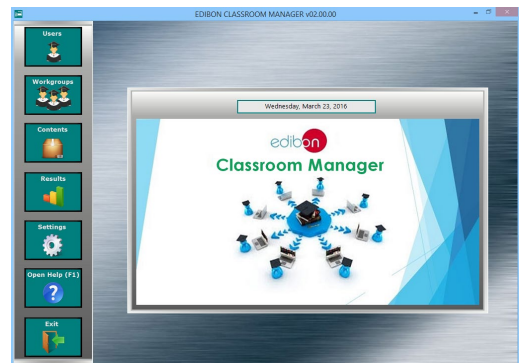
Instructor Software

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

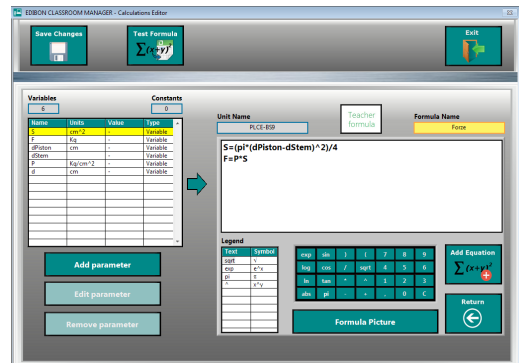
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual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

Innovative features:

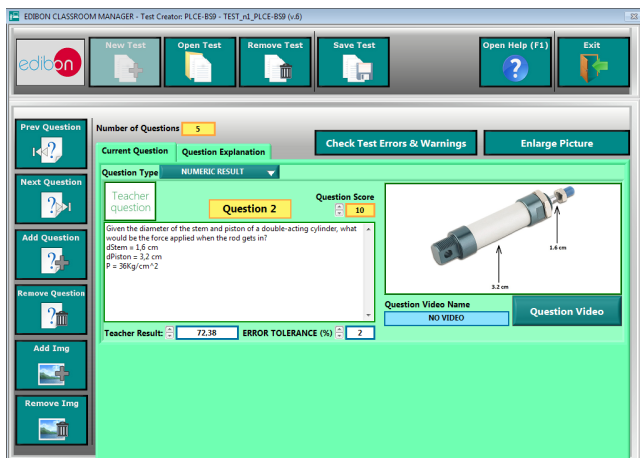
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.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



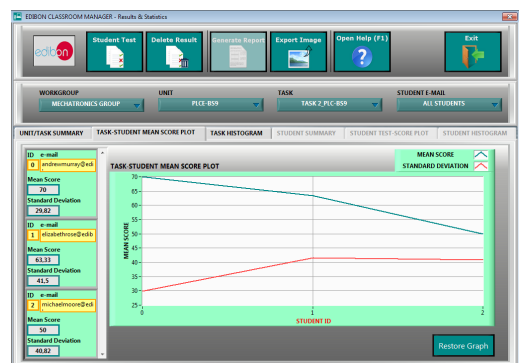
ECM-SOF. EDIBON Classroom Manager (Instructor Software) Application Main Screen



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.

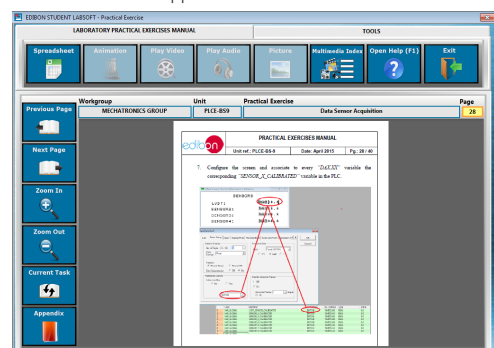
Innovative features:

- 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.

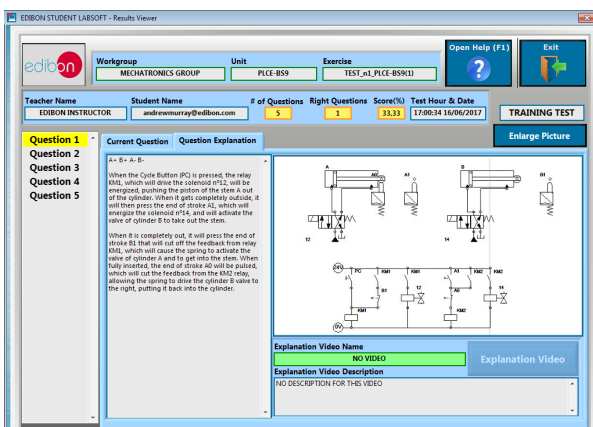
For more information see ICAI catalogue. Click on the following link:  
[www.edibon.com/en/interactive-computer-aided-instruction-software](http://www.edibon.com/en/interactive-computer-aided-instruction-software)



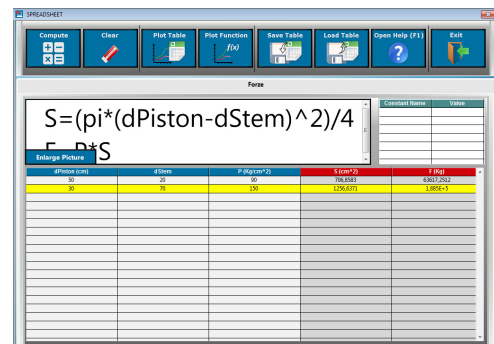
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



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:

