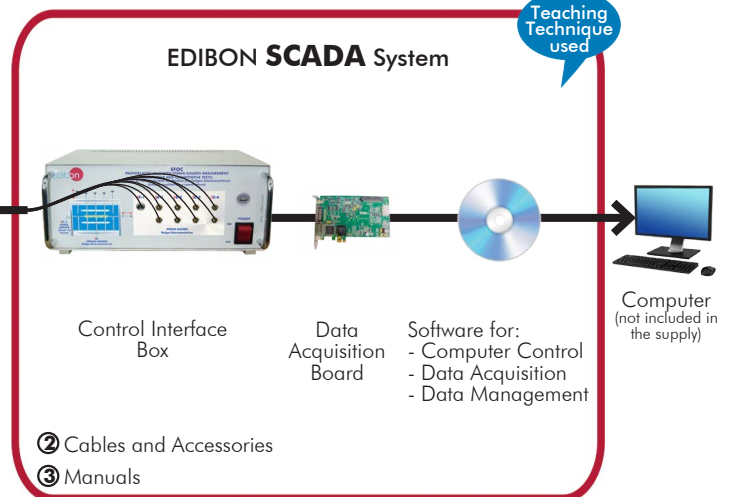


① Unit: EFOC. Computer Controlled Photoelasticity Unit



\* Minimum supply always includes: 1 + 2 + 3 (Computer not included in the supply)

### Key features:

- **Advanced Real-Time SCADA.**
- **Open Control + Multicontrol + Real-Time Control.**
- **Specialized EDIBON Control Software based on LabVIEW.**
- **National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**
- **Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**
- **Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**
- **Capable of doing applied research, real industrial simulation, training courses, etc.**
- **Remote operation and control by the user and remote control for EDIBON technical support, are always included.**
- **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- **Designed and manufactured under several quality standards.**
- **Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.**
- **This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

**OPEN CONTROL  
+  
MULTICONTROL  
+  
REAL TIME CONTROL**



**www.edibon.com**

PRODUCTS  
↳ 7.- MECHANICS  
AND  
14.-BIOMEDICAL  
ENGINEERING

For more information about Key Features, click here



Certificate of Approval of the  
Quality Management System



European Union Certificate  
(total safety)



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



Certificate of Approval of the  
Environmental Management System



Worlddidac Association  
Certificate of Membership

## INTRODUCTION

Photoelasticity is the method of analysing and recording mechanical stresses and strains in components.

The components used are test specimens or models made of transparent special material which becomes optically double-refractive under mechanical loading.

Using polarised light, the distribution of stress in test specimens is investigated.

The polarisation filters represent the distribution of stress in colours.

By using white or monochromatic light and different configuration of linear and circular polarizer / analyzer we can obtain the principal stresses direction and the principal stresses difference.

By using strain gauges we can measure the stress in a certain position and in one direction. With photoelasticity we can observe the value in the whole element and in all directions.

## GENERAL DESCRIPTION

Unit for photoelasticity practices, illustrating the subjects of the photoelasticity theory, the elasticity theory, strength of materials, and structure theory.

It is very suitable for the introduction and study of photoelasticity: optical elements, isochromatic, isoclinic, band order, band factor, edge tensioning, and for strain and stress analysis and measurement with strain gauges.

With the aid of the SCADA system it is possible to analyze and process the captured data during test experiments, making measurements with strain gauges.

Using this unit photoelastic experiments and practices of transparent test specimens (models) may be performed.

The different test specimens are subjected to loading by external forces and have polarised light shone through them.

A load application element can apply tensile, bending, compressive, and distributed and punctual loads to the specimen.

The stresses and strains occurring in the test specimen are represented as bright spots or figures of different colours, and we can visualise the distribution of stress.

We offer a wide range of test specimens for making a variety of practices and experiments.

These specimens show a full color and high contrast results and are also made of a special very hard material that avoids breaking during daily use.

The unit includes specimens with strain gauges and the accessories (electronic, mechanical and software) for acquiring all the values in the computer in real time and allows to compare the advantages of one method with the other.

It is also very useful for Young's module determination of the material and fringe order and band order calculation.

This Computer Controlled Unit is supplied with the EDIBON Computer Control System (SCADA), and includes: The unit itself + Computer Control, Data Acquisition and Data Management Software Packages, for controlling the process and all parameters involved in the process.

With this unit there are several options and possibilities:

- Main items: 1, 2 and 3.
- Optional items: 4, 5 and 6.

Let us describe first the main items (1 to 3):

### ① EFOC. Unit:

The "EFOC" unit includes the following items:

#### - EFOC Unit:

- Bench-top unit.
- Anodized aluminum frame and painted steel panels.
- Main metal elements made of stainless steel.
- Light source, two fluorescent tubes of 30 cm and 8 W.
- Monochromatic light 35 W.
- Opalescent diffuser plate.
- Double effect polarizing filters (linear polarization and circular polarization), of 30 x 30 cm and protected by methacrylate plates.
- Load frame with pulling jack.
- Ten pressure screws and accessories.

The "EFO" unit includes the following items:

- EFO-K1. Kit of Static Test Specimens (Basic kit), formed by:
  - Nº3. Stepped Rectangular Specimen.
  - Nº4. Compact Circular Specimen.
  - Nº5. Circular with Orifice Specimen.
  - Nº9. Medium Rectangular Specimen.
  - Nº13. "C" Specimen Probe.
  - Nº14. Specimen with Arch Probe.
  - Nº17. Square with Diagonal Bar Specimen Probe.
- EFO-K3. Kit of Test Specimens with Strain Gauges (Basic kit), formed by:
  - Nº7-G. Trapezoidal Specimen with strain gauges + Nº7. Trapezoidal Specimen.
  - Nº8-G. Big Rectangular Specimen with strain gauges + Nº8. Big Rectangular Specimen.
  - Nº19-G. "T" Beam Specimen with strain gauges + Nº19. "T" Beam Specimen.
- EFOC/KIT. Photoelasticity Kit with Strain Gauges.
  - Load cell for direct force measurement.
  - Electronics, hardware and software for strain gauges measurement from PC, and direct force measurement applied to the specimens:

#### - Control Interface Box:

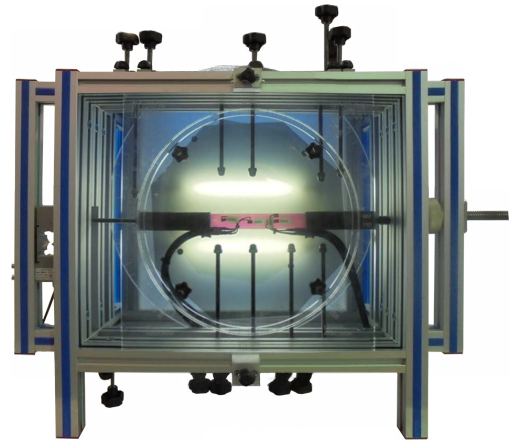
- Metallic box.
- Sensors connectors.
- Main switch.

#### - USB Data Acquisition Board:

- National Instruments High Speed Multifunction Data Acquisition Board (500kS/s).
- Signal Streaming technology through USB to ensure high speed and bidirectional data transfer.
- USB compatibility: USB2.0 Hi Speed (480Mbps/s) or full speed.
- Truly Plug & Play: the PC will automatically detect the new device and install the software.

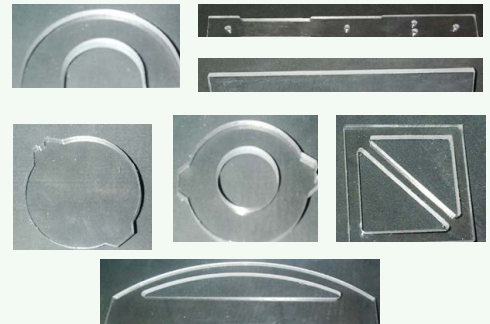
#### - Computer Control+Data Acquisition+Data Management Software:

- Compatible with actual Windows operating systems.
- Control and data acquisition in real time.
- Management, processing, comparison and storage of data.
- Main functions of the software:
  - Analysis and measurement of the strains.
  - Young 's module calculation.
  - Poisson 's ration calculation.
  - Measurement the force applied.
  - Analysis and measurement of stresses.
  - Register of the (experimental) practical exercises.
  - Calibration of sensors.



Unit: EFOC

#### Included elements



EFO-K1. Kit of Static Test Specimens (Basic kit)



EFO-K3. Kit of Test Specimens with Strain Gauges (Basic kit)



EFOC/KIT. Photoelasticity Kit with Strain Gauges

The complete unit includes as well:

**Advanced Real-Time SCADA.**

**Open Control + Multicontrol + Real-Time Control.**

**Specialized EDIBON Control Software based on LabVIEW.**

**National Instruments Data Acquisition board (250 KS/s, kilo samples per second).**

**Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.**

**Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.**

**Capable of doing applied research, real industrial simulation, training courses, etc.**

**Remote operation and control by the user and remote control for EDIBON technical support, are always included.**

**Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**

**Designed and manufactured under several quality standards.**

**Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.**

**This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.**

Additional recommended elements (Not included):

- EFO-K2. Kit of Static Test Specimens (Advanced kit), formed by:
  - Nº1. Big Irregular Specimen.
  - Nº2. Small Irregular Specimen.
  - Nº6. Notches Rectangular Specimen.
  - Nº7. Trapezoidal Specimen.
  - Nº8. Big Rectangular Specimen.
  - Nº10. Small Rectangular Specimen (2 units).
  - Nº11. "U" Specimen.
  - Nº12. Wide Rectangular Specimen.
  - Nº15. Triangular Specimen (2 units).
  - Nº16. Hollow Square Specimen.
  - Nº18. Square with Two Diagonal Bars Specimen.
  - Nº19. "T" Beam Specimen.
  - Nº20. Double "T" Beam Specimen.
  - Nº21. Rectangular with Hole Specimen.
- EFO-K4. Kit of Test Specimens with Strain Gauges (Advanced kit), formed by:
  - Nº9-G. Medium Rectangular Specimen with strain gauges + Nº9. Medium Rectangular Specimen.
  - Nº10-G. Small Rectangular Specimen with strain gauges + Nº10. Small Rectangular Specimen.
  - Nº11-G. "U" Specimen with strain gauges + Nº11. "U" Specimen.
  - Nº20-G. Double "T" Beam Specimen with strain gauges + Nº20. Double "T" Beam Specimen.
- EFO-K5. Kit of Articulated Structures, formed by:
  - Nº30. Articulated Structure 1.
  - Nº31. Articulated Structure 2.
  - Nº32. Articulated Structure 3.
- EFO-K6. Kit of Dynamic Panels, formed by:
  - Nº40. Dynamic Panel 1.
  - Nº41. Dynamic Panel 2.
- EFO-ICL. Accessory with Independent Circular and Linear Sheets.

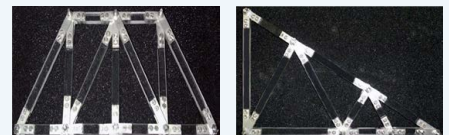
Examples some additional recommended elements



EFO-K2. Kit of Static Test Specimens (Advanced kit)



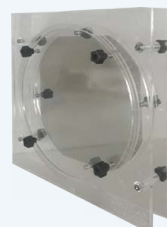
EFO-K4. Kit of Test Specimens with Strain Gauges (Advanced kit)



EFO-K5. Kit of Articulated Structures



EFO-K6. Kit of Dynamic Panels



EFO-ICL. Accessory with Independent Circular and Linear Sheets

## ② Cables and Accessories, for normal operation.

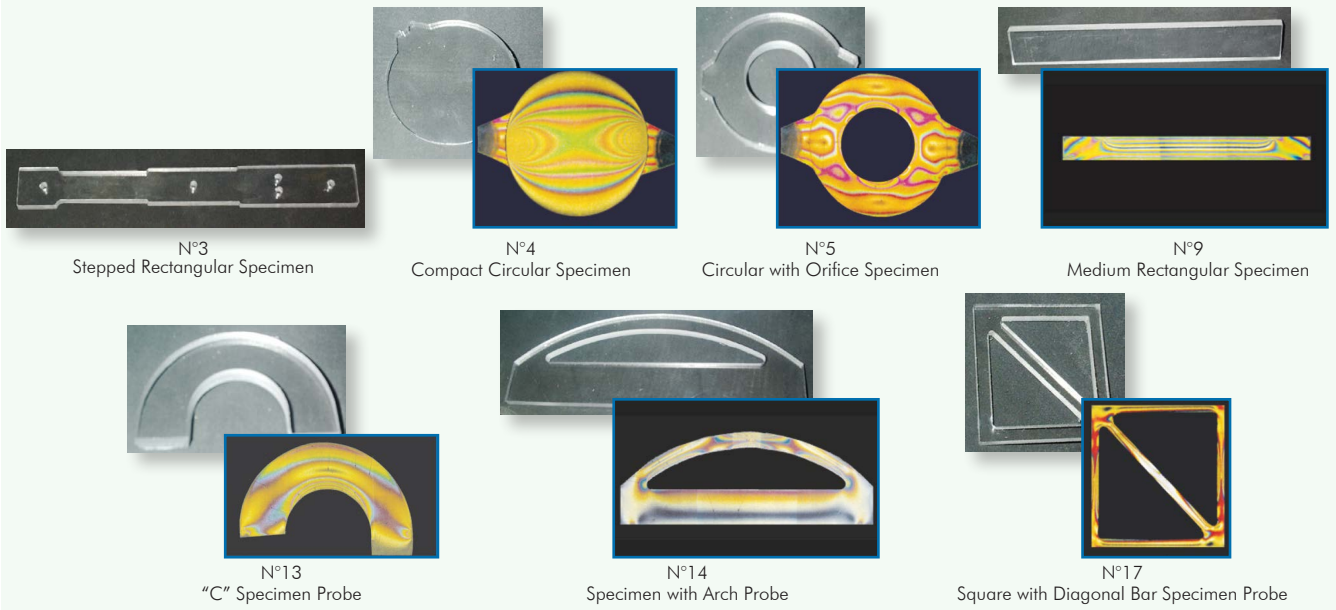
## ③ Manuals:

This unit is **supplied with 8 manuals**: Required services, Assembly and Installation, Control software, Starting-up, Safety, Maintenance, Calibration & Practices manuals.

\*References 1 to 3 are the main items: EFOC + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

## Included elements

### EFO-K1. Kit of Static Test Specimens (Basic kit). Always included with the EFO/EFOC/EFOV unit.



### EFO-K3. Kit of Test Specimens with Strain Gauges (Basic kit). Always included with the EFOC/EFOV Unit.



### EFOC/KIT. Photoelasticity Kit with Strain Gauges



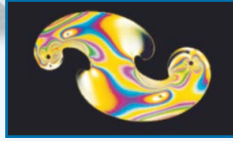
Control Interface Box + USB Data Acquisition Board



Computer Control + Data Acquisition + Data Management Software

Additional recommended element (Not included)

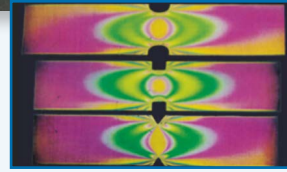
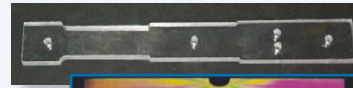
**EFO-K2. Kit of Static Test Specimens (Advanced kit).** Not included in the standard supply.



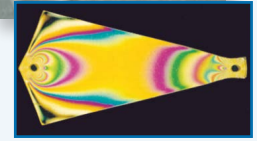
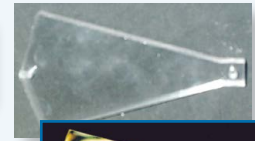
N°1  
Big Irregular Specimen



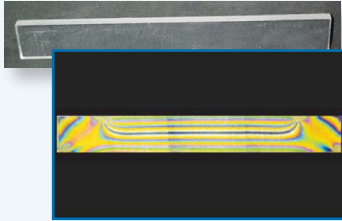
N°2  
Small Irregular Specimen



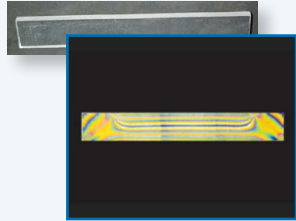
N°6  
Notches Rectangular Specimen



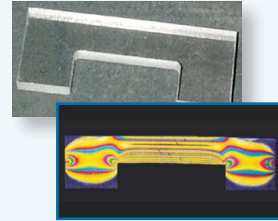
N°7  
Trapezoidal Specimen



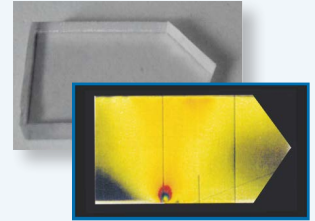
N°8  
Big Rectangular Specimen



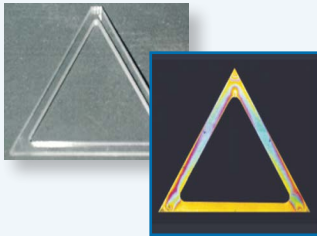
N°10  
Small Rectangular Specimen (2 units)



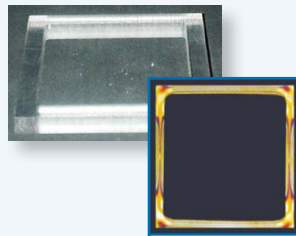
N°11  
"U" Specimen



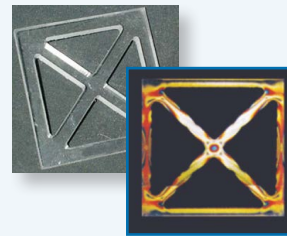
N°12  
Wide Rectangular Specimen



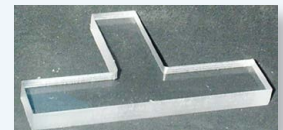
N°15  
Triangular Specimen (2 units)



N°16  
Hollow Square Specimen



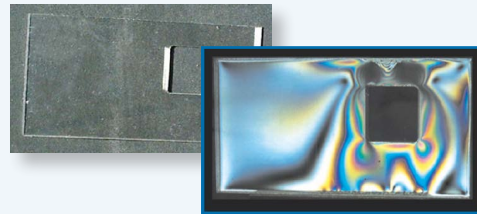
N°18  
Square with two Diagonal Bars Specimen



N°19  
"T" Beam Specimen



N°20  
Double "T" Beam Specimen



N°21  
Rectangular with Hole Specimen

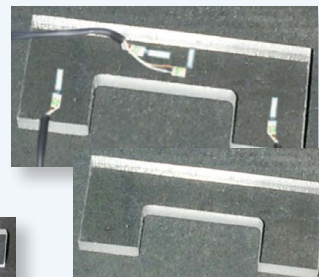
**EFO-K4. Kit of Test Specimens with Strain Gauges (Advanced kit).** Not included in the standard supply. Only to be used with the EFOC/EFOV.



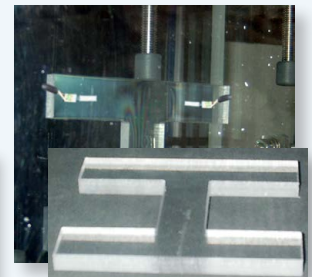
N°9-G.  
Medium Rectangular Specimen with strain gauges  
+  
N°9.  
Medium Rectangular Specimen



N°10-G.  
Small Rectangular Specimen with strain gauges  
+  
N°10.  
Small Rectangular Specimen



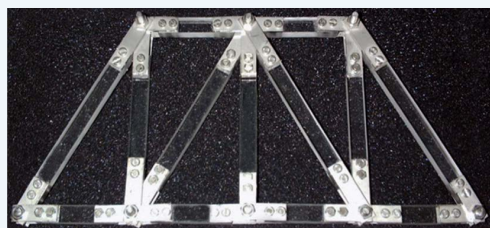
N°11-G.  
"U" Specimen with strain gauges  
+  
N°11.  
"U" Specimen



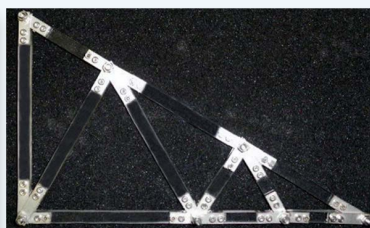
N°20-G.  
Double "T" Beam Specimen with strain gauges  
+  
N°20.  
Double "T" Beam Specimen

Additional recommended elements (Not included)

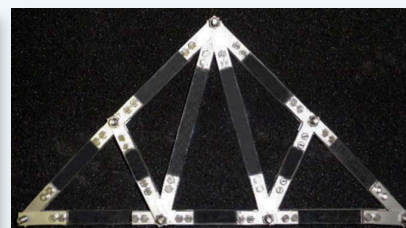
**EFO-K5. Kit of Articulated Structures.** Not included in the standard supply.



N°30  
Articulated Structure 1

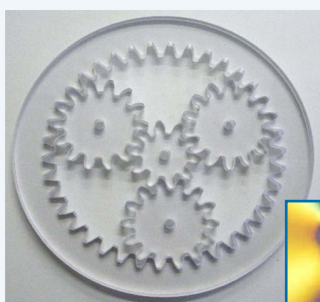


N°31  
Articulated Structure 2

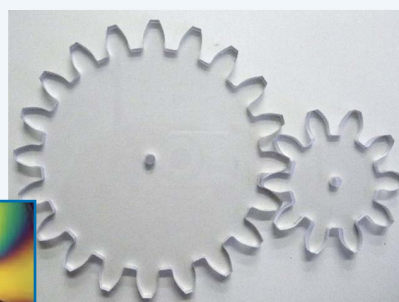
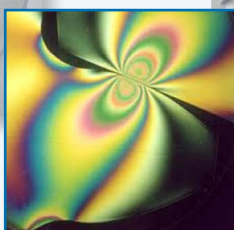


N°32  
Articulated Structure 3

**EFO-K6. Kit of Dynamic Panels.** Not included in the standard supply.

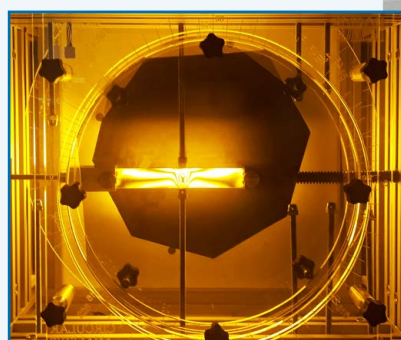
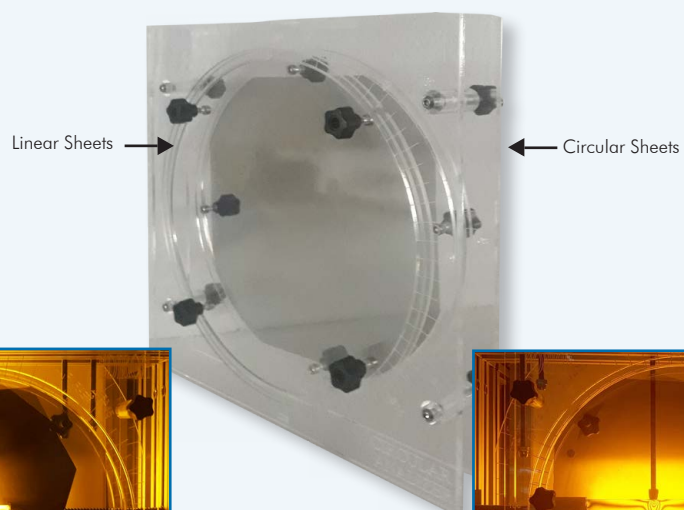


N°40  
Dynamic Panel 1

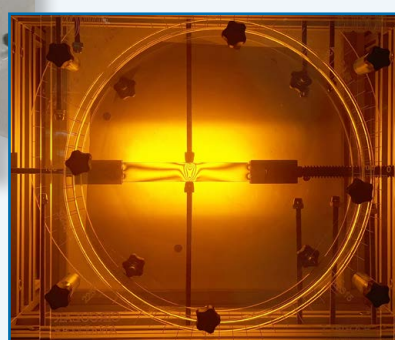


N°41  
Dynamic Panel 2

**EFO-ICL. Accessory with Independent Circular and Linear Sheets.** Not included in the standard supply.



Dark Field



Light Field

## EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

- 1.- Introduction to photoelasticity: optical elements, isochromatic, isoclinic, band order, band factor, edge tension sign, etc.
  - 2.- Determination of principal stress difference.
  - 3.- Isochromatics.
  - 4.- Illustration of the themes about elasticity, strength of materials and structures using photoelastic tests.
  - 5.- Pure traction/optical-tensional law.
  - 6.- Diametrically compressed disc.
  - 7.- Ring with diametrical compression traction.
  - 8.- Ring with diametrical compression.
  - 9.- Plate with circular drill with traction.
  - 10.- Comparison of the effects from different engravings in piece with traction.
  - 11.- Pure traction in a piece with section linearly variable.
  - 12.- Pure flexion.
  - 13.- Simple flexion.
  - 14.- Simple flexion, compound beams.
  - 15.- Compound flexion.
  - 16.- Compound central core of the section.
  - 17.- Piece with a great curvature subjected to flexion.
  - 18.- Arch built-in with a central charge.
  - 19.- Triangular structure.
  - 20.- Comparison of the structures.
  - 21.- Comparison of the effect of different notches.
  - 22.- Strain and stress analysis and measurements with strain gauges using computer.
  - 23.- Tardy compensation method (requires EFO-ICL).
- Other possibilities to be done with this unit:
- 24.- Many students view results simultaneously.  
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
  - 25.- Open Control, Multicontrol and Real Time Control.  
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
  - 26.- The Computer Control System with SCADA allows a real industrial simulation.
  - 27.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
  - 28.- This unit can be used for doing applied research.
  - 29.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
  - 30.- Visualization of all the sensors values used in the EFOC unit process.
- 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.
- Computer.

## DIMENSIONS AND WEIGHTS

### EFOC:

#### Unit:

- Dimensions: 750 x 400 x 550 mm approx.  
(29.53 x 15.75 x 21.65 inches approx.).
- Weight: 22 Kg approx.  
(48.5 pounds approx.).

#### Control Interface Box:

- Dimensions: 310 x 220 x 180 mm approx.  
(12.20 x 8.66 x 7.09 inches approx.).
- Weight: 3 Kg approx.  
(6.6 pounds approx.).

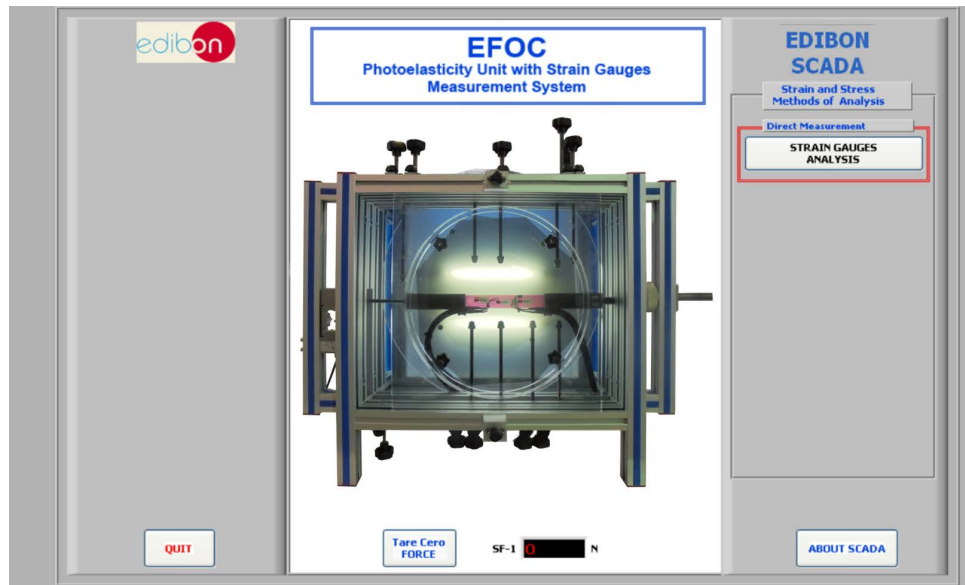
## ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- EFO-K2. Kit of Static Test Specimens (Advanced kit), formed by:
  - N°1. Big Irregular Specimen.
  - N°2. Small Irregular Specimen.
  - N°6. Notches Rectangular Specimen.
  - N°7. Trapezoidal Specimen.
  - N°8. Big Rectangular Specimen.
  - N°10. Small Rectangular Specimen (2 units).
  - N°11. "U" Specimen.
  - N°12. Wide Rectangular Specimen.
  - N°15. Triangular Specimen (2 units).
  - N°16. Hollow Square Specimen.
  - N°18. Square with Two Diagonal Bars Specimen.
  - N°19. "T" Beam Specimen.
  - N°20. Double "T" Beam Specimen.
  - N°21. Rectangular with Hole Specimen.
- EFO-K4. Kit of Test Specimens with Strain Gauges (Advanced kit), formed by:
  - N°9-G. Medium Rectangular Specimen with strain gauges + N°9. Medium Rectangular Specimen.
  - N°10-G. Small Rectangular Specimen with strain gauges + N°10. Small Rectangular Specimen.
  - N°11-G. "U" Specimen with strain gauges + N°11. "U" Specimen.
  - N°20-G. Double "T" Beam Specimen with strain gauges + N°20. Double "T" Beam Specimen.
- EFO-K5. Kit of Articulated Structures, formed by:
  - N°30. Articulated Structure 1.
  - N°31. Articulated Structure 2.
  - N°32. Articulated Structure 3.
- EFO-K6. Kit of Dynamic Panels, formed by:
  - N°40. Dynamic Panel 1.
  - N°41. Dynamic Panel 2.
- EFO-ICL. Accessory with Independent Circular and Linear Sheets.

## SIMILAR UNITS AVAILABLE

- EFOC. Computer Controlled Photoelasticity Unit.
  - Offered in this catalog:
  - Offered in other catalogs:
- EFO. Photoelasticity Unit.
- EFOV. Computer Controlled Photoelasticity Unit with Artificial Vision System.
- PSD. Photoelastic Stress Demonstration Unit.

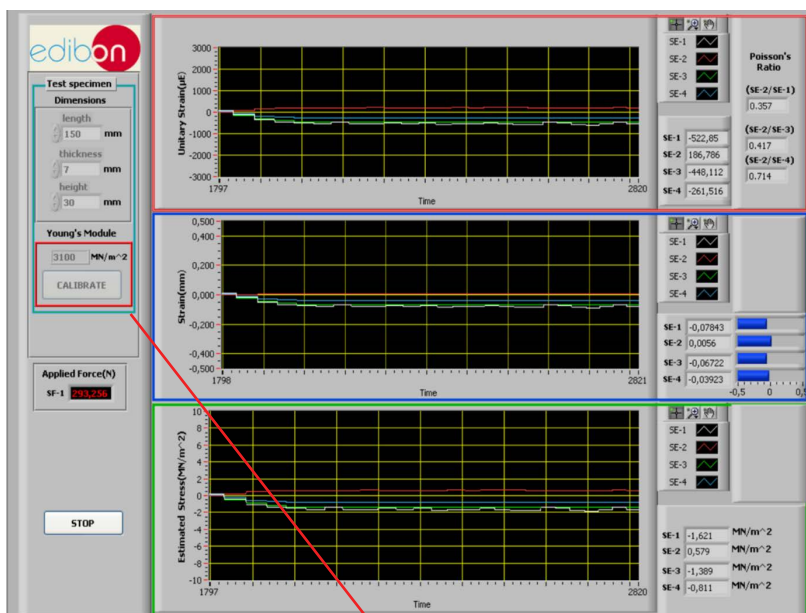
### SCADA Main screen



This is the main screen, where the different tasks that can be carried out with this unit are shown.

On the right-hand side of the screen, we find the button that controls the action to carry out on the deformation analysis measured with strain gauges.

### "Strain & Stress analysis" tool



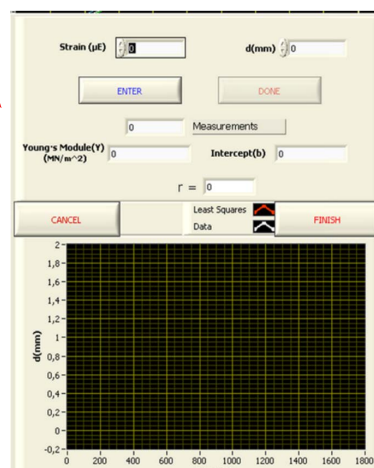
This screen can graphically represent in real time values taken by the sensors and visualise the evolution of those measures in the time.

The digital indicators of the right-hand side are labeled with the names of the sensors.

On the left-hand side of the screen, we find the necessary controls to introduce the geometrical data of the specimen with gauges to analyse.

Clicking on the START button, the data acquisition, in real time, begins for strain measurement and stress suffered on the four points of the specimen.

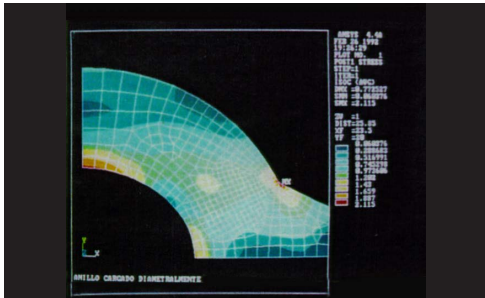
### Young's Module Calibration Screen



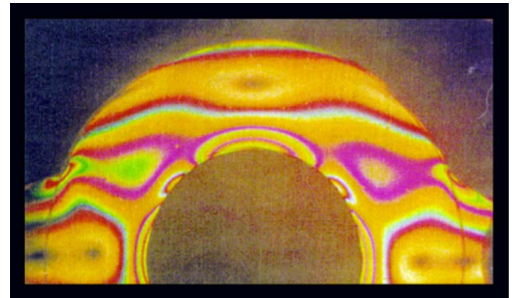
This screen has the necessary tools to obtain the value of Young's module of the specimen, applying least squares method.

1. Differences between the simulation and the photoelastic reality.

Software  
Simulation

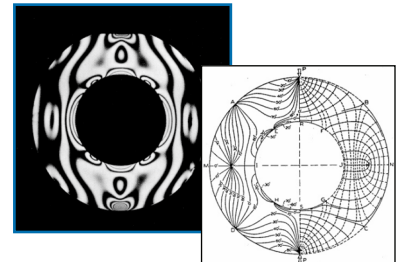
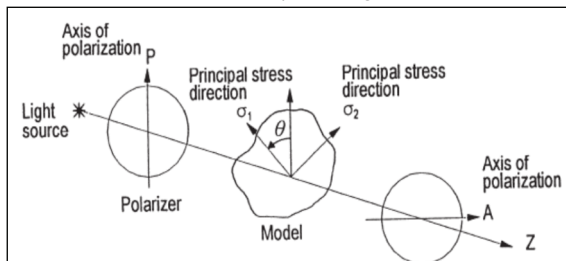


**Real**  
(with EFO/EFOC/EFOV Units)



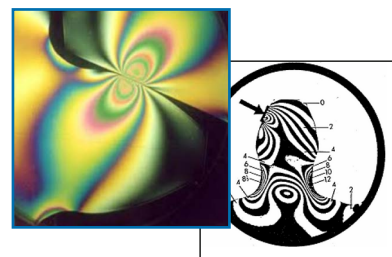
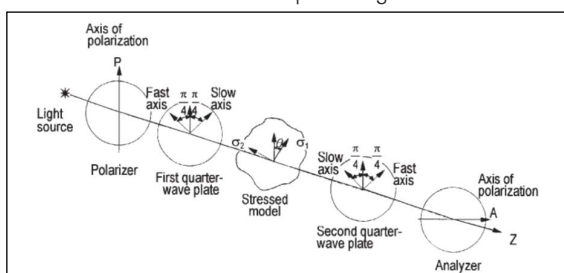
2. Main configurations with EFO/EFOC/EFOV Units.

Plane Polariscope configuration



Plane polariscope configuration with monochromatic light, for isoclines and direction of principal stresses determination

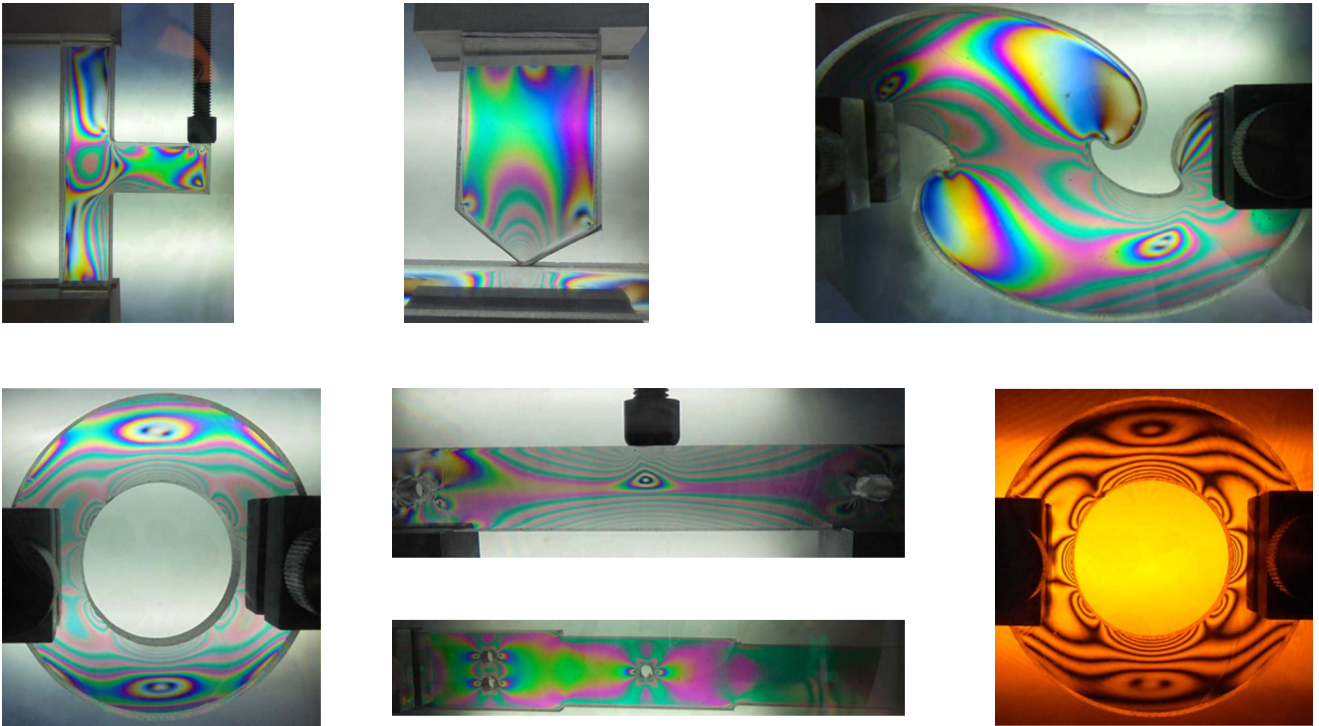
Circular Polariscope configuration



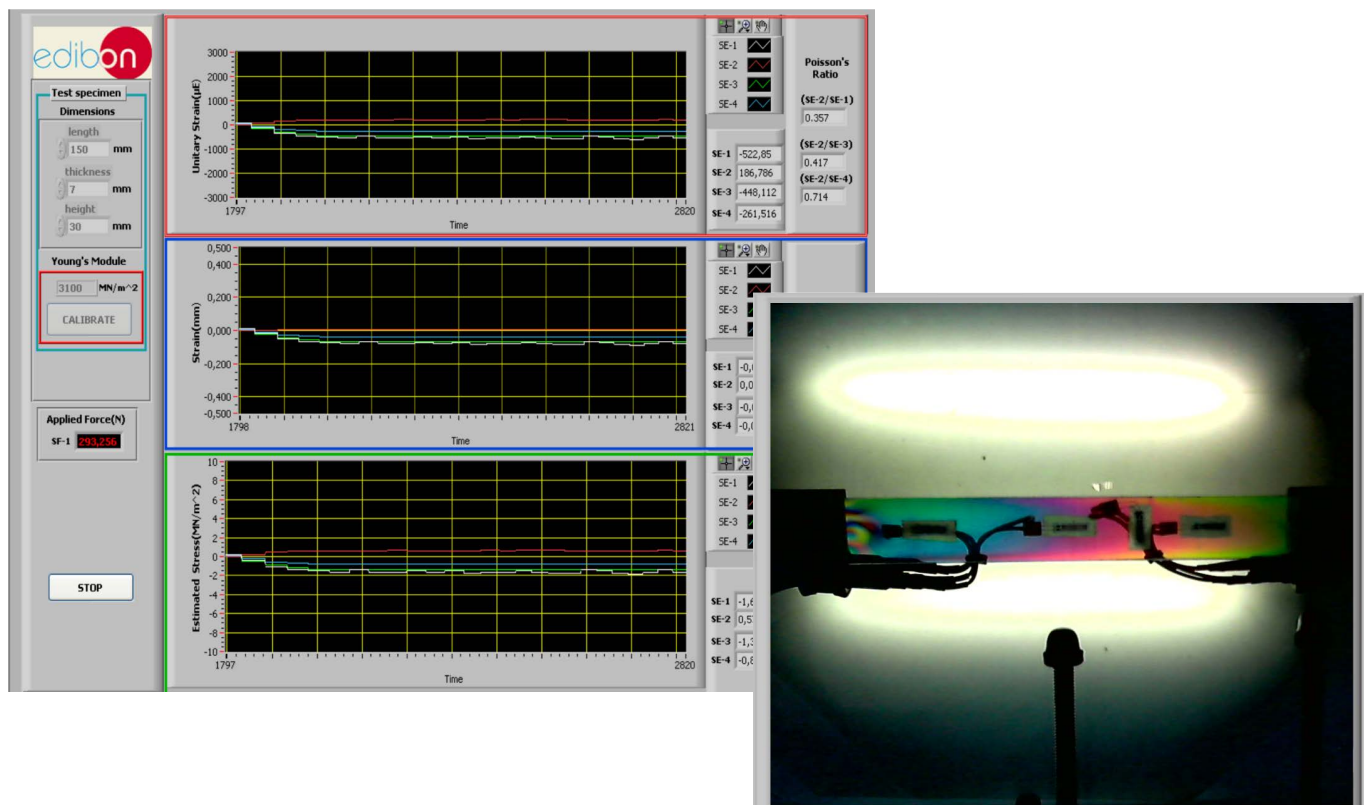
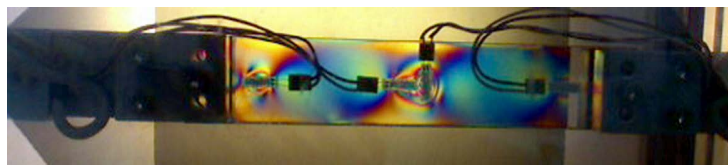
Circular polariscope configuration for isochromatics and principal stresses difference determination

Some **real** results obtained from this unit

3. Some real results obtained from EFO/EFOC/EFOV Units and different specimens.



4. Some typical results for strain gauges analysis. (EFOC/EFOV)



## COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1 to 3) described, we can offer, as optional, other items from 4 to 6.

All these items try to give more possibilities for:

- a) Technical and Vocational Education configuration. (ICAI)
- b) Multipost Expansions options. (MINI ESN and ESN)

### a) Technical and Vocational Education configuration

#### ④ EFOC/ICAI. Interactive Computer Aided Instruction Software.

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.

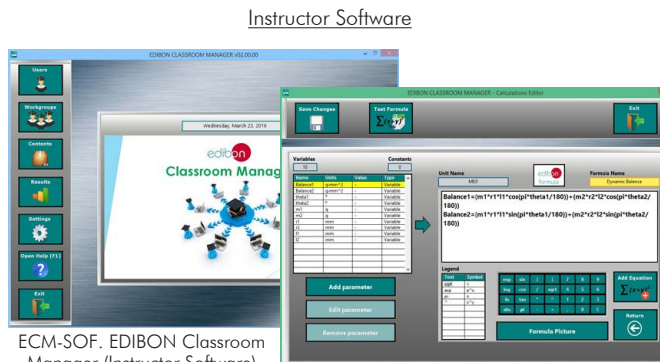
This software is optional and can be used additionally to items (1 to 6).

#### - 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



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

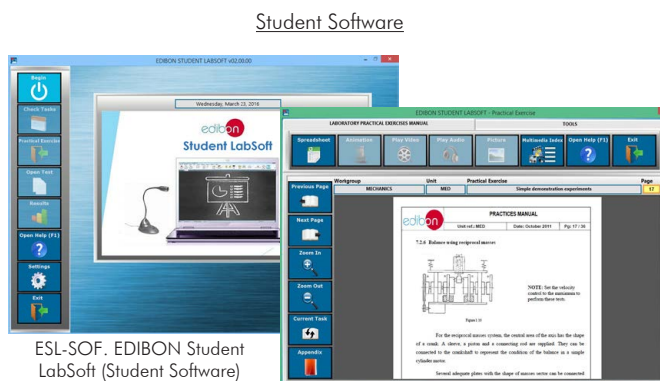
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

#### - 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.

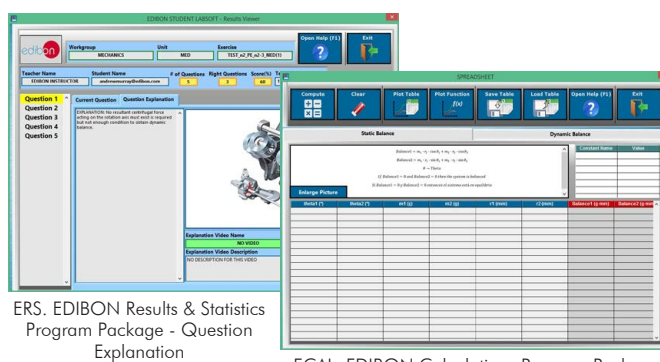
Innovative features:

- 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



ERS. EDIBON Results & Statistics Program Package - Question Explanation

ECAL. EDIBON Calculations Program Package Main Screen

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)

b) Multipost Expansions options

⑤ **MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.**

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously. It is useful for both, Higher Education and/or Technical and Vocational Education.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit. Then, the number of possible users who can work with the same unit is higher than in an usual way of working (usually only one).

Main characteristics:

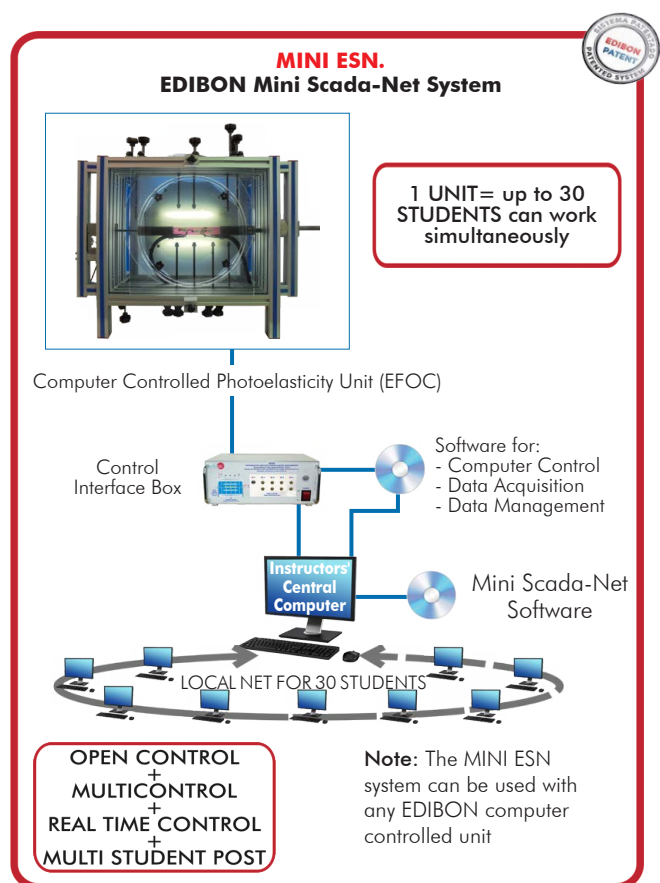
- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

For more information see MINI ESN catalogue. Click on the following link:

[www.edibon.com/en/edibon-scada-net](http://www.edibon.com/en/edibon-scada-net)



⑥ **ESN. EDIBON Scada-Net Systems.**

This unit can be integrated, in the future, into a Complete Laboratory with many Units and many Students.

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

[www.edibon.com/en/edibon-scada-net](http://www.edibon.com/en/edibon-scada-net)

## ORDER INFORMATION

### **Main items** (always included in the supply)

Minimum supply always includes:

- ① **Unit: EFOC. Computer Controlled Photoelasticity Unit.**
- ② **Cables and Accessories**, for normal operation.
- ③ **Manuals.**

\*IMPORTANT: Under EFOC we always supply all the elements for immediate running as 1, 2 and 3.

### **Optional items** (supplied under specific order)

a) Technical and Vocational Education configuration

- ④ EFOC/ICAI. Interactive Computer Aided Instruction Software.

b) Multipost Expansions options

- ⑤ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.
- ⑥ ESN. EDIBON Scada-Net Systems.

**① EFOC. Unit:**

The "EFOC" unit includes the following items:

- EFO Unit:

Bench-top unit.  
Anodized aluminum frame and painted steel panels.  
Main metal elements made of stainless steel.  
Light source, two fluorescent tubes of 30 cm and 8 W.  
Monochromatic light 35 W.  
Opalescent diffuser plate.  
Double effect polarizing filters (linear polarization and circular polarization), of 30 x 30 cm and protected by methacrylate plates.  
Load frame with pulling jack.  
Ten pressure screws and accessories.

The "EFO" unit includes the following items:

- EFO-K1. Kit of Static Test Specimens (Basic kit), formed by:

Nº3. Stepped Rectangular Specimen.  
Nº4. Compact Circular Specimen.  
Nº5. Circular with Orifice Specimen.  
Nº9. Medium Rectangular Specimen.  
Nº13. "C" Specimen Probe.  
Nº14. Specimen with Arch Probe.  
Nº17. Square with Diagonal Bar Specimen Probe.

- EFO-K3. Kit of Test Specimens with Strain Gauges (Basic kit), formed by:

Nº7-G. Trapezoidal Specimen with strain gauges + Nº7. Trapezoidal Specimen.  
Nº8-G. Big Rectangular Specimen with strain gauges + Nº8. Big Rectangular Specimen.  
Nº19-G. "T" Beam Specimen with strain gauges + Nº19. "T" Beam Specimen.

- EFOC/KIT. Photoelasticity Kit with Strain Gauges.

Load cell for direct force measurement.

Electronics, hardware and software for strain gauges measurement from PC, and direct force measurement applied to the specimens:

- Control Interface Box:

Metallic box.  
Sensors connectors.  
Main switch.

- USB Data Acquisition Board:

National Instruments High Speed Multifunction Data Acquisition Board (500kS/s).  
Signal Streaming technology through USB to ensure high speed and bidirectional data transfer.  
USB compatibility: USB2.0 Hi Speed (480Mbits/s) or full speed.  
Truly Plug & Play: the PC will automatically detect the new device and install the software.

- Computer Control+Data Acquisition+Data Management Software:

Compatible with actual Windows operating systems.  
Control and data acquisition in real time.  
Management, processing, comparison and storage of data.  
Main functions of the software:  
Analysis and measurement of the strains.  
Young's module calculation.  
Poisson's ration calculation.  
Measurement the force applied.  
Analysis and measurement of stresses.  
Register of the (experimental) practical exercises.  
Calibration of sensors.

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on LabVIEW.

National Instruments Data Acquisition board (250 KS/s, kilo samples per second).

Calibration exercises, which are included, teach the user how to calibrate a sensor and the importance of checking the accuracy of the sensors before taking measurements.

Projector and/or electronic whiteboard compatibility allows the unit to be explained and demonstrated to an entire class at one time.

Capable of doing applied research, real industrial simulation, training courses, etc.

Remote operation and control by the user and remote control for EDIBON technical support, are always included.

Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).

Designed and manufactured under several quality standards.

Optional ICAI software to create, edit and carry out practical exercises, tests, exams, calculations, etc. Apart from monitoring user's knowledge and progress reached.

This unit has been designed for future expansion and integration. A common expansion is the EDIBON Scada-Net (ESN) System which enables multiple students to simultaneously operate many units in a network.

Additional recommended elements (Not included):

- EFO-K2. Kit of Static Test Specimens (Advanced kit), formed by:

Nº1. Big Irregular Specimen.  
Nº2. Small Irregular Specimen.  
Nº6. Notches Rectangular Specimen.  
Nº7. Trapezoidal Specimen.  
Nº8. Big Rectangular Specimen.  
Nº10. Small Rectangular Specimen (2 units).  
Nº11. "U" Specimen.  
Nº12. Wide Rectangular Specimen.  
Nº15. Triangular Specimen (2 units).  
Nº16. Hollow Square Specimen.  
Nº18. Square with Two Diagonal Bars Specimen.  
Nº19. "T" Beam Specimen.  
Nº20. Double "T" Beam Specimen.  
Nº21. Rectangular with Hole Specimen.

- EFO-K4. Kit of Test Specimens with Strain Gauges (Advanced kit), formed by:

Nº9-G. Medium Rectangular Specimen with strain gauges + Nº9. Medium Rectangular Specimen.  
Nº10-G. Small Rectangular Specimen with strain gauges + Nº10. Small Rectangular Specimen.  
Nº11-G. "U" Specimen with strain gauges + Nº11. "U" Specimen.  
Nº20-G. Double "T" Beam Specimen with strain gauges + Nº20. Double "T" Beam Specimen.

- EFO-K5. Kit of Articulated Structures, formed by:

Nº30. Articulated Structure 1.  
Nº31. Articulated Structure 2.  
Nº32. Articulated Structure 3.

- EFO-K6. Kit of Dynamic Panels, formed by:

Nº40. Dynamic Panel 1.  
Nº41. Dynamic Panel 2.

- EFO-ICL. Accessory with Independent Circular and Linear Sheets.

**② Cables and Accessories**, for normal operation.

**③ Manuals:**

This unit is supplied with 8 manuals: Required services, Assembly and Installation, Control software, Starting-up, Safety, Maintenance, Calibration & Practices manuals.

### Exercises and Practical Possibilities to be done with the Main Items

- 1.- Introduction to photoelasticity: optical elements, isochromatic, isoclinic, band order, band factor, edge tension sign, etc.
  - 2.- Determination of principal stress difference.
  - 3.- Isochromatics.
  - 4.- Illustration of the themes about elasticity, strength of materials and structures using photoelastic tests.
  - 5.- Pure traction/optical-tensional law.
  - 6.- Diametrically compressed disc.
  - 7.- Ring with diametrical compression traction.
  - 8.- Ring with diametrical compression.
  - 9.- Plate with circular drill with traction.
  - 10.- Comparison of the effects from different engraves in piece with traction.
  - 11.- Pure traction in a piece with section linearly variable.
  - 12.- Pure flexion.
  - 13.- Simple flexion.
  - 14.- Simple flexion, compound beams.
  - 15.- Compound flexion.
  - 16.- Compound central core of the section.
  - 17.- Piece with a great curvature subjected to flexion.
  - 18.- Arch built-in with a central charge.
  - 19.- Triangular structure.
  - 20.- Comparison of the structures.
  - 21.- Comparison of the effect of different notches.
  - 22.- Strain and stress analysis and measurements with strain gauges using computer.
  - 23.- Tardy compensation method (requires EFO-ICL).
- Other possibilities to be done with this unit:
- 24.- Many students view results simultaneously.  
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
  - 25.- Open Control, Multicontrol and Real Time Control.  
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivative parameters; etc, in real time.
  - 26.- The Computer Control System with SCADA allows a real industrial simulation.
  - 27.- This unit is totally safe as uses mechanical, electrical/electronic, and software safety devices.
  - 28.- This unit can be used for doing applied research.
  - 29.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
  - 30.- Visualization of all the sensors values used in the EFOC unit process.
- Several other exercises can be done and designed by the user.

## TENDER SPECIFICATIONS (for optional items)

### a) Technical and Vocational Education configuration

#### ④ EFOC/ICAI. Interactive Computer Aided Instruction Software.

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.

- 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.

- 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.

### b) Multipost Expansions options

#### ⑤ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.

MINI ESN. EDIBON Mini Scada-Net System allows up to 30 students to work with a Teaching Unit in any laboratory, simultaneously.

The MINI ESN system consists of the adaptation of any EDIBON Computer Controlled Unit with SCADA integrated in a local network.

This system allows to view/control the unit remotely, from any computer integrated in the local net (in the classroom), through the main computer connected to the unit.

Main characteristics:

- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work doing "real time" control/multicontrol and visualisation.
- Instructor can see in the computer what any user/student is doing in the unit.
- Continuous communication between the instructor and all the users/students connected.

Main advantages:

- It allows an easier and quicker understanding.
- This system allows you can save time and cost.
- Future expansions with more EDIBON Units.

The system basically will consist of:

This system is used with a Computer Controlled Unit.

- Instructor's computer.
- Students' computers.
- Local Network.
- Unit-Control Interface adaptation.
- Unit Software adaptation.
- Webcam.
- MINI ESN Software to control the whole system.
- Cables and accessories required for a normal operation.

\* 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](mailto:edibon@edibon.com) Web: [www.edibon.com](http://www.edibon.com)

Edition: ED01/24  
Date: February/2024

REPRESENTATIVE:

