

① Unit: TVPLC. Computer Controlled Flame Propagation and Stability Unit

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 CAL software helps the user perform calculations and comprehend the results.**
- **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.**



For more information about Key Features, click here



ISO 9001: Quality Management (for Design, Manufacturing, Commercialization and After-sales service)



European Union Certificate (total safety)



Certificates ISO 14001 and ECO-Management and Audit Scheme (environmental management)



Certificate and Worlddidac Member

## INTRODUCTION

The Computer Controlled Flame Propagation and Stability Unit "TVPLC", developed by EDIBON, is a teaching unit that allows the student to investigate the behaviour of flames under various circumstances and to know the parameters used in the design of burners or combustion devices.

The flame is the gaseous medium in which certain combustion processes are expressed. It is very important to study the stability in order to know how a burner must be designed and to obtain a safe design and operation.

## GENERAL DESCRIPTION

The Computer Controlled Flame Propagation and Stability Unit "TVPLC" is a teaching unit which allows to obtain various flames by changing the quantities of the fuel – comburent mix.

The unit is prepared to work with different gaseous fuels, so it makes it possible to study the differences between them.

The TVPLC unit consists of a vertical burner, which will be lit by a lighter. It consists of different installations or circuits which are described below:

**Air circuit:** it supplies the burner with the necessary comburent for the combustion process. It is composed of a fan and a solenoid valve, usually open. There is a manual regulation valve to adjust the required air flow. The circuit includes a flexible tube for an easy connection to the burner.

**Fuel gas circuit:** it is composed of two solenoid valves, usually closed due to safety reasons. It is completely made of stainless steel. There is a manual regulation valve to adjust the required gas flow.

**Safety elements.** It is important for the student to familiarize with the different safety elements which can be implemented in a combustion installation. The burner is protected by a box made of stainless steel which acts as physical barrier between combustion process and user.

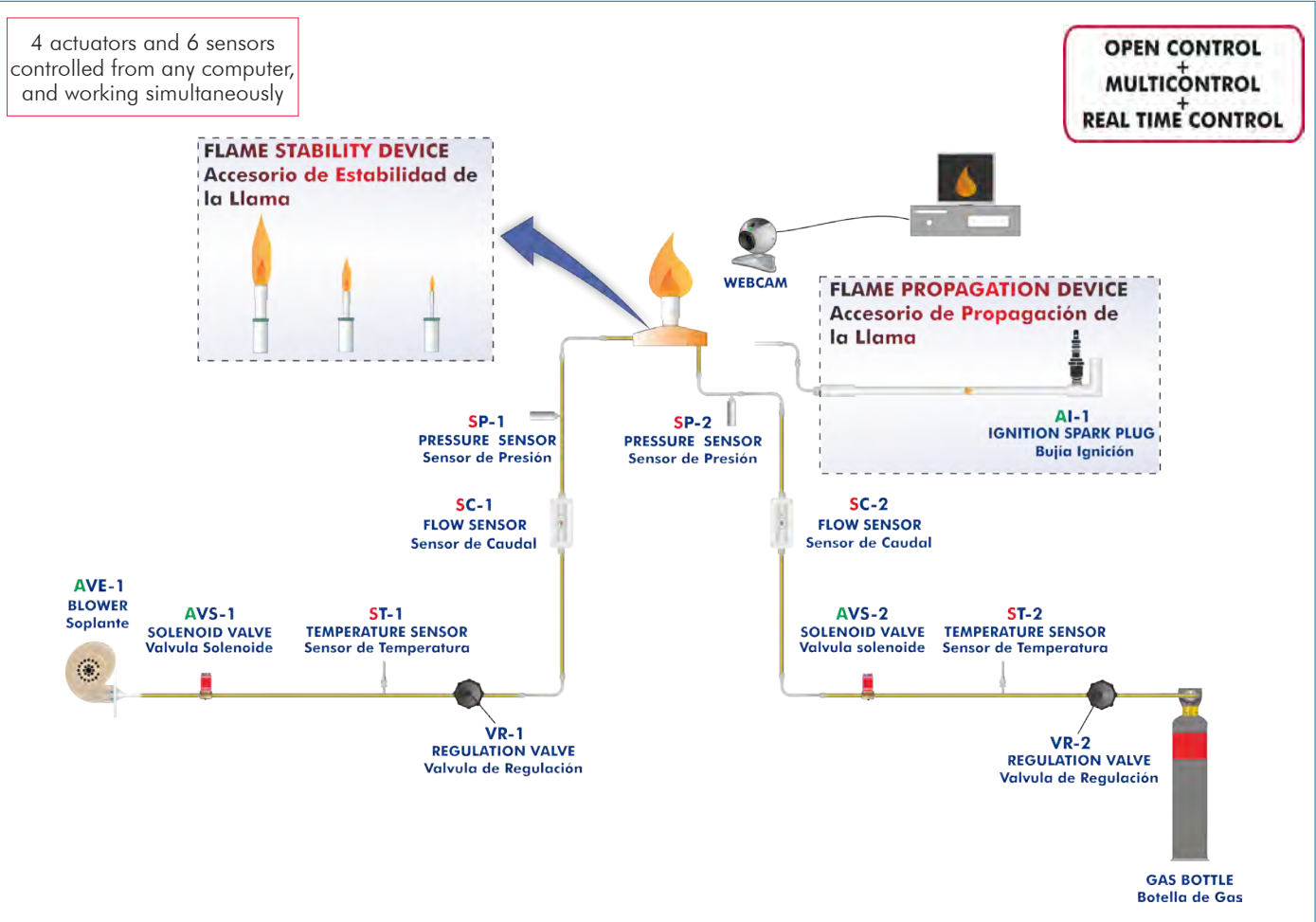
**Flame Propagation Accessory:** Structure made of aluminum profiles. Panels are made of PVC in order to lighten the unit. It consists of a transparent PVC 5 meters long hose to be able to view the experiment. The ignition process is carried out by a spark plug installed at one end.

**Instrumentation and sensors for the correct study of a combustion process flame.** Mainly, the flows, temperatures and pressures of air and gas lines are studied.

A camera is provided to be installed together with the computer (PC). Thus, photographs of the different flames can be obtained.

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

## PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



With this unit there are several options and possibilities:

- Main items: 1, 2, 3, 4, 5 and 6.
- Optional items: 7, 8 and 9.

Let us describe first the main items (1 to 6):

① **TVPLC. Unit:**

Bench top unit.

Anodized aluminum structure and panels of painted steel.

Main metallic elements of stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

Burner made with a protective metal box, with a transparent window, which ensures the operation safety and a complete visibility of the experiment.

Air circuit to supply the necessary oxygen to the combustion process. It is composed of:

Computer controlled pressure fan; it reaches a maximum flow of 6 m<sup>3</sup>/h.

Computer controlled solenoid valve to control the air flow during the flame propagation experiment.

Air flow manual regulation valve.

Gas circuit: fuel supply system, computer controlled, and composed of:

Gas flow manual regulation valve.

Two solenoid pilot valves.

Computer controlled ignition system, implemented for the Flame Propagation Accessory. It consists of a spark plug which is supplied by a ignition transformer.

Four flame tubes, easily interchangeable, with four different sections: 9, 12, 17 and 20 mm.

Conical flame stabilizers. They are placed at the upper side of the corresponding flame tube. Its aim is to increase the mixes range for which the flame is kept stable.

Flame Propagation Accessory composed of:

5 m. transparent hose for visualizing the experiment.

Ignition spark plug.

A manual lighter.

2 "J type" temperature sensors to measure:

Inlet air temperature.

Inlet gas temperature.

2 pressure sensors to measure:

Air pressure.

Gas pressure.

2 flow sensors to measure:

Air flow, range: 0 – 0.6 l./s.

Gas line.

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 CAL software helps the user perform calculations and comprehend the results.**

**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.**



Unit: TVPLC

**② TVPLC/CIB. Control Interface Box:**

The Control Interface Box is part of the SCADA system.

Control interface box with process diagram in the front panel and with the same distribution that the different elements located in the unit, for an easy understanding by the student.

All sensors, with their respective signals, are properly manipulated from -10V. to +10V. computer output.

Sensors connectors in the interface have different pines numbers (from 2 to 16), to avoid connection errors.

Single cable between the control interface box and computer.

**The unit control elements are permanently computer controlled**, without necessity of changes or connections during the whole process test procedure.

**Simultaneous visualization in the computer of all parameters involved in the process.**

**Calibration of all sensors involved in the process.**

**Real time curves representation about system responses.**

Storage of all the process data and results in a file.

Graphic representation, in real time, of all the process/system responses.

**All the actuators' values can be changed at any time from the keyboard** allowing the analysis about curves and responses of the whole process.

All the actuators and sensors values and their responses are displayed on only one screen in the computer.

**Shield and filtered signals to avoid external interferences.**

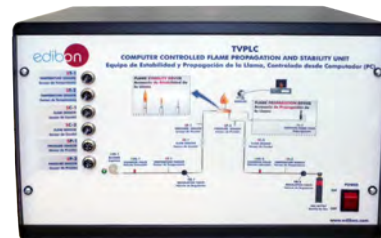
**Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.**

Real time computer control for pumps, compressors, heating elements, control valves, etc.

**Real time computer control for parameters involved in the process simultaneously.**

**Open control** allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously.

**Three safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.**



TVPLC/CIB

**③ DAB. Data Acquisition Board:**

The Data Acquisition board is part of the SCADA system.

PCI Express Data acquisition board (National Instruments) to be placed in a computer slot. Bus PCI Express.

**Analog input:**

Number of channels= 16 single-ended or 8 differential. Resolution=16 bits, 1 in 65536.

Sampling rate up to: **250 KS/s (kilo samples per second)**.

Input range (V)= ±10 V. Data transfers=DMA, interrupts, programmed I/O. DMA channels=6.

**Analog output:**

Number of channels=2. Resolution=16 bits, 1 in 65536.

Maximum output rate up to: 900 KS/s.

Output range(V)= ±10 V. Data transfers=DMA, interrupts, programmed I/O.

**Digital Input/Output:**

Number of channels=24 inputs/outputs. D0 or DI Sample Clock frequency: 0 to 100 MHz.

Timing: Number of Counter/timers=4. Resolution: Counter/timers: 32 bits.



DAB

**④ TVPLC/CCSOF. Computer Control + Data Acquisition + Data Management Software:**

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.**

Sampling velocity up to **250 KS/s (kilo samples per second)**.

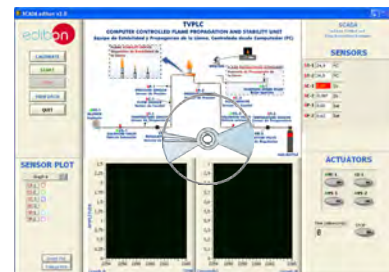
**Calibration system for the sensors involved in the process.**

**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.**



TVPLC/CCSOF

**⑤ Cables and Accessories**, for normal operation.

**⑥ Manuals:**

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

\*References 1 to 6 are the main items: TVPLC + TVPLC/CIB + DAB + TVPLC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

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

- 1.- Study of the flame stability of a burner.
  - 2.- Study of the flame stability with stabilizer devices.
  - 3.- Study of flame propagation.
  - 4.- Smithells flame separation.
  - 5.- Demonstration of the process of flame lift off.
  - 6.- Demonstration of the process of flame light back.
  - 7.- Investigation and study of the methods of improving flame stability limits.
  - 8.- Study of the data for the construction of flames stability diagrams.
  - 9.- Investigation of the relationship between flame speed and air/fuel ratio for a variety of gaseous fuels.
  - 10.-Investigation of the vertical and horizontal flame movement.
  - 11.-Study of the effect of changing cross-section of the burner on flame speed.
  - 12.-Study of the effect of directional change on flame speed.
  - 13.-Study of methods of arresting of moving flames in the flame speed tube.
- Additional practical possibilities:
- 14.-Sensors calibration.
- Other possibilities to be done with this Unit:
- 15.-Many students view results simultaneously.  
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
- 16.-Open Control, Multicontrol and Real Time Control.  
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc, in real time.
  - 17.-The Computer Control System with SCADA allows a real industrial simulation.
  - 18.-This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
  - 19.-This unit can be used for doing applied research.
  - 20.-This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
  - 21.-Control of the TVPLC unit process through the control interface box without the computer.
  - 22.-Visualization of all the sensors values used in the TVPLC unit process.
- Several other exercises can be done and designed by the user.

## REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50Hz or 110V./60Hz.
- Exhaust gases extractor.
- Computer.

## DIMENSIONS AND WEIGHTS

### TVPLC:

#### Unit:

- Dimensions: 700 x 500 x 800mm. aprox.  
(27.56 x 19.68 x 31.50 inches approx.)
- Weight: 60 Kg. approx.  
(132 pounds approx.)

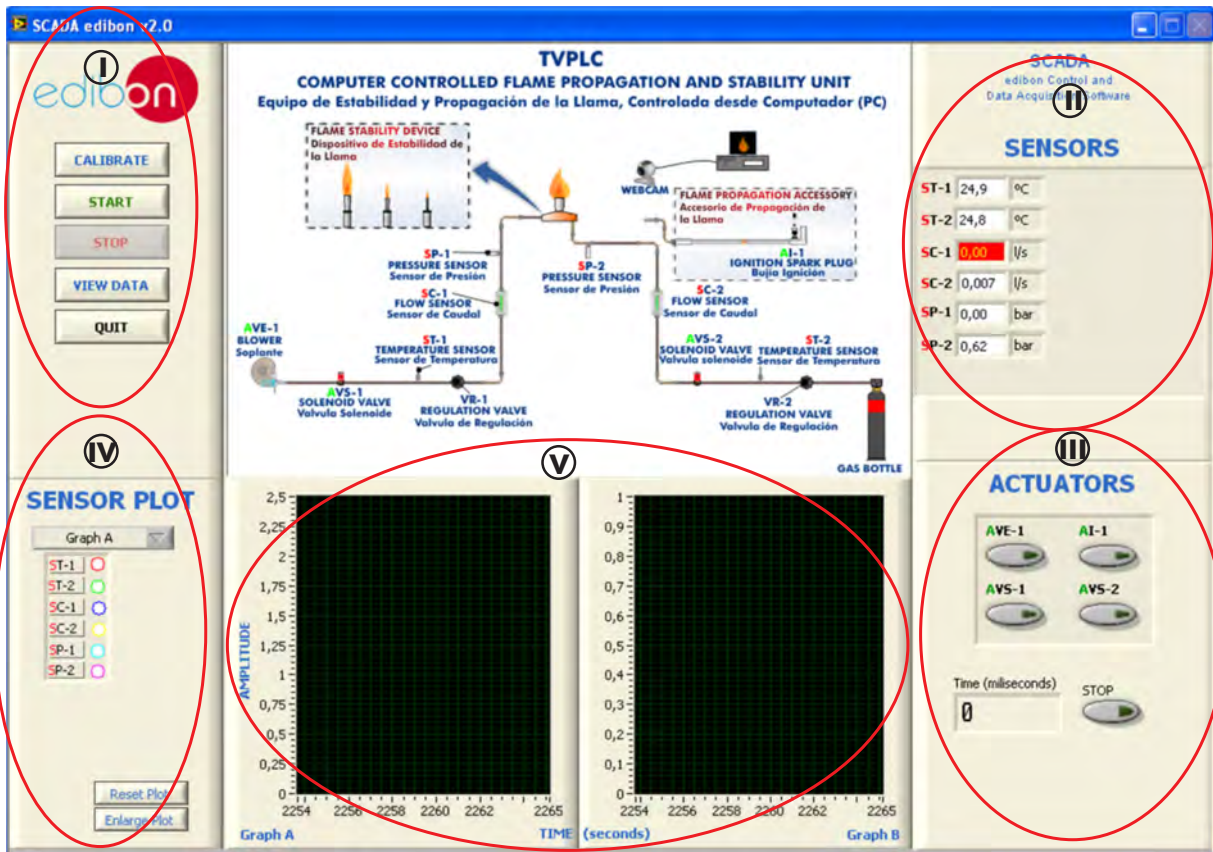
#### Flame Propagation Accessory:

- Dimensions: 2000 x 500 x 150 mm. aprox.  
(78.74 x 19.68 x 5.9 inches approx.)
- Weight: 20 Kg. approx.  
(44 pounds approx.)

#### Control-Interface Box:

- Dimensions: 490 x 330 x 310 mm. aprox.  
(19.29 x 12.99 x 12.20 inches approx.)
- Weight: 10 Kg. approx.  
(22 pounds approx.)

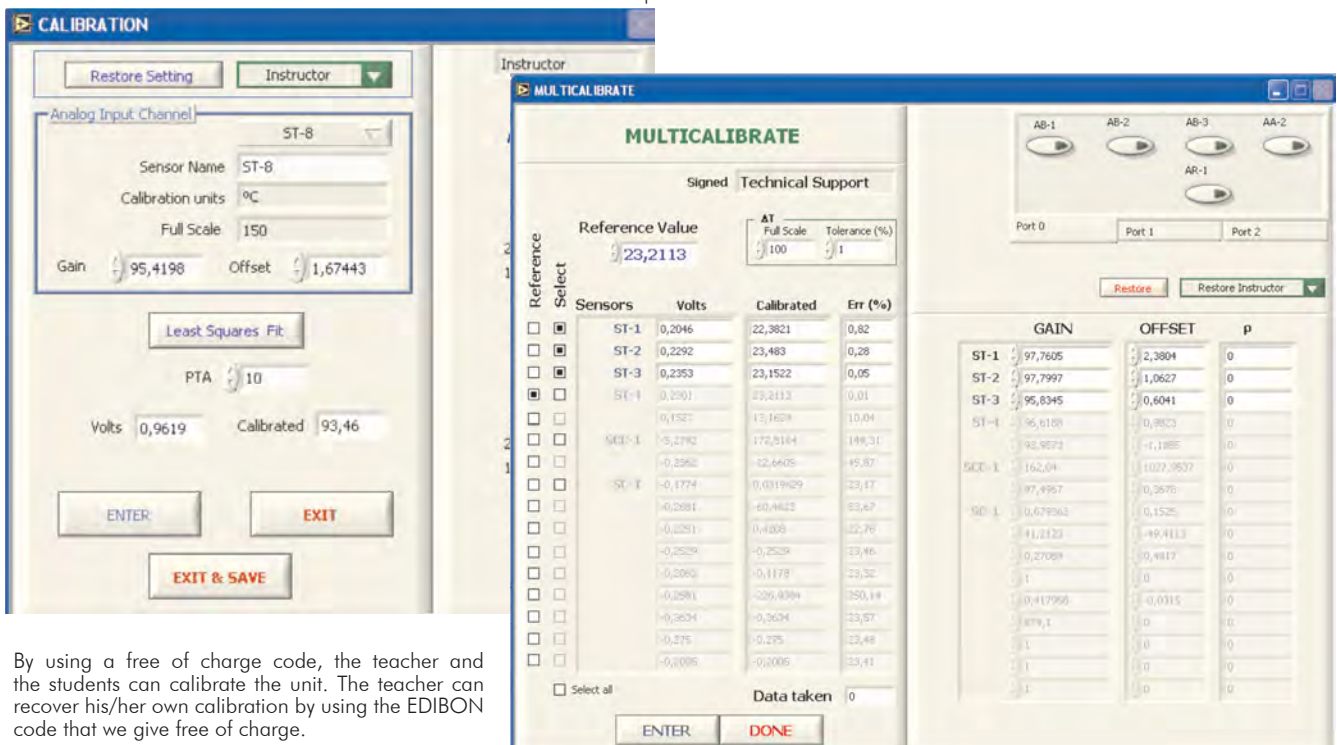
SCADA  
Main screen



- I Main software operation possibilities.
- II Sensors displays, real time values, and extra output parameters. Sensors: ST= Temperature sensor. SP=Pressure Sensor. SC=Flow sensor.
- III Actuators controls. Actuators: AVE=Fan. AVS=Solenoid valve. AI=Ignition spark plug.
- IV Channel selection and other plot parameters.
- V Real time graphics displays.

Software for Sensors Calibration

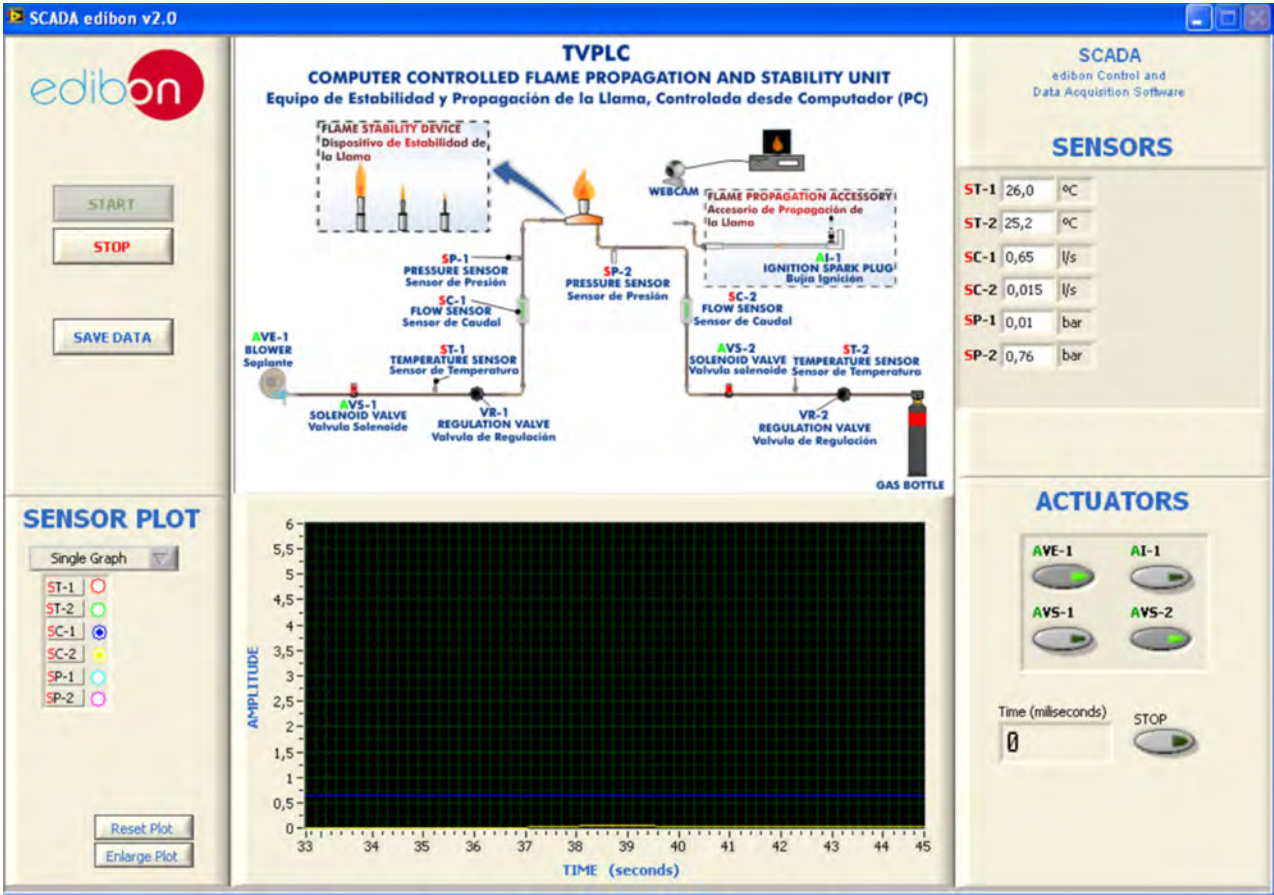
Example of screen



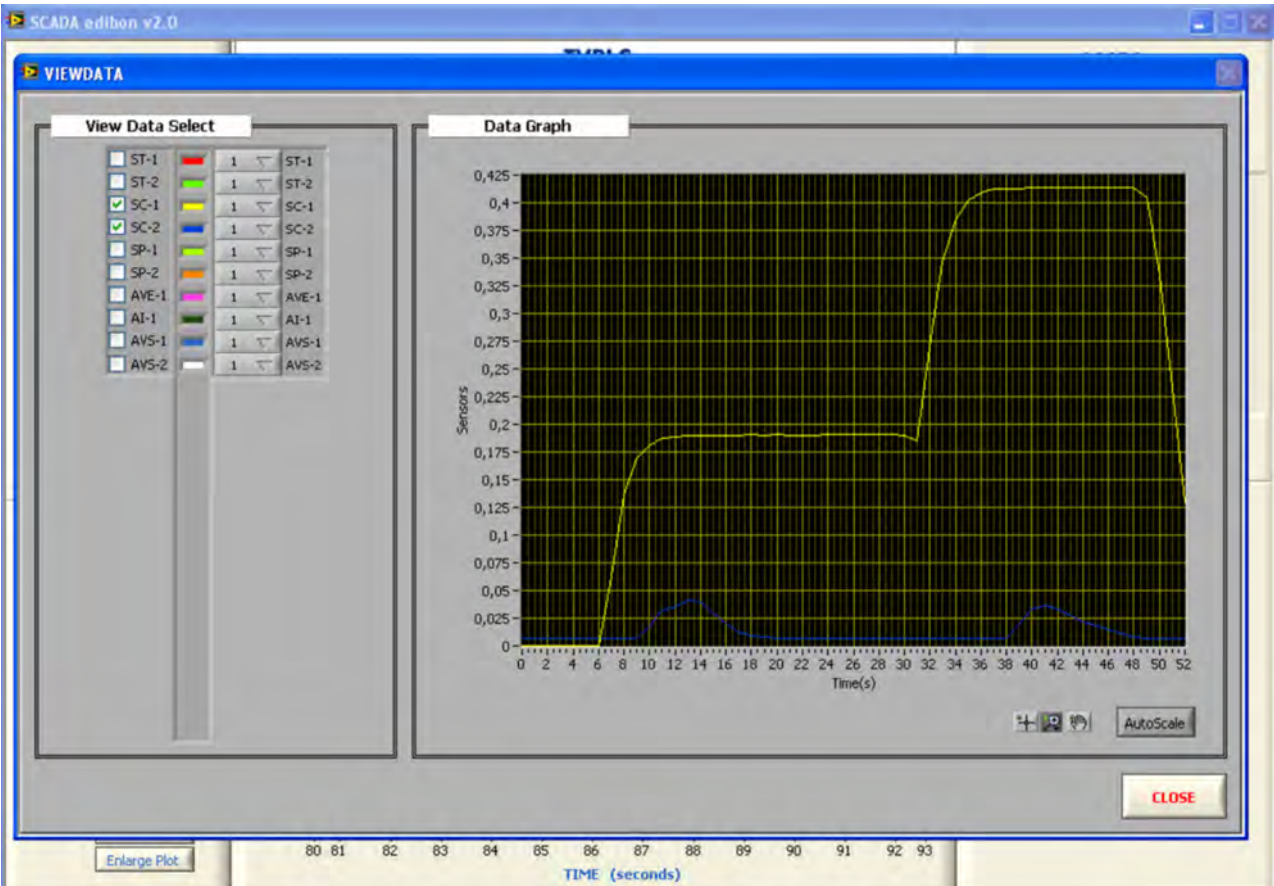
By using a free of charge code, the teacher and the students can calibrate the unit. The teacher can recover his/her own calibration by using the EDIBON code that we give free of charge.

SOME REAL RESULTS OBTAINED FROM THIS UNIT

We see the sensors values in real time.



We can visualize the graphics in real time, and save them in files.  
VIEWDATA= Graphic visualization for the saved data in a file.



Additionally to the main items (1 to 6) described, we can offer, as optional, other items from 7 to 9.

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

⑦ **TVPLC/ICAI. Interactive Computer Aided Instruction Software System.**

This complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM) totally integrated with the Student Software (EDIBON Student Labsoft -ESL). 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).

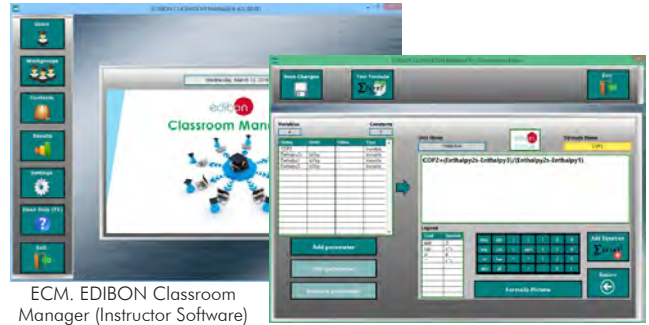
**-ECM. EDIBON Classroom Manager (Instructor Software).**

ECM 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 Workgroups, Tasks 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.**

**EDIBON Classroom Manager**



ECM. 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

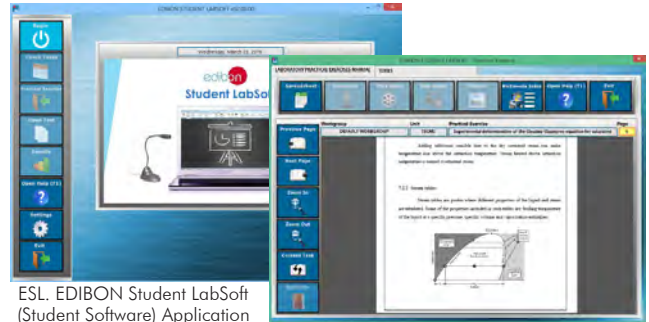
**-ESL. EDIBON Student Labsoft (Student Software).**

ESL 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:

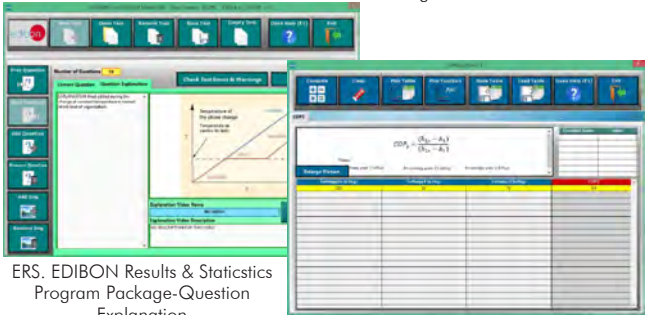
- Student Log-In & Self-Registration.**
- Existing Tasks checking & Monitoring.**
- Default contents & scheduled tasks available to be used from the first session.**
- Practical Exercises accomplishment by following the Manual provided by EDIBON.**
- Evaluation Methods to prove your knowledge and progression.**
- Test self-correction.**
- Calculations computing and plotting.**
- Equation System Solver Engine.**
- User Monitoring Learning & Printable Reports.**
- Multimedia-Supported auxiliary resources.**

**EDIBON Student LabSoft**



ESL. 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/products/catalogues/en/ICAI.pdf](http://www.edibon.com/products/catalogues/en/ICAI.pdf)



b) Multipost Expansions options

⑧ **Mini ESN. EDIBON Mini Scada-Net System.**

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:

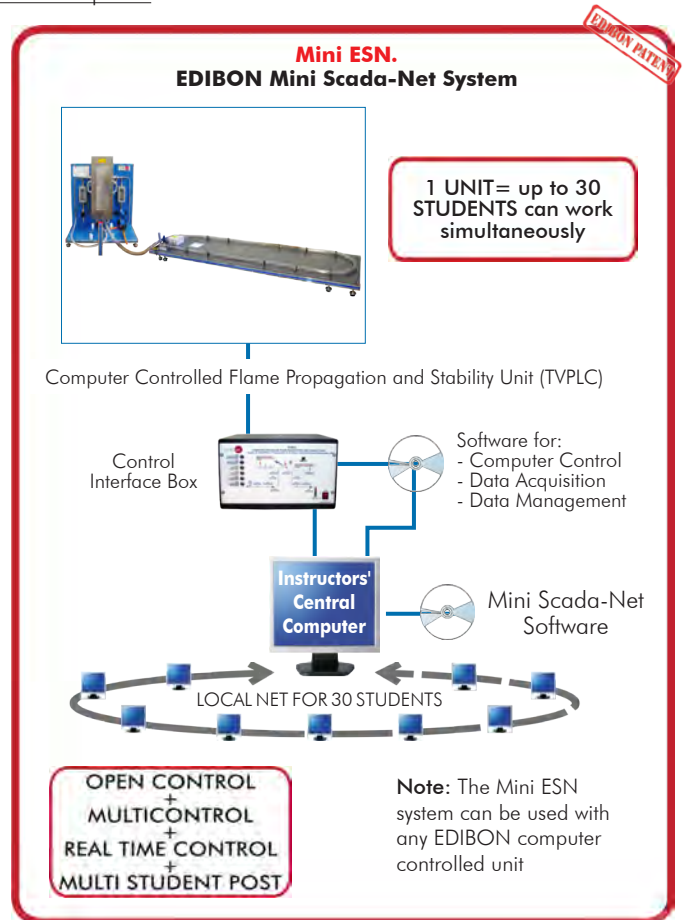
- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work 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/products/catalogues/en/Mini-ESN.pdf](http://www.edibon.com/products/catalogues/en/Mini-ESN.pdf)



⑨ **ESN. EDIBON Scada-Net System.**

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/products/catalogues/en/units/thermodynamicsthermotechnics/esn-thermodynamics/ESN-THERMODYNAMICS.pdf](http://www.edibon.com/products/catalogues/en/units/thermodynamicsthermotechnics/esn-thermodynamics/ESN-THERMODYNAMICS.pdf)

## ORDER INFORMATION

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

Minimum supply always includes:

- ① **Unit: TVPLC. Computer Controlled Flame Propagation and Stability Unit.**
- ② **TVPLC/CIB. Control Interface Box.**
- ③ **DAB. Data Acquisition Board.**
- ④ **TVPLC/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ⑤ **Cables and Accessories**, for normal operation.
- ⑥ **Manuals.**

**\*IMPORTANT:** Under TVPLC we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.

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

#### a) Technical and Vocational configuration

- ⑦ TVPLC/ICAI. Interactive Computer Aided Instruction Software System.

#### b) Multipost Expansions options

- ⑧ Mini ESN. EDIBON Mini Scada-Net System.
- ⑨ ESN. EDIBON Scada-Net System.

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Bench top unit.

Anodized aluminum structure and panels of painted steel.

Main metallic elements of stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

Burner made with a protective metal box, with a transparent window, which ensures the operation safety and a complete visibility of the experiment.

Air circuit to supply the necessary oxygen to the combustion process. It is composed of:

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Computer controlled solenoid valve to control the air flow during the flame propagation experiment.

Air flow manual regulation valve.

Gas circuit: fuel supply system, computer controlled, and composed of:

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Air flow, range: 0 – 0.6 l./s.

Gas line.

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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 CAL software helps the user perform calculations and comprehend the results.

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.

**② TVPLC/CIB. Control Interface Box:**

The Control Interface Box is part of the SCADA system.

Control interface box with process diagram in the front panel.

The unit control elements are permanently computer controlled.

Simultaneous visualization in the computer of all parameters involved in the process.

Calibration of all sensors involved in the process.

Real time curves representation about system responses.

All the actuators' values can be changed at any time from the keyboard allowing the analysis about curves and responses of the whole process.

Shield and filtered signals to avoid external interferences.

Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.

Real time computer control for parameters involved in the process simultaneously.

Open control allowing modifications, at any moment and in real time, of parameters involved in the process simultaneously.

Three safety levels, one mechanical in the unit, another electronic in the control interface and the third one in the control software.

**③ DAB. Data Acquisition Board:**

The Data Acquisition board is part of the SCADA system.

PCI Express Data acquisition board (National Instruments) to be placed in a computer slot.

Analog input: Channels= 16 single-ended or 8 differential. Resolution=16 bits, 1 in 65536. Sampling rate up to: 250 KS/s (kilo samples per second).

Analog output: Channels=2. Resolution=16 bits, 1 in 65536.

Digital Input/Output: Channels=24 inputs/outputs.

**④ TVPLC/CSOF. Computer Control +Data Acquisition+Data Management Software:**

The three softwares are part of the SCADA system.

Compatible with the industry standards.

Flexible, open and multicontrol software, developed with actual windows graphic systems, acting simultaneously on all process parameters.

Management, processing, comparison and storage of data.

Sampling velocity up to 250 KS/s (kilo samples per second).

Calibration system for the sensors involved in the process.

It allows the registration of the alarms state and the graphic representation in real time.

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.

**⑤ Cables and Accessories, for normal operation.****⑥ Manuals:**

This unit is supplied with 8 manuals: Required Services, Assembly and Installation, Interface and Control Software, Starting-up, Safety, Maintenance, Calibration & Practices Manuals.

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

- 1.- Study of the flame stability of a burner.
- 2.- Study of the flame stability with stabilizer devices.
- 3.- Study of flame propagation.
- 4.- Smithells flame separation.
- 5.- Demonstration of the process of flame lift off.
- 6.- Demonstration of the process of flame light back.
- 7.- Investigation and study of the methods of improving flame stability limits.
- 8.- Study of the data for the construction of flames stability diagrams.
- 9.- Investigation of the relationship between flame speed and air/fuel ratio for a variety of gaseous fuels.
- 10.- Investigation of the vertical and horizontal flame movement.
- 11.- Study of the effect of changing cross-section of the burner on flame speed.
- 12.- Study of the effect of directional change on flame speed.
- 13.- Study of methods of arresting of moving flames in the flame speed tube.

Additional practical possibilities:

- 14.- Sensors calibration.

Other possibilities to be done with this Unit:

- 15.- Many students view results simultaneously.  
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
  - 16.- Open Control, Multicontrol and Real Time Control.  
This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc, in real time.
  - 17.- The Computer Control System with SCADA allows a real industrial simulation.
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  - 21.- Control of the TVPLC unit process through the control interface box without the computer.
  - 22.- Visualization of all the sensors values used in the TVPLC unit process.
- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

⑦ **TVPLC/ICAI. Interactive Computer Aided Instruction Software System.**

This complete software package consists of an Instructor Software (EDIBON Classroom Manager -ECM) totally integrated with the Student Software (EDIBON Student Labsoft -ESL). Both are interconnected so that the teacher knows at any moment what is the theoretical and practical knowledge of the students.

-ECM. EDIBON Classroom Manager (Instructor Software).

ECM 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. EDIBON Student Labsoft (Student Software).

ESL 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

⑧ **Mini ESN. EDIBON Mini Scada-Net System.**

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.



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Edition: ED01/16  
Date: August/2016

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