

EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

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| <ol style="list-style-type: none"> 1.- Study of the main principles of a proton exchange fuel cell (PEM) operation. 2.- Study of the structure and main principles of a metal hydride cylinder. 3.- Calculation of the efficiency of a PEM fuel cell. 4.- Study of the influence of air consumption and hydrogen consumption in the efficiency of a PEM fuel cell. 5.- Study of the power density of a PEM fuel cell. 6.- Representation of the polarization curve of a PEM fuel cell. 7.- Determination of the voltage and current density characteristics of a PEM fuel cell. 8.- Influence of hydrogen consumption in the electric power generation. 9.- Study of the influence of the generated power in the efficiency of a PEM fuel cell. 10.-Study of the influence of the reagents' flows in the generation of electrical power. 11.-Study of the use of reagents and transport phenomena. <p>Additional practical possibilities:</p> <ol style="list-style-type: none"> 12.-Sensors calibration. <p>Other possibilities to be done with this Unit:</p> <ol style="list-style-type: none"> 13.-Many students view results simultaneously. | <p>To view all results in real time in the classroom by means of a projector or an electronic whiteboard.</p> <ol style="list-style-type: none"> 14.-Open Control, Multicontrol and Real Time Control. <p>This unit allows intrinsically and/or extrinsically to change the span, gains; proportional, integral, derivate parameters; etc, in real time.</p> <ol style="list-style-type: none"> 15.-The Computer Control System with SCADA allows a real industrial simulation. 16.-This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices. 17.-This unit can be used for doing applied research. 18.-This unit can be used for giving training courses to Industries even to other Technical Education Institutions. 19.-Control of the EC6C unit process through the control interface box without the computer. 20.-Visualization of all the sensors values used in the EC6C unit process. <p>- Several other exercises can be done and designed by the user.</p> |
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REQUIRED SERVICES

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

REQUIRED ACCESSORIES

- Bottle of compressed hydrogen of degree 4.0 (purity of 99.995%) at a pressure of 150-200 bars.

RECOMMENDED ACCESSORIES

- Edilab-Elec 2: Electrolyzer with a hydrogen production of 60 NL/h.

DIMENSIONS AND WEIGHTS

EC6C:

Unit:

- Dimensions: 700 x 400 x 550 mm. approx.
(27.55 x 15.75 x 21.65 inches approx.)
- Weight: 25 Kg. approx.
(55 pounds approx.).

Load module:

- Dimensions: 490 x 450 x 470 mm. approx.
(19.29 x 17.71 x 18.50 inches approx.)
- Weight: 12 Kg. approx.
(26.4 pounds approx.).

Control Interface Box:

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

AVAILABLE VERSIONS

Offered in this catalogue:

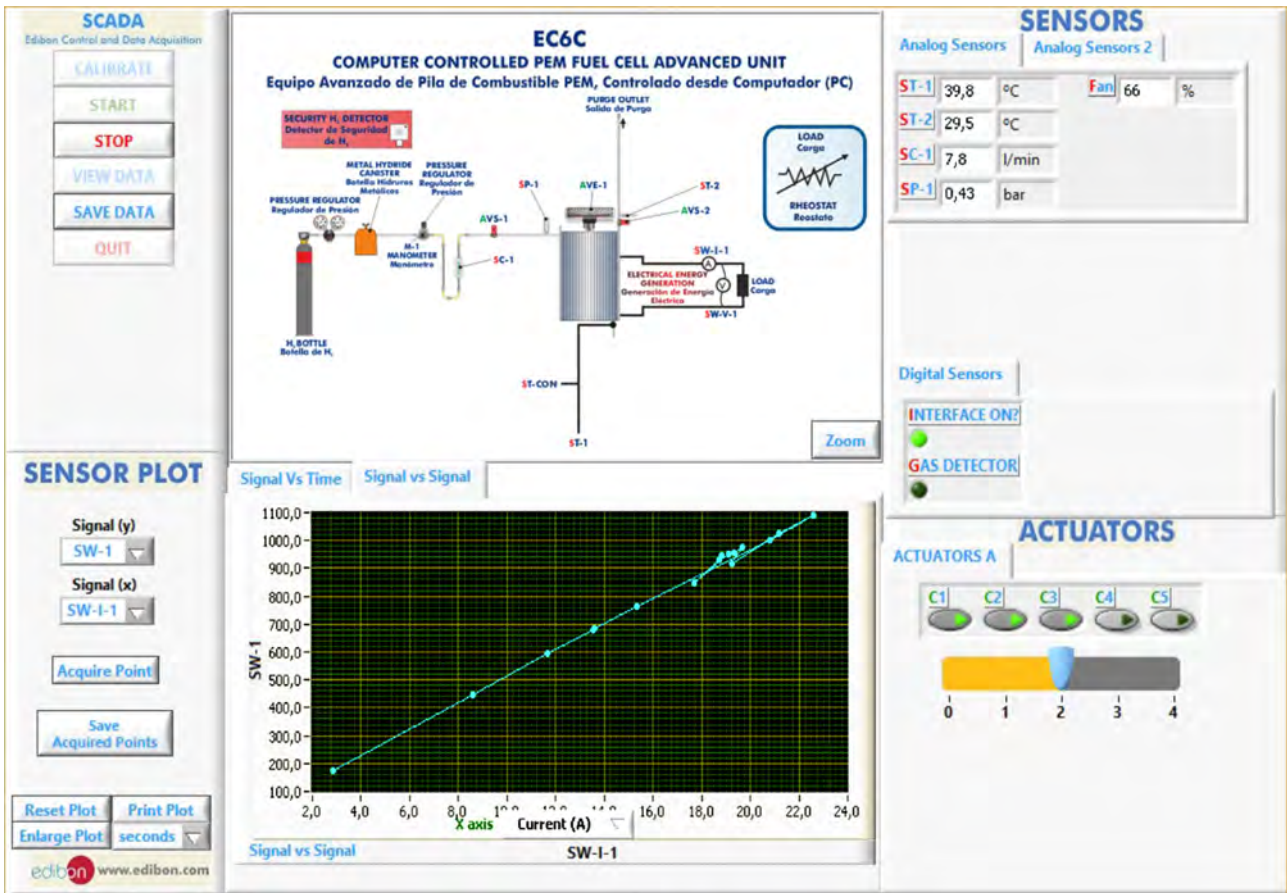
- EC6C. Computer Controlled PEM Fuel Cell Advanced Unit.

Offered in other catalogue:

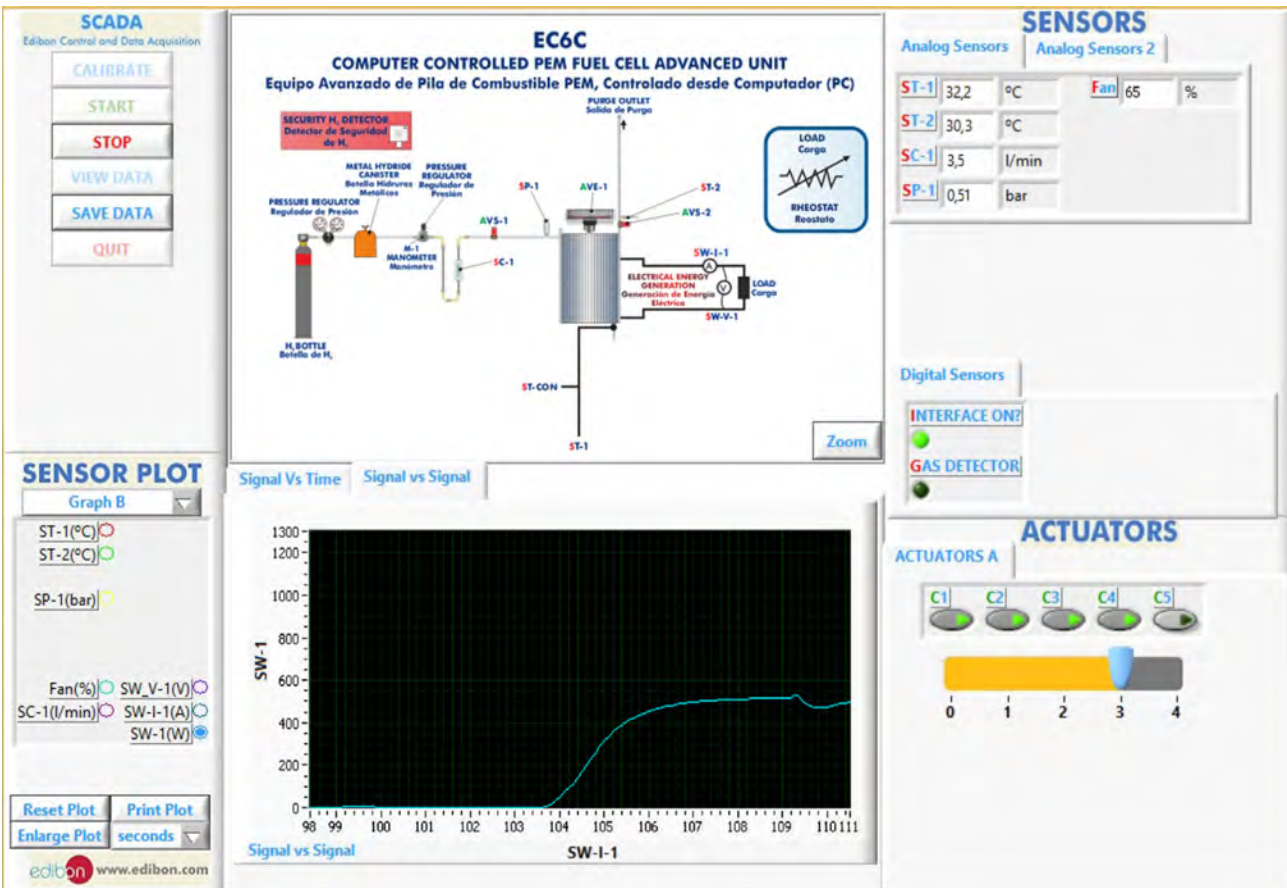
- EC6B. PEM Fuel Cell Advanced Unit.

SOME REAL RESULTS OBTAINED FROM THIS UNIT

The software enables to plot the value of one signal versus another signal.

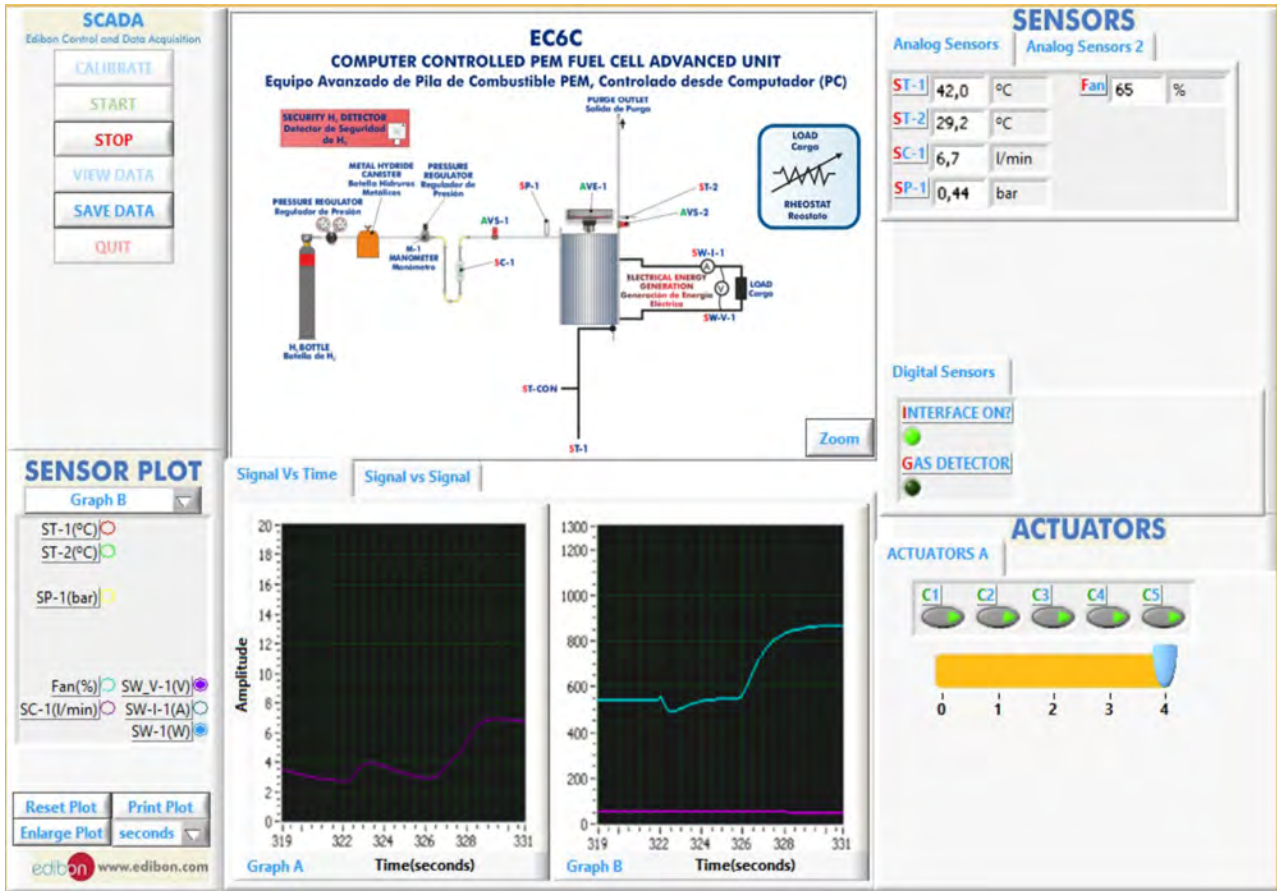


Data collected by the sensors can be represented vs. time. The evolution of the PEM type fuel cell power (SW-1 sensor) vs. time is observed in this graph.

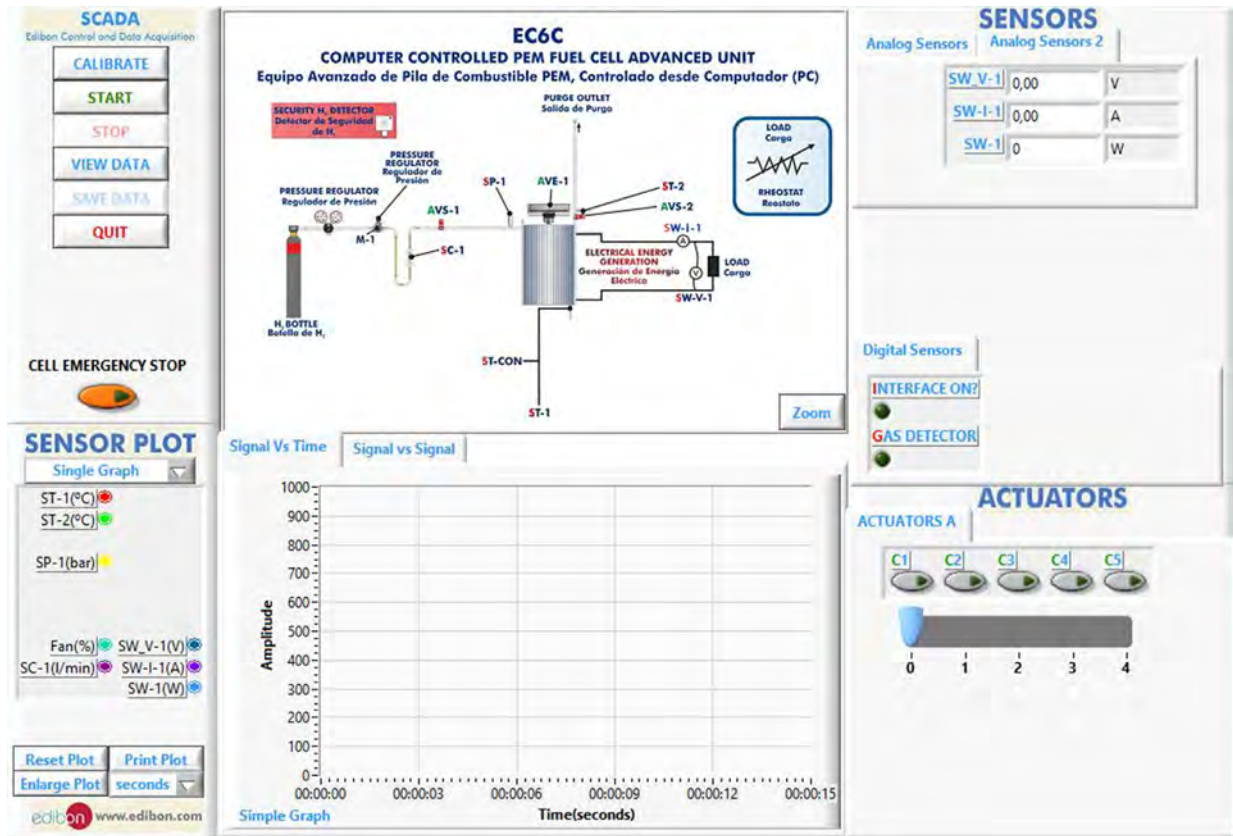


Some **real** results obtained from this Unit

The right side graph shows the evolution of power and voltage vs. time, and the left side graph shows the evolution of the required hydrogen flow vs. time depending on the consumed load. Thus, the influence of various parameters can be easily studied.



The software allows the plotting of the characteristic curves of the PEM fuel cell and their comparison with the theoretical working curves. In this representation the points that determine the characteristic power curve (SW1) current (SW1-A) can be observed.



Exercises and Practical Possibilities to be done with the Main Items

- 1.- Study of the main principles of a proton exchange fuel cell (PEM) operation.
- 2.- Study of the structure and main principles of a metal hydride cylinder.
- 3.- Calculation of the efficiency of a PEM fuel cell.
- 4.- Study of the influence of air consumption and hydrogen consumption in the efficiency of a PEM fuel cell.
- 5.- Study of the power density of a PEM fuel cell.
- 6.- Representation of the polarization curve of a PEM fuel cell.
- 7.- Determination of the voltage and current density characteristics of a PEM fuel cell.
- 8.- Influence of hydrogen consumption in the electric power generation.
- 9.- Study of the influence of the generated power in the efficiency of a PEM fuel cell.
- 10.-Study of the influence of the reagents' flows in the generation of electrical power.
- 11.-Study of the use of reagents and transport phenomena.

Additional practical possibilities:

- 12.-Sensors calibration.

Other possibilities to be done with this Unit:

- 13.-Many students view results simultaneously.

To view all results in real time in the classroom by means of a projector or an electronic whiteboard.

- 14.-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.

- 15.-The Computer Control System with SCADA allows a real industrial simulation.

- 16.-This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.

- 17.-This unit can be used for doing applied research.

- 18.-This unit can be used for giving training courses to Industries even to other Technical Education Institutions.

- 19.-Control of the EC6C unit process through the control interface box without the computer.

- 20.-Visualization of all the sensors values used in the EC6C unit process.

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

