Pressure Measurement and Calibration Unit

TMCP

Technical Teaching Equipment

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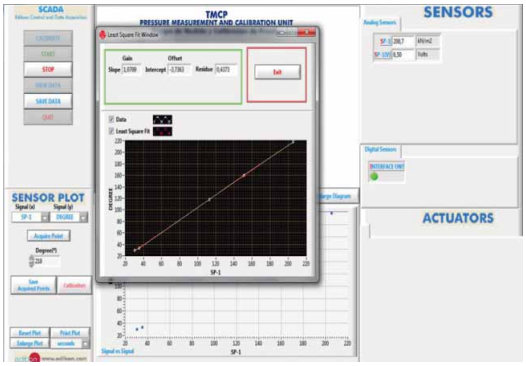
Products
Products range
Units
8.- Fluid Mechanics & Aerodynamics
and
9.- Thermodynamics &Thermotechnics



Screenshot of the computer data acquisition and calculations software

INTRODUCTION

Calibration is the process of comparing the values obtained by a measuring instrument with the corresponding measurement of a reference standard.
The Pressure Measurement and Calibration Unit (TMCP) introduces the pressure variable to the students as force per unit of area, as well as its calibration, units and errors.

GENERAL DESCRIPTION

The Pressure Measurement and Calibration Unit (TMCP) has been designed to study the concept of pressure and the different methods and techniques used to measure this variable.
The dead-weight calibrator consists of a cylinder in which interior a precision piston is fitted and slid. Different weights are added to generate inside the cylinder a certain amount of preset pressures.
The Bourdon manometer and the pressure sensor, which must be checked and calibrated, are connected to the cylinder through a flexible tube. Any possible leakage outside the piston is directed through the flexible tube towards a vessel, to which a check valve is fitted to prevent pressure drop in the manometer due to that leakage.
The Bourdon manometer includes a scale calibrated in degrees of rotation, apart from the usual pressure scale.
The pressure sensor generates an output voltage proportional to the applied pressure.
An electronic console with two digital displays that show the output of the pressure sensor (in Volts) and the conditioned reading in engineering units. Besides the corresponding signals are sent to an I/O port for their acquisition via software in a computer (PC).
Software used to acquire data and to obtain the calibration curve (with slope and ordinate in the origin) both in function of the angular displacement of the needle and in function of the output voltage of the sensor.

ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)

Worlddidac Quality Charter Certificate and
Worlddidac Member

SPECIFICATIONS

Bench-top unit mounted on an anodized aluminum structure and panel of painted steel.

Main metallic elements of stainless steel.

Dead-weight calibrator:

Diameter of the piston: 18 mm.

Area of the piston: 0.000254469 m^2.

Weight of the piston: 0.5 Kg.

It uses water for safety and ease of use purposes.

Set of weights:

0.5 Kg., 1 Kg., 2.5 Kg., 5 Kg.

Bourdon type manometer, connected to the dead weight calibrator, range: 0-2.5 Bar (250kN/m^2), class: 1.6. It includes a scale calibrated in degrees of rotation, apart from the usual pressure scale.

Electronic pressure sensor, connected to the dead weight calibrator, range: 0-2.5 Bar (250kN/m^2).

Vessel, made of PMMA, to facilitate the priming of the calibrator.

An electronic console with two digital displays that show the output of the pressure sensor (in Volts) and the conditioned reading in engineering units. Besides the corresponding signals are sent to an I/O port for their acquisition via software in a computer (PC).

Electronic console:

Metallic box.

Pressure sensor connection.

Digital display for the pressure sensor (in kN/m^2). Digital display for the pressure sensor (in Volts).

Connection to computer (PC).

Software to acquire data and to obtain the calibration curve (with slope and ordinate in the origin) both in function of the angular displacement of the needle and in function of the output voltage of the sensor.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Study of the concept of pressure (force/area).

2.- Study of the function of a dead-weight pressure calibrator.

3.- Study of the concepts of measurement and calibration (gauge and absolute pressures, zero error, non-linearity, scale error, conversion of arbitrary scale into engineering units).

4.- Study of pressure scales.

5.- Study of the operation and characteristic behaviour of a Bourdon type manometer.

6.- Checking the readings of a Bourdon type manometer using a standard set of calibrated weights.

7.- Calibration of a Bourdon type manometer in engineering units (kN/m^2).

8.- Calibration of a Bourdon type manometer in arbitrary units (angular displacement of needle).

9.- Study of the operation and characteristic behaviour of a pressure sensor.

10- Calibration of a pressure sensor (output voltage of the sensor).

11.-Calibration of a pressure sensor and signal conditioning circuit in engineering units.

12.-Study of the sources of error in measuring and calibration (signal conditioning, manufacturing tolerances, display resolution, friction and backlash…).

REQUIRED SERVICES

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

RECOMMENDED ACCESSORIES

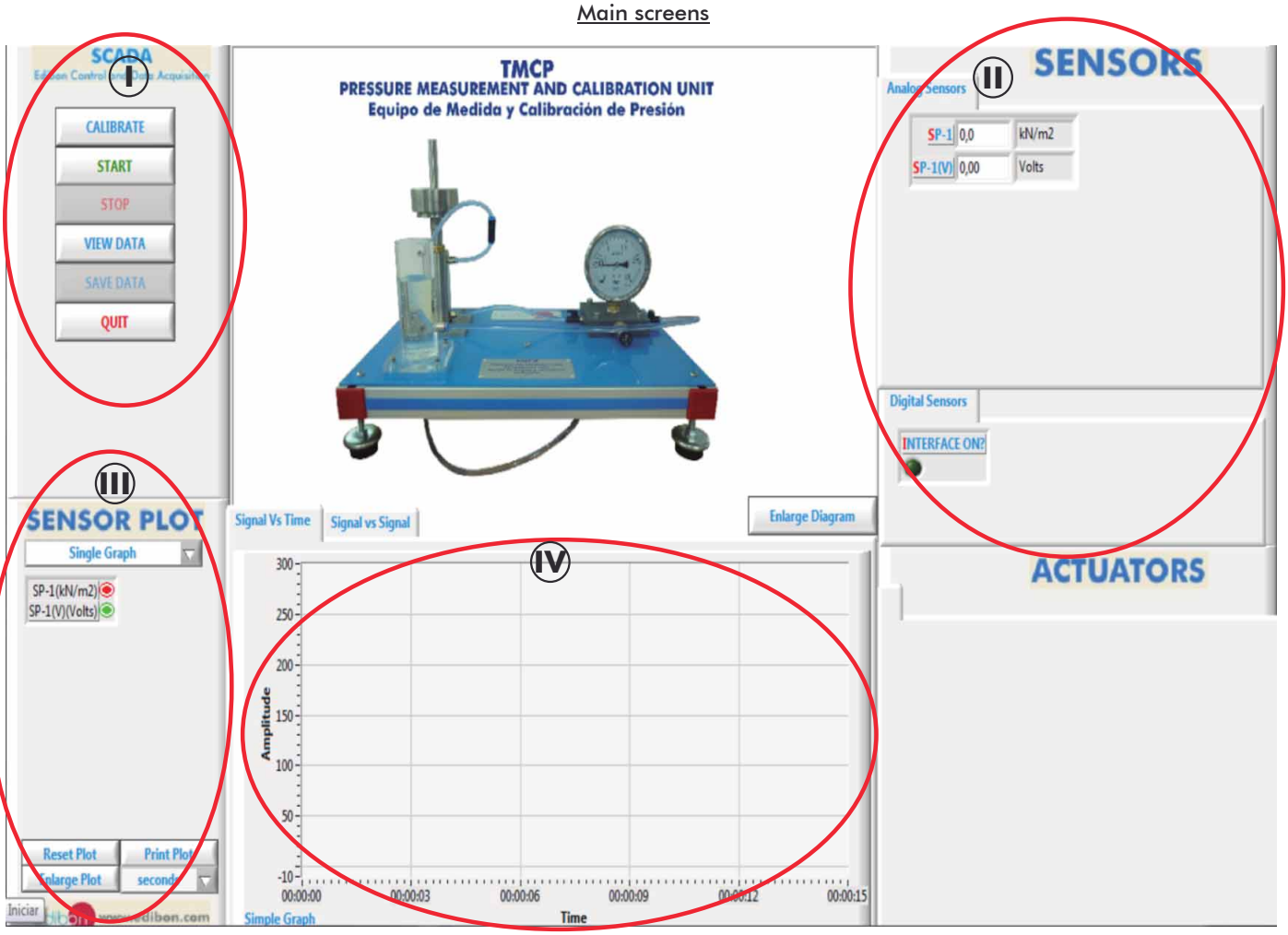
- Precision balance (0-5 Kg).

DIMENSIONS & WEIGHTS

TMCP:

Unit:	-Dimensions:	500 x 350 x 350 mm. approx. (19.68 x 13.78 x 13.78 inches approx.)
	-Weight:	15 Kg. approx. (33 pounds approx.)
Electronic console:	-Dimensions:	310 x 220 x 145 mm. approx. (12.20 x 8.66 x 5.70 inches approx.).
	-Weight:	3 Kg. approx. (6.6 pounds approx.)

Main screens



Ⓘ Main software operation possibilities.

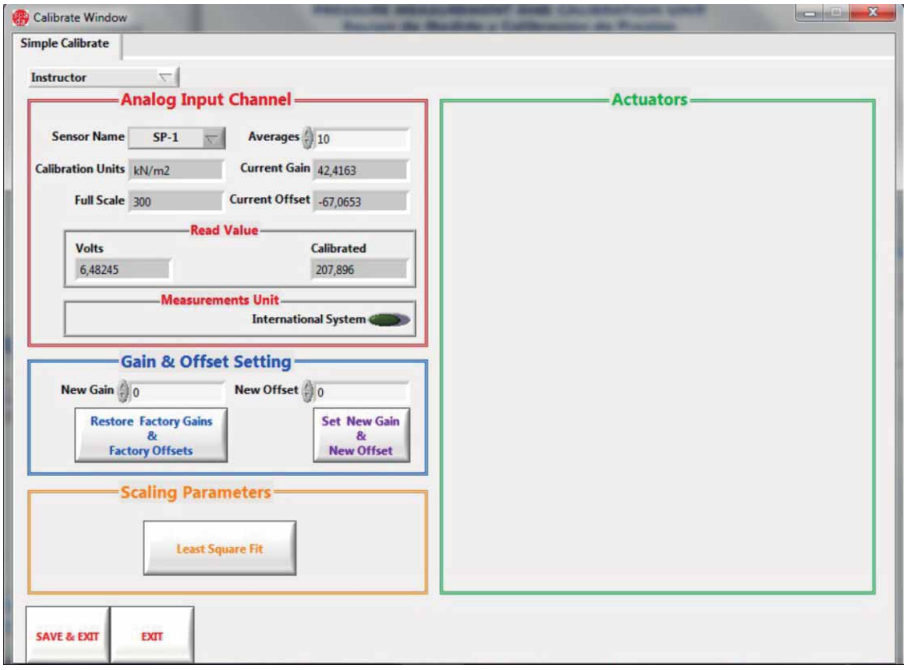
Ⓘ Ⓘ Sensors displays, real time values, and extra output parameters. Sensor: SP=Pressure sensor.

Ⓘ Ⓘ Ⓘ Channel selection and other plot parameters.

Ⓘ Ⓥ Real time graphics displays.

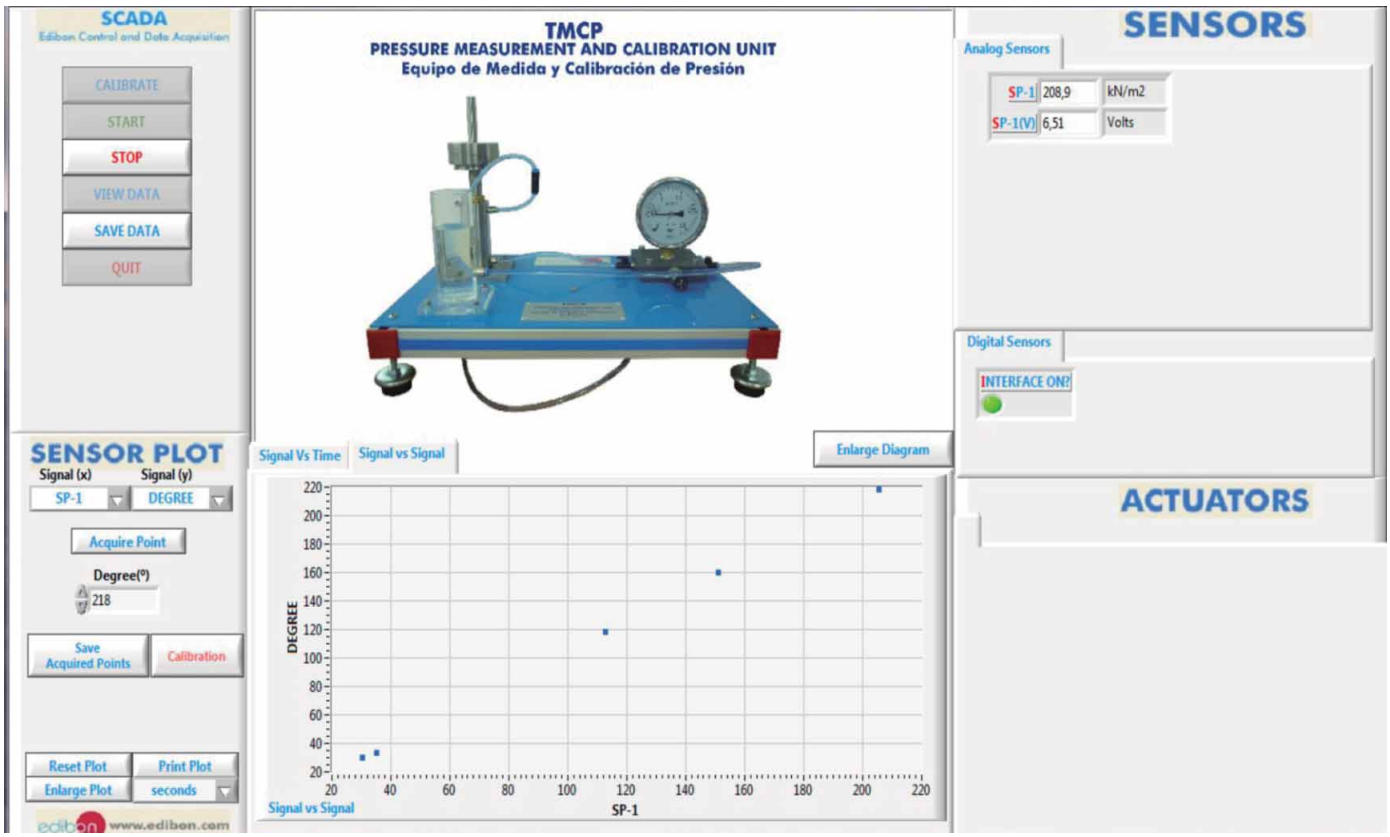
Software for Sensors Calibration

Example of screen

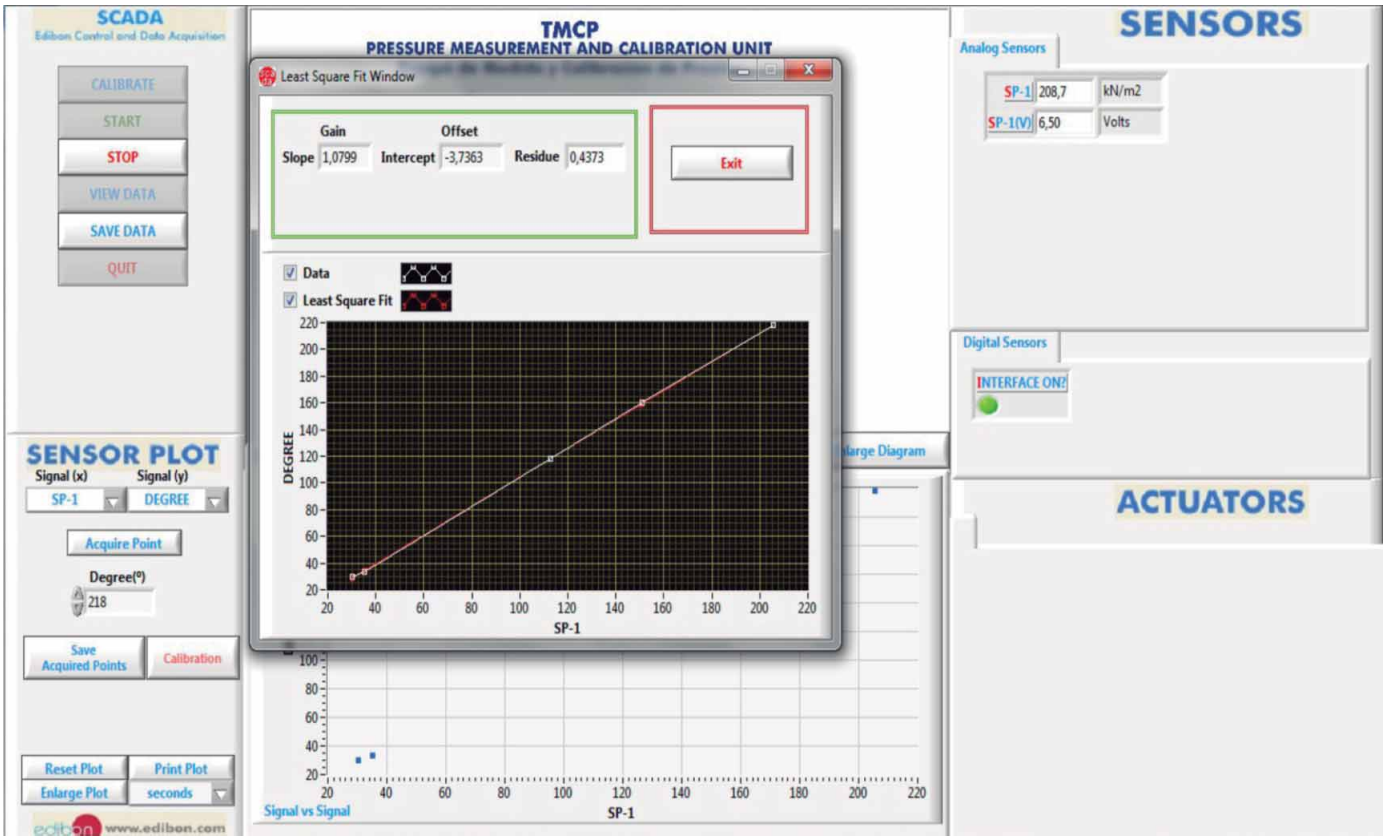


By using a free of charge code, the teacher and the students can calibrate the unit.
The teacher can recover his/her own calibration by using the EDIBON code that we give free of charge.

Example of data acquisition and pressure sensor calibration in function of the angular displacement of the Bourdon manometer needle.



The software provides the calibration curve of the pressure sensor in function of the values of angular displacement of the Bourdon manometer needle introduced. The values of the slope and ordinate in the origin are obtained from the calibration curve.



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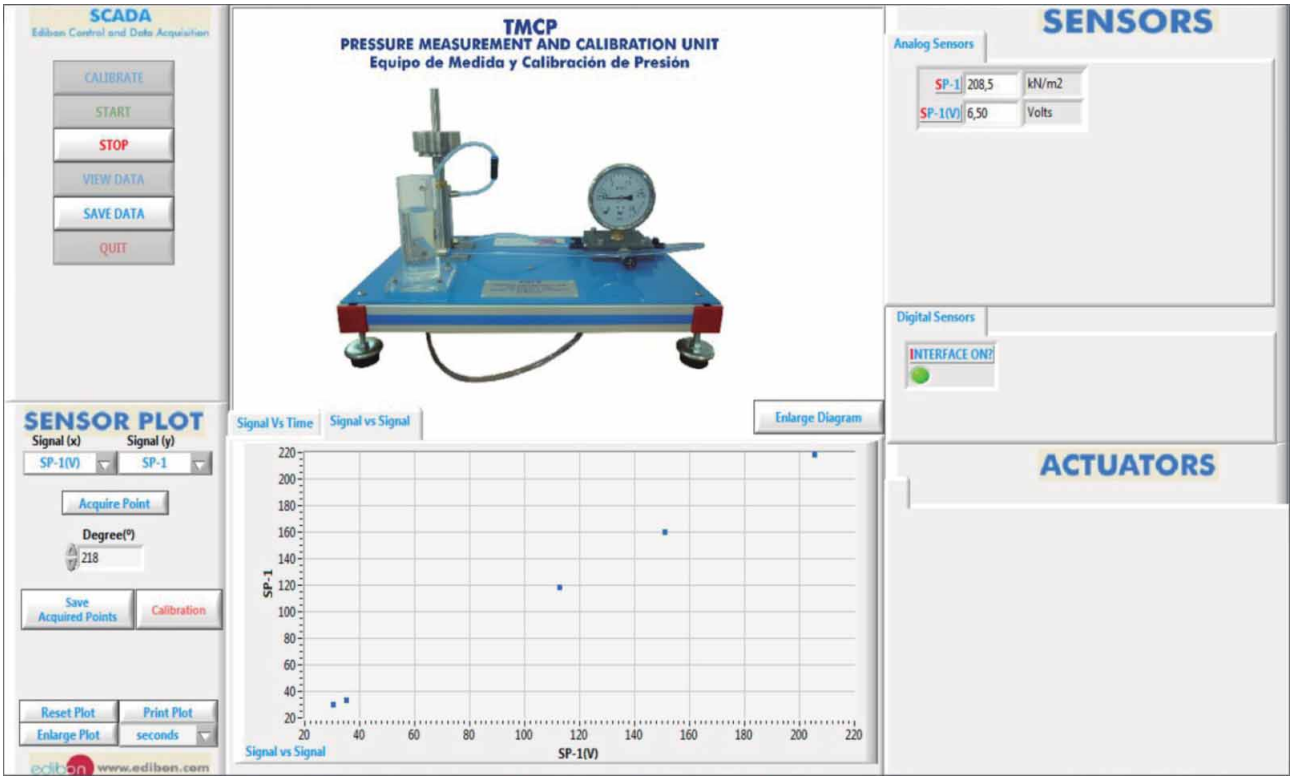
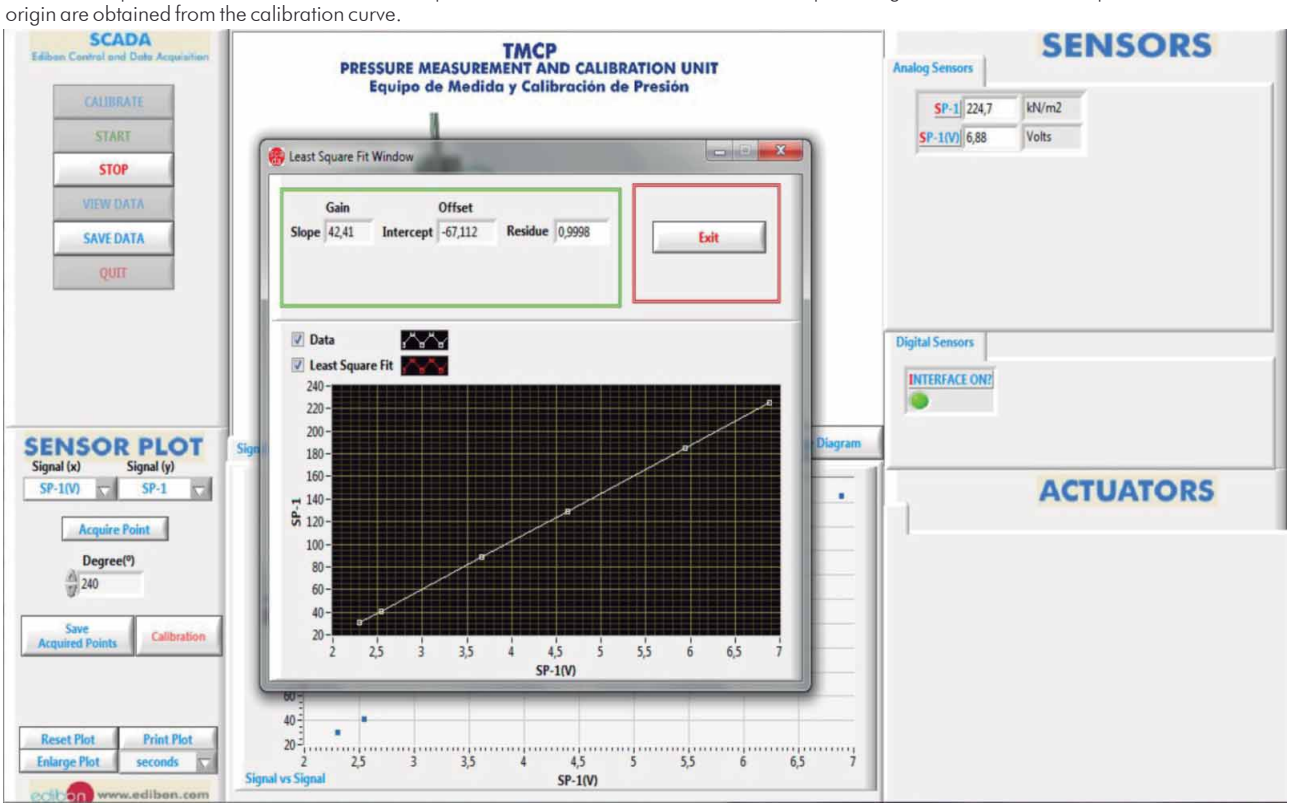
Example of data acquisition and pressure sensor calibration in function of the output voltage of the sensor.



The software provides the calibration curve of the pressure sensor in function of the sensor output voltage. The values of the slope and ordinate in the origin are obtained from the calibration curve.



✱Specifications subject to change without previous notice, due to the convenience of improvements of the product.

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REPRESENTATIVE: