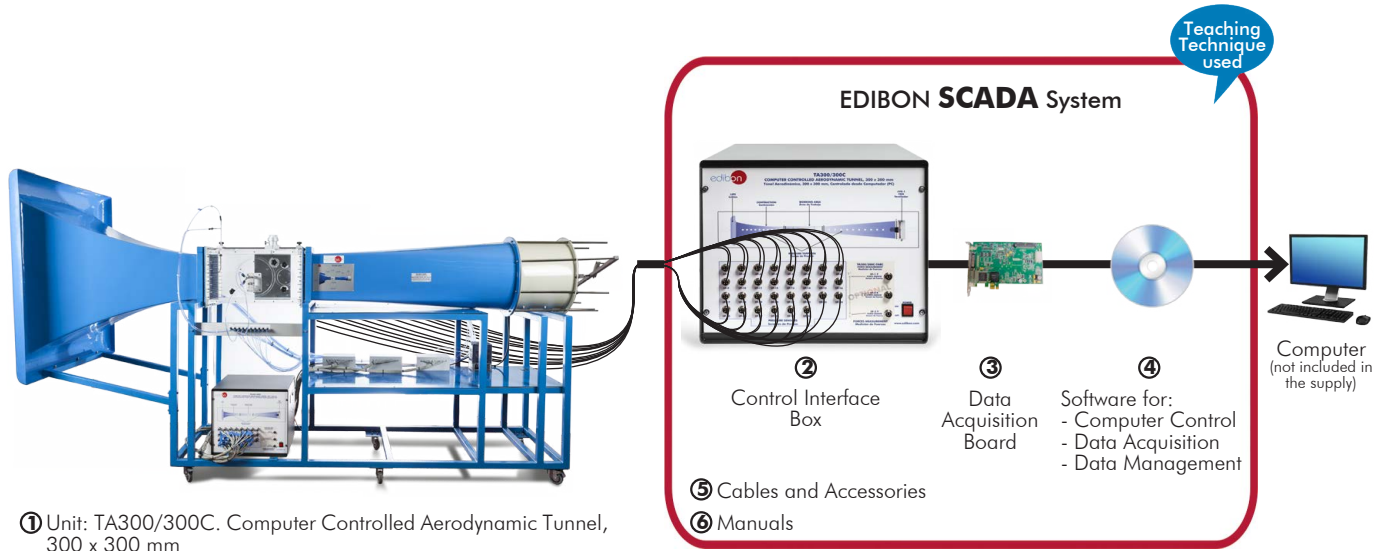


Computer Controlled Aerodynamic Tunnel, 300 x 300 mm, with SCADA

TA300/300C



* Minimum supply always includes: 1 + 2 + 3 + 4 + 5 + 6
(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
8.- FLUID MECHANICS

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

Aerodynamics is the part of fluid mechanics that studies the motion of gases and the forces or reactions to which the bodies they interact with are subjected. Aerodynamics is not only important by itself but also as a complement to aeronautics. According to Mach number, or relative speed of a movable object with respect to air, these studies are divided into subsonic and supersonic aerodynamics, depending on whether that number is higher or lower than one.

Knowing the aerodynamics principles is useful for many activities, from the take-off and piloting of an airplane to driving a car or kicking a ball. Every time we move or throw an object, there are many physical principles acting, but we do not notice them.

Aerodynamic test tunnels are widely used to determine the actions of the wind on different types of bodies. The model under study remains motionless, whereas the flow medium is set in motion to generate the desired flow.

GENERAL DESCRIPTION

The Computer Controlled Aerodynamic Tunnel, 300 x 300 mm, "TA300/300C", is a wind tunnel designed to study subsonic aerodynamics in a tunnel in open circuit and with incompressible subsonic flow. Air is drawn by a variable speed fan, computer controlled, located at the discharge end of the tunnel. Several models and accessories are available, allowing a comprehensive study of subsonic aerodynamics.

The unit includes several tunnel sections. In the same order in which the flow crosses them, they are: lips, haven section, contraction, working area, diffuser and fan.

Lips and a haven section are incorporated at the tunnel inlet to reduce the pressure drop and the interferences in the flow. An 9.5:1 contraction ratio and a perfectly studied contour curve of the contraction ensures well developed airflow through the working area.

The working area is located after the contraction. It is a constant section tract, where the models to be tested are assembled, and the dimensions of the transverse section is bigger than the models. It is made of clear acrylic resin to allow to observe the models. This section includes a Pitot static tube in the top side to study the static pressure, dynamic pressure and total pressure.

A diffuser is included at the tunnel outlet to avoid the generation of turbulences, which can generate damages in the current quality at the working area.

An axial-flow fan, located at the discharge end of the tunnel, provides a more uniform velocity profile at the working area.

There are sixty different appropriate tapings for the pressure takings (along the tunnel and in the different models). The unit includes thirty differential pressure sensors to measure the static pressure.

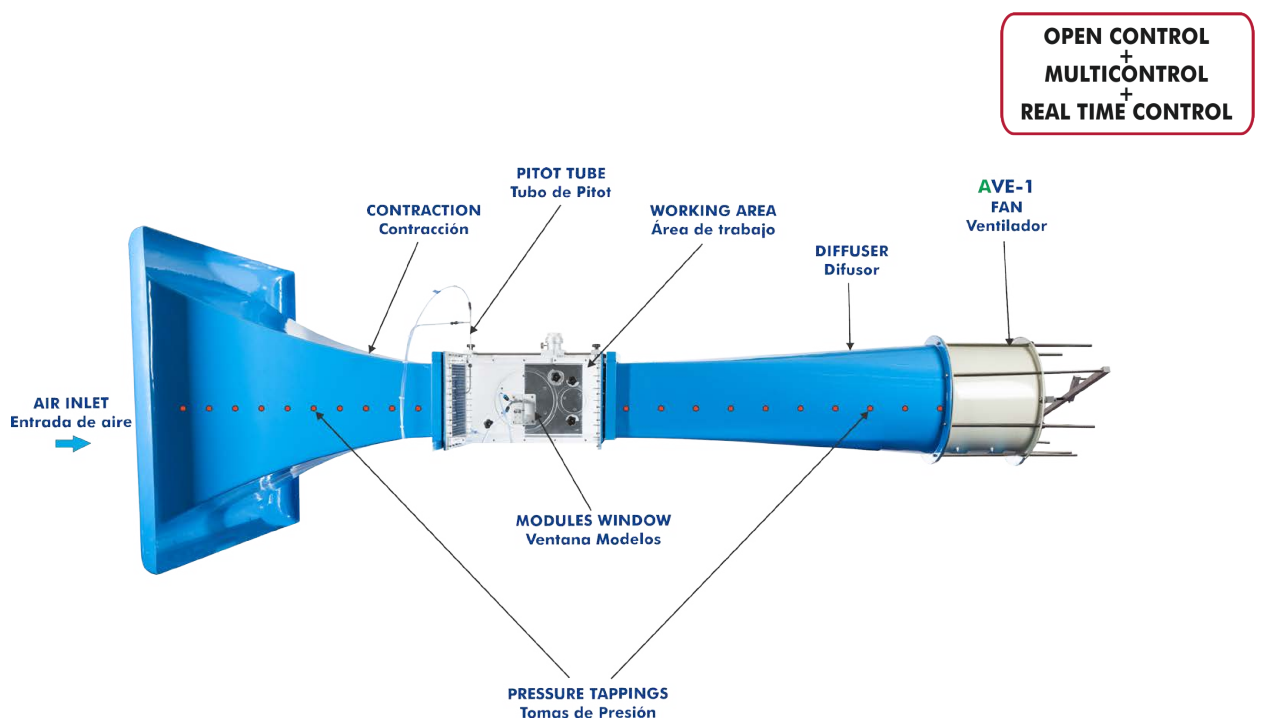
The models are mounted on a circular hatch, and they are coupled to the working area to seal the opening. They are secured by knobs on the side wall of the working area.

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.



TA300/300C detail

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, 9 and 10.

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

① **TA300/300C. Unit:**

Bench-top wind tunnel in open circuit and with incompressible subsonic flow.

Anodized aluminum frame and panels made of painted steel.

Main metallic elements made of stainless steel.

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

Inlet section with lips, a haven section and a 9.5:1 contraction ratio.

Transparent working area of 300 x 300 mm and length of 600 mm to assemble and test the different models.

The working area includes a Pitot static tube mounted in the top side.

Outlet section with diffuser that allows to avoid the generation of turbulences, which can generate damages the current quality in the working area.

Variable speed axial-flow fan, computer controlled:

Air velocity in the working area: 0 – 34 m/s.

Power: 1.5 kW.

Sixty different pressure tapping (along the tunnel and in the models).

Thirty differential pressure sensors, range: 0 – 1 psi.

Several models and accessories are available, allowing a comprehensive study of subsonic aerodynamics.

Some models include several pressure tapings.

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.

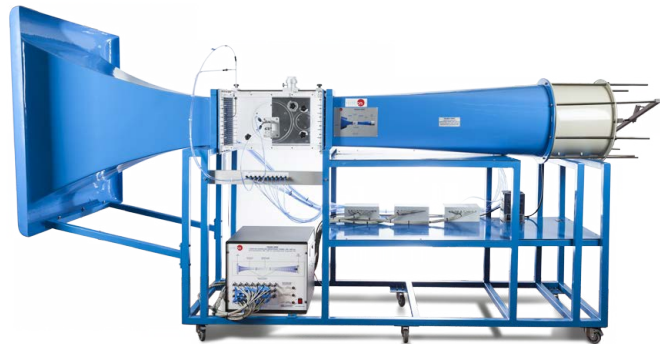
Remote operation and control by the user and remote control for EDIBON technical support, are always included.

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.



Unit: TA300/300C

Example of required element:
(at least one)



TA300/F16. F-16 Airplane Model



TA1/300. Sphere Drag Model



TA300/MP. Yaw Probe

Required elements (at least one) (Not included):

- TA1/300. Sphere Drag Model (requires the model TA300/300C-TARC).
- TA2/300. Drag Model of Hemisphere Convex to Airflow (requires the model TA300/300C-TARC).
- TA3/300. Circular Plate Drag Model (requires the model TA300/300C-TARC).
- TA4/300. Ring Drag Model (requires the model TA300/300C-TARC).
- TA5/300. Square Plate Drag Model (requires the model TA300/300C-TARC).
- TA6/300. Cylinder Drag Model (requires the model TA300/300C-TARC).
- TA7/300. Streamlined Shape Drag Model (requires the model TA300/300C-TARC).
- TA8/300. Paraboloid Drag Model (requires the model TA300/300C-TARC).
- TA9/300. Drag Model of Hemisphere Concave to Airflow (requires the model TA300/300C-TARC).
- TA10/300. Wing with Flaps Drag Model (requires the model TA300/300C-TARC).
- TA11/300. Flag Drag Model (requires the model TA300/300C-TARC).
- TA12/300. Wing Model with NACA 0015 Profile (requires the model TA300/300C-TARC).
- TA13/300. Wing Model with NACA 54118 Profile (requires the model TA300/300C-TARC).
- TA14/300. Wing Model with NACA 4415 Profile (requires the model TA300/300C-TARC).
- TA15/300. Dimpled Sphere Drag Model (requires the model TA300/300C-TARC).
- TA16/300. Set for Alternative Models Projects.
- TA17/300. Pitot Tube.
- TA18/300. Wake Survey Rake.

- TA19/300. Pressure Distribution in a Wing Model with NACA 0015 Profile.
- TA20/300. Pressure Distribution in a Wing Model with NACA 54118 Profile.
- TA21/300. Pressure Distribution in a Wing Model with NACA 4415 Profile.
- TA22/300. Pressure Distribution in a Cylinder.
- TA23/300. Bernoulli Apparatus Model (requires the model TA17/300).
- TA24/300. Spring-mounted Wing Model.
- TA25/300. Car Model.
- TA26/300. Prandtl Tube.
- TA300/A320. AIRBUS A-320 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/A380. AIRBUS A-380 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/B737. BOING 737 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBA36. BEECH BONANZA A-36 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBV35. BEECH BONANZA V-35 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/F16. F-16 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/MP. Accessory for Models Positioning (requires at least an airplane model or the model TA300/YP).
- TA300/300C-TARC. Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model or an airplane model).
- TA300/300-BLE. Model to Study the Boundary Layer in a Flat Plate (requires the model TA17/300).
- TA300/300-SGI. Smoke Generator.
- TA300/MB. Manometers Board. 24 Manometric Tubes of 250 mm length.
- TA300/SC. Storage Cabinet.
- TA300/YP. Yaw Probe (requires the model TA300/MP).
- APIV/30. PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm.

② TA300/300C/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.

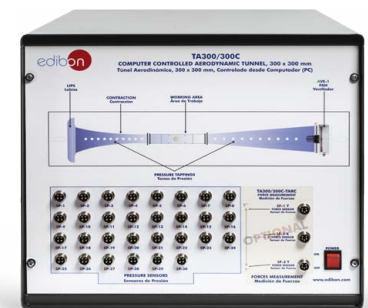
Real time computer control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.

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.



TA300/300C/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.

The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.



DAB

④ TA300/300C/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).

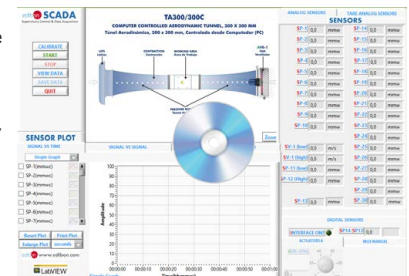
Calibration system for the sensors involved in the process.

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.



TA300/300C/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: TA300/300C + TA300/300C/CIB + DAB + TA300/300C/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

Required elements (at least one) (Not included)



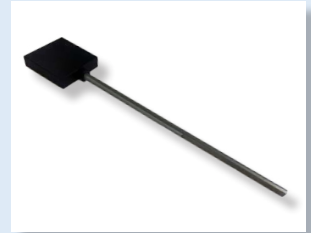
TA1/300. Sphere Drag Model
(requires the model
TA300/300C-TARC)



TA2/300. Drag Model of
Hemisphere Convex to Airflow
(requires the model
TA300/300C-TARC)



TA3/300. Circular Plate
Drag Model
(requires the model
TA300/300C-TARC)



TA5/300. Square Plate
Drag Model
(requires the model
TA300/300C-TARC)



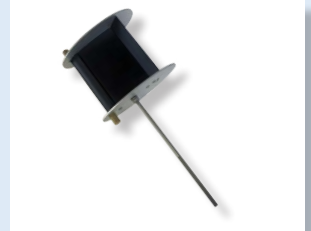
TA6/300. Cylinder Drag Model
(requires the model
TA300/300C-TARC)



TA7/300. Streamlined
Shape Drag Model
(requires the model
TA300/300C-TARC)



TA9/300. Drag Model of
Hemisphere Concave to Airflow
(requires the model
TA300/300C-TARC)



TA10/300. Wing with
Flaps Drag Model
(requires the model
TA300/300C-TARC)



TA12/300. Wing Model
with NACA 0015 Profile
(requires the model
TA300/300C-TARC)



TA13/300. Wing Model
with NACA 54118 Profile
(requires the model
TA300/300C-TARC)



TA15/300. Dimpled Sphere
Drag Model
(requires the model
TA300/300C-TARC)



TA17/300. Pitot Tube



TA18/300. Wake Survey Rake



TA19/300. Pressure Distribution in a
Wing Model with NACA 0015 Profile



TA20/300. Pressure Distribution in a
Wing Model with NACA 54118 Profile



TA22/300. Pressure Distribution
in a Cylinder



TA23/300. Bernoulli
Apparatus Model
(requires the model
TA17/300)



TA24/300. Spring-mounted
Wing Model

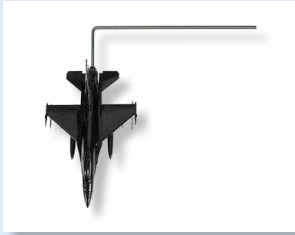


TA25/300. Car Model



TA300/A380. AIRBUS A-380
Airplane Model (requires the
model TA300/MP or the model
TA300/300C-TARC)

Required elements (at least one) (Not included)



TA300/F16. F-16 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC)



TA300/MP. Accessory for Models Positioning (requires at least an airplane model or the model TA300/YP)



TA300/MB. Manometers Board. 24 Manometric Tubes of 250 mm length



TA300/300C-TARC. Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model or an airplane model)



TA300/300-BLE. Model to Study the Boundary Layer in a Flat Plate (requires the model TA17/300)



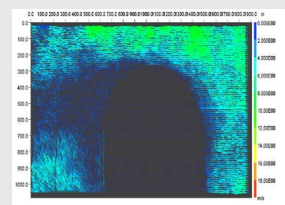
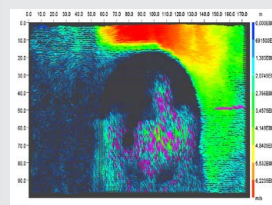
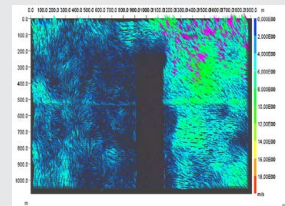
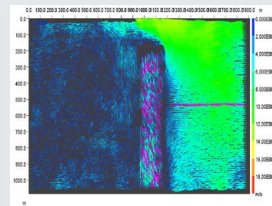
TA300/300-SGI. Smoke Generator



TA300/YP. Yaw Probe (requires the model TA300/MP)



APIV/30. PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm



EXERCISES AND PRACTICAL POSSIBILITIES TO BE DONE WITH THE MAIN ITEMS

- 1.- Comprehensive study of subsonic aerodynamics and airflow studies.
 - 2.- Study of flow visualization.
 - 3.- Study of static pressure, dynamic pressure and total pressure using a Pitot' tube.
 - 4.- Study of velocity measurement using a Pitot tube.
 - 5.- Flux in a nozzle: Determination of the characteristics of the pressures field in a nozzle.
 - 6.- Flux in a nozzle: Observation of the local characteristics, depending on whether the walls have a curvature or not, as well as what happens at the inlet and outlet areas of the contraction.
- Additional practical possibilities:
- 7.- Sensors calibration.
- Additional practical possibilities to be done with the required elements (at least one) (Not included):
- 8.- Display of flows around different drag models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 9.- Determination of the drag coefficient and the lift coefficient in different models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 10.- Measurement of drag forces and lift forces in different models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 11.- Study of pressure and flow distribution around a model:
 - Pressure Distribution in a Wing Model with NACA 0015 Profile (TA19/300).
 - Pressure Distribution in a Wing Model with NACA 54118 Profile (TA20/300).
 - Pressure Distribution in a Wing Model with NACA 4415 Profile (TA21/300).
 - Pressure Distribution in a Cylinder (TA22/300).
 - 12.- Study of effect of changing in Bernoulli Apparatus Model (TA23/300) the cross section and application of the Bernoulli equation.
 - 13.- Investigation into the influence of models shape in the drag forces (Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model) (TA300/300C-TARC)).
 - 14.- Study of static pressure, dynamic pressure and total pressure using a Pitot tube (TA17/300).
 - 15.- Study of Boundary Layer in a Flat Plate (TA300/300-BLE).
 - 16.- Demonstration of flow patterns around different objects with the Smoke Generator (TA300/300-SG1).
 - 17.- Study of static pressure, dynamic pressure and total pressure with the Wake Survey Rake (TA18/300).
 - 18.- Study of flutter (TA24/300).
 - 19.- Study of the PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm (APIV/30).
- Other possibilities to be done with this unit:
- 20.- Many students view results simultaneously.

To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 21.- 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.
 - 22.- The Computer Control System with SCADA allows a real industrial simulation.
 - 23.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
 - 24.- This unit can be used for doing applied research.
 - 25.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 26.- Control of the TA300/300C unit process through the control interface box without the computer.
 - 27.- Visualization of all the sensors values used in the TA300/300C 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

TA300/300C:

Unit:

- Dimensions: 3500 x 1300 x 1900 mm approx.
(137.79 x 51.18 x 74.80 inches approx.)
- Weight: 200 Kg approx.
(441 pounds approx.)

Control Interface Box:

- Dimensions: 490 x 450 x 470 mm approx.
(19.29 x 17.71 x 18.50 inches approx.)
- Weight: 20 Kg approx.
(44 pounds approx.)

REQUIRED ELEMENTS (Not included)

Required (at least one):

- TA1/300. Sphere Drag Model (requires the model TA300/300C-TARC).
- TA2/300. Drag Model of Hemisphere Convex to Airflow (requires the model TA300/300C-TARC).
- TA3/300. Circular Plate Drag Model (requires the model TA300/300C-TARC).
- TA4/300. Ring Drag Model (requires the model TA300/300C-TARC).
- TA5/300. Square Plate Drag Model (requires the model TA300/300C-TARC).
- TA6/300. Cylinder Drag Model (requires the model TA300/300C-TARC).
- TA7/300. Streamlined Shape Drag Model (requires the model TA300/300C-TARC).
- TA8/300. Paraboloid Drag Model (requires the model TA300/300C-TARC).
- TA9/300. Drag Model of Hemisphere Concave to Airflow (requires the model TA300/300C-TARC).
- TA10/300. Wing with Flaps Drag Model (requires the model TA300/300C-TARC).
- TA11/300. Flag Drag Model (requires the model TA300/300C-TARC).
- TA12/300. Wing Model with NACA 0015 Profile (requires the model TA300/300C-TARC).
- TA13/300. Wing Model with NACA 54118 Profile (requires the model TA300/300C-TARC).
- TA14/300. Wing Model with NACA 4415 Profile (requires the model TA300/300C-TARC).
- TA15/300. Dimpled Sphere Drag Model (requires the model TA300/300C-TARC).
- TA16/300. Set for Alternative Models Projects.
- TA17/300. Pitot Tube.
- TA18/300. Wake Survey Rake.
- TA19/300. Pressure Distribution in a Wing Model with NACA 0015 Profile.
- TA20/300. Pressure Distribution in a Wing Model with NACA 54118 Profile.
- TA21/300. Pressure Distribution in a Wing Model with NACA 4415 Profile.
- TA22/300. Pressure Distribution in a Cylinder.
- TA23/300. Bernoulli Apparatus Model (requires the model TA17/300).
- TA24/300. Spring-mounted Wing Model.
- TA25/300. Car Model.
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- TA300/B737. BOING 737 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBA36. BEECH BONANZA A-36 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBV35. BEECH BONANZA V-35 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/F16. F-16 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/MP. Accessory for Models Positioning (requires at least an airplane model or the model TA300/YP).
- TA300/300C-TARC. Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model or an airplane model).
- TA300/300-BLE. Model to Study the Boundary Layer in a Flat Plate (requires the model TA17/300).
- TA300/300-SGI. Smoke Generator.
- TA300/MB. Manometers Board. 24 Manometric Tubes of 250 mm length.
- TA300/SC. Storage Cabinet.
- TA300/YP. Yaw Probe (requires the model TA300/MP).
- APIV/30. PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm.

SIMILAR UNITS AVAILABLE

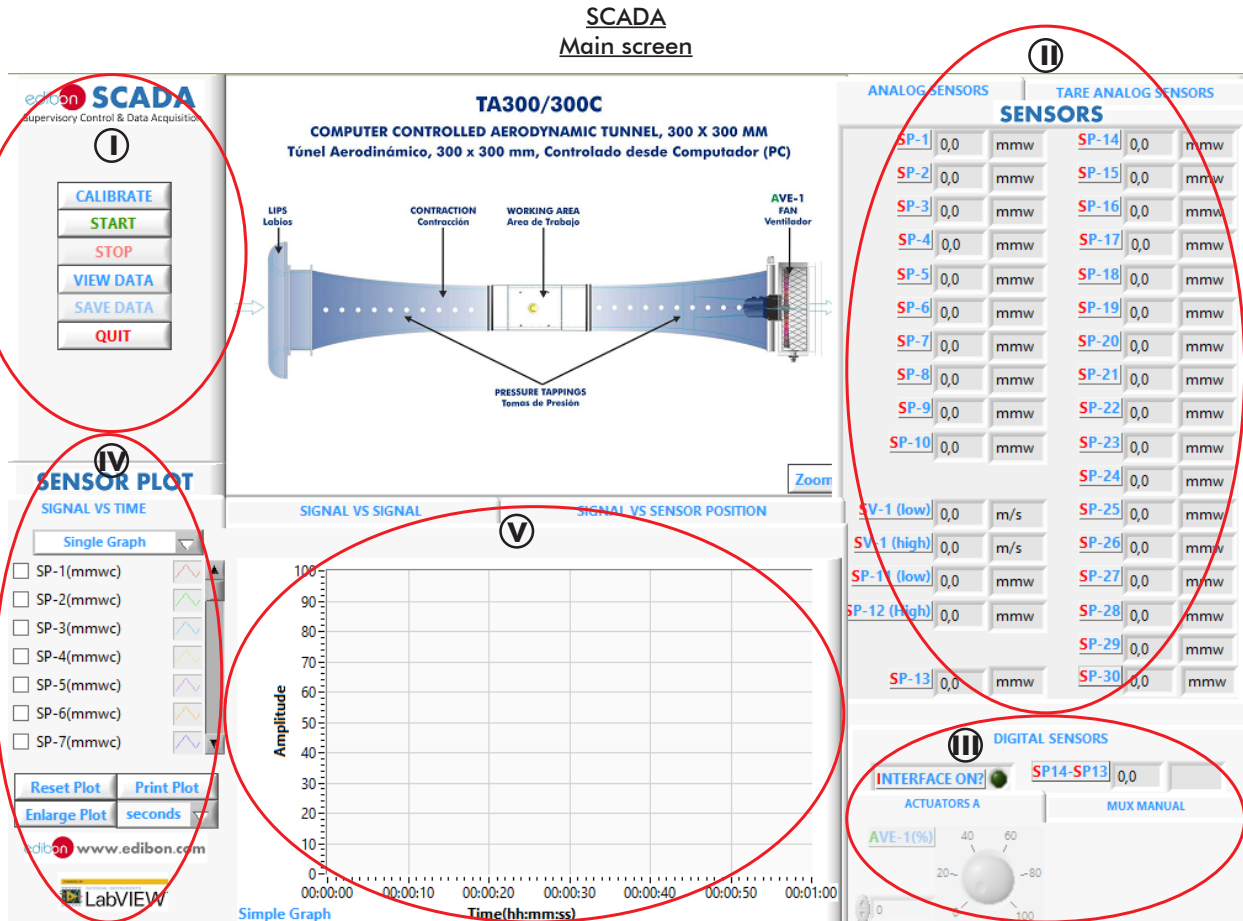
Offered in this catalog:

- TA300/300C. Computer Controlled Aerodynamic Tunnel, 300 x 300 mm.

Offered in other catalogs:

- TA300/300. Aerodynamic Tunnel, 300 x 300 mm.
- TA1200/1200C. Computer Controlled Aerodynamic Tunnel, 1200 x 1200 mm.
- TA1000/1000C. Computer Controlled Aerodynamic Tunnel, 1000 x 1000 mm.
- TA610/915C. Computer Controlled Aerodynamic Tunnel, 610 x 915 mm.
- TA50/250C. Computer Controlled Aerodynamic Tunnel, 50 x 250 mm.
- TA50/250. Aerodynamic Tunnel, 50 x 250 mm.

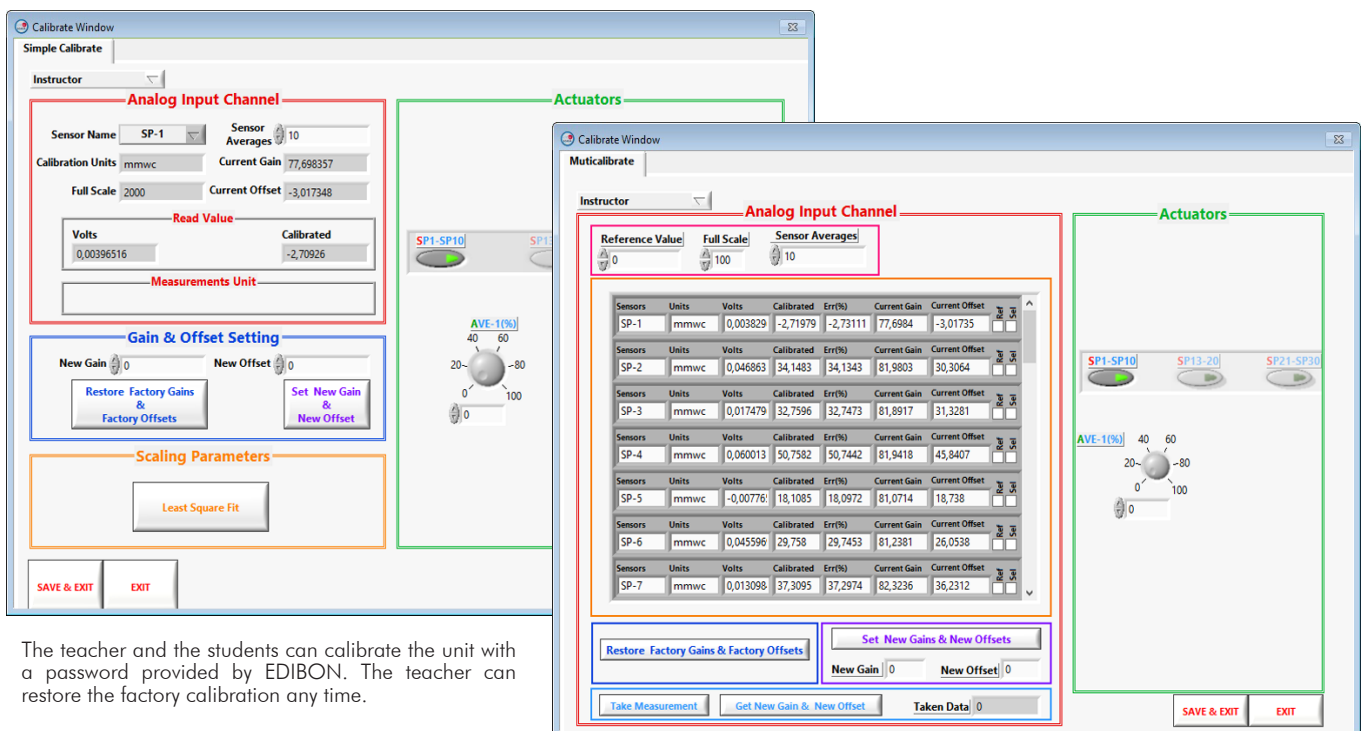
SOFTWARE MAIN SCREENS



- ❶ Main software operation possibilities.
- ❷ Sensors displays, real time values, and extra output parameters. Sensors: SP=Pressure sensor. SV=Speed sensor. SANG-1=Angle of rotation sensor. SF=Force sensor.
- ❸ Actuators controls. Actuators: AVE=Fan.
- ❹ Channel selection and other plot parameters.
- ❺ Real time graphics displays.

Software for Sensors Calibration

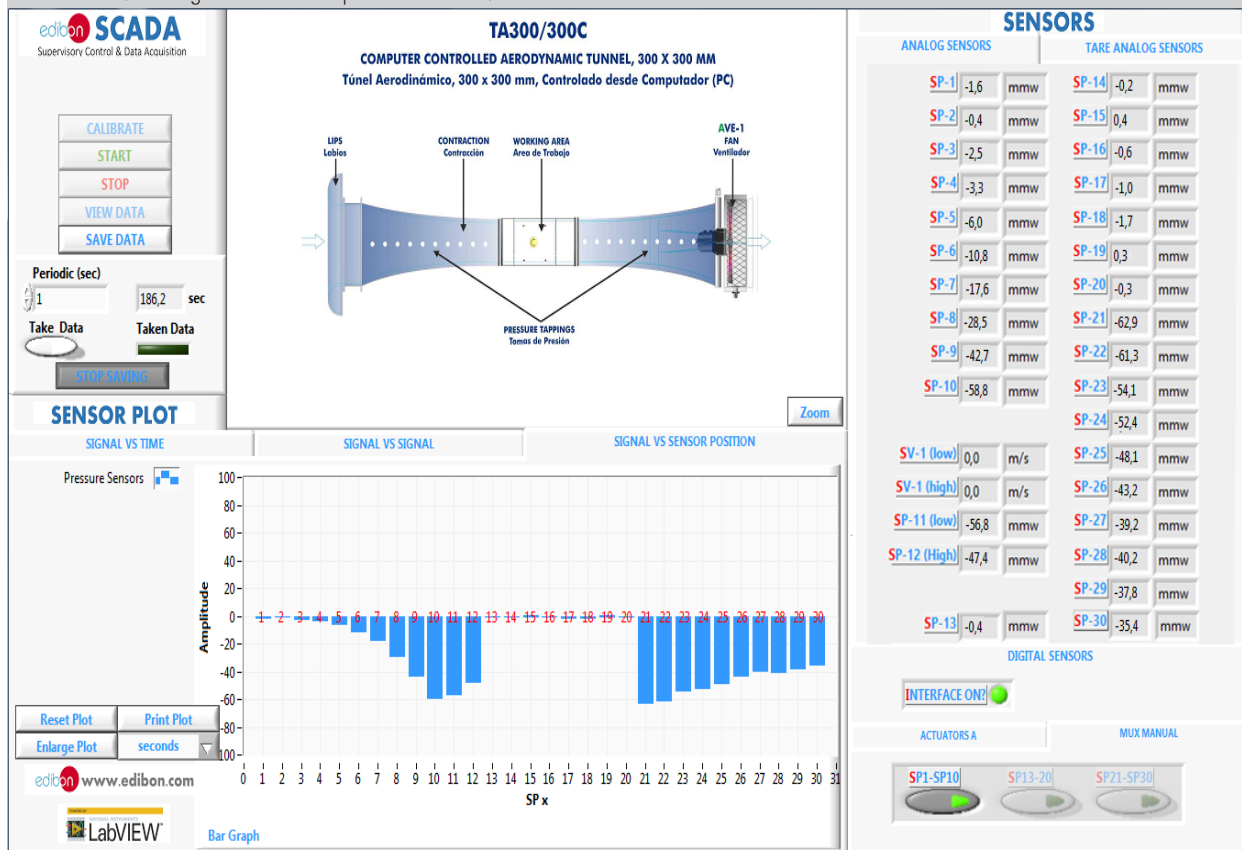
Example of screens



The teacher and the students can calibrate the unit with a password provided by EDIBON. The teacher can restore the factory calibration any time.

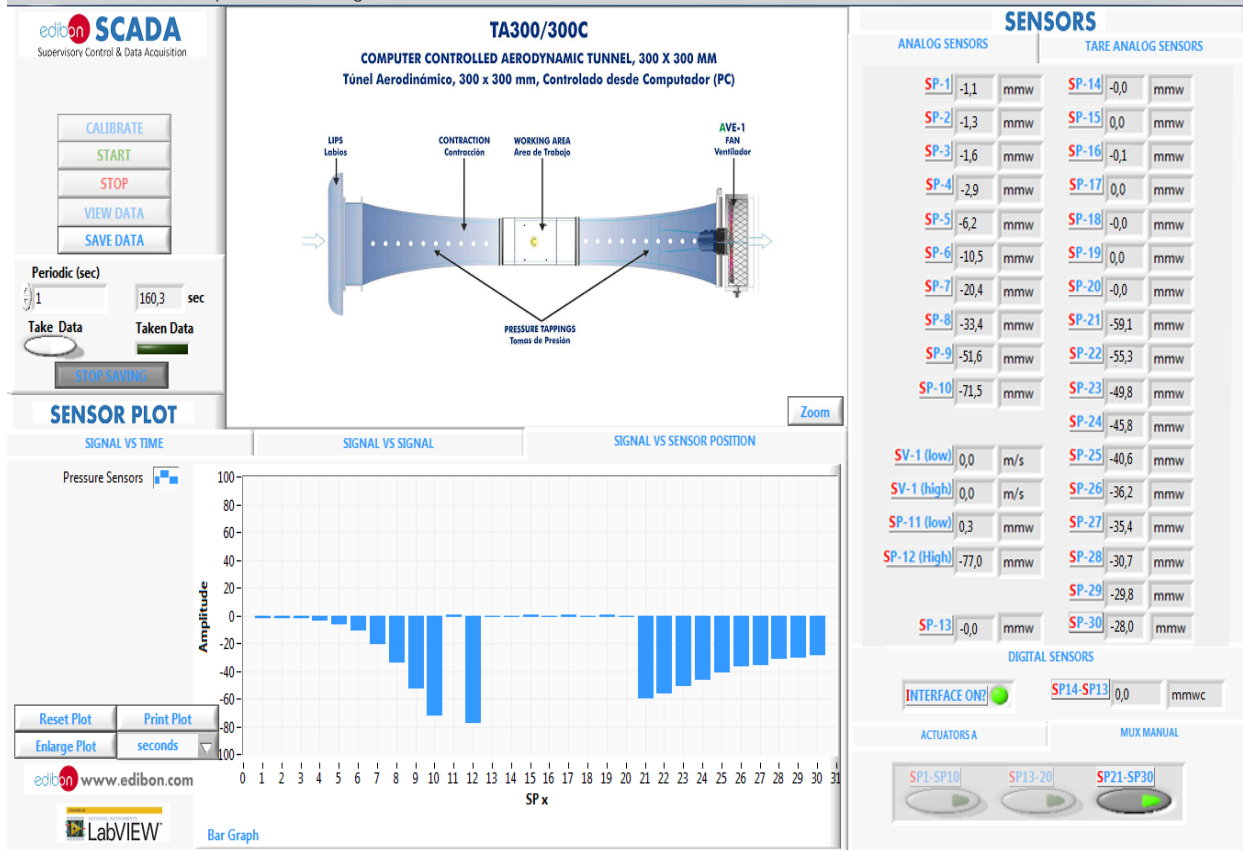


Pressure test: Plotting of the different pressure sensors.

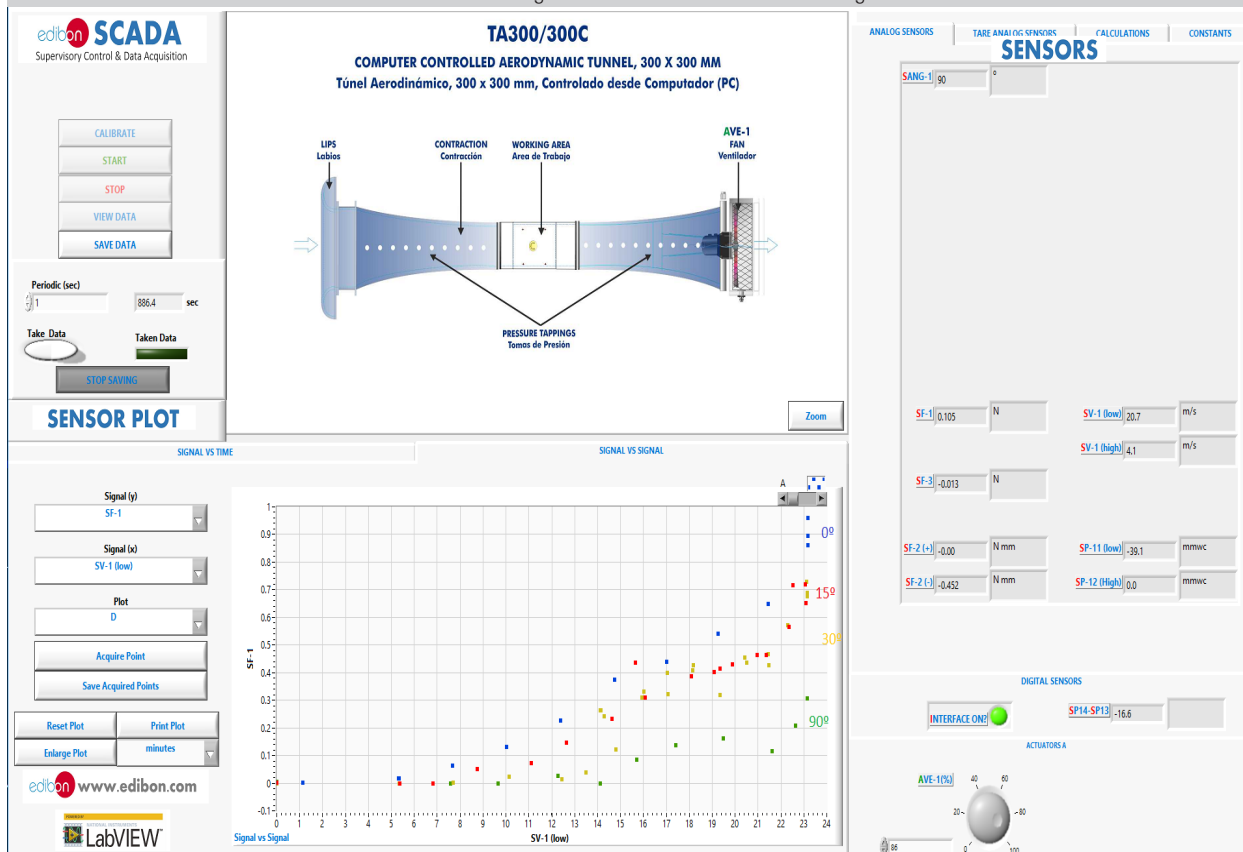


Some **real** results obtained from this unit

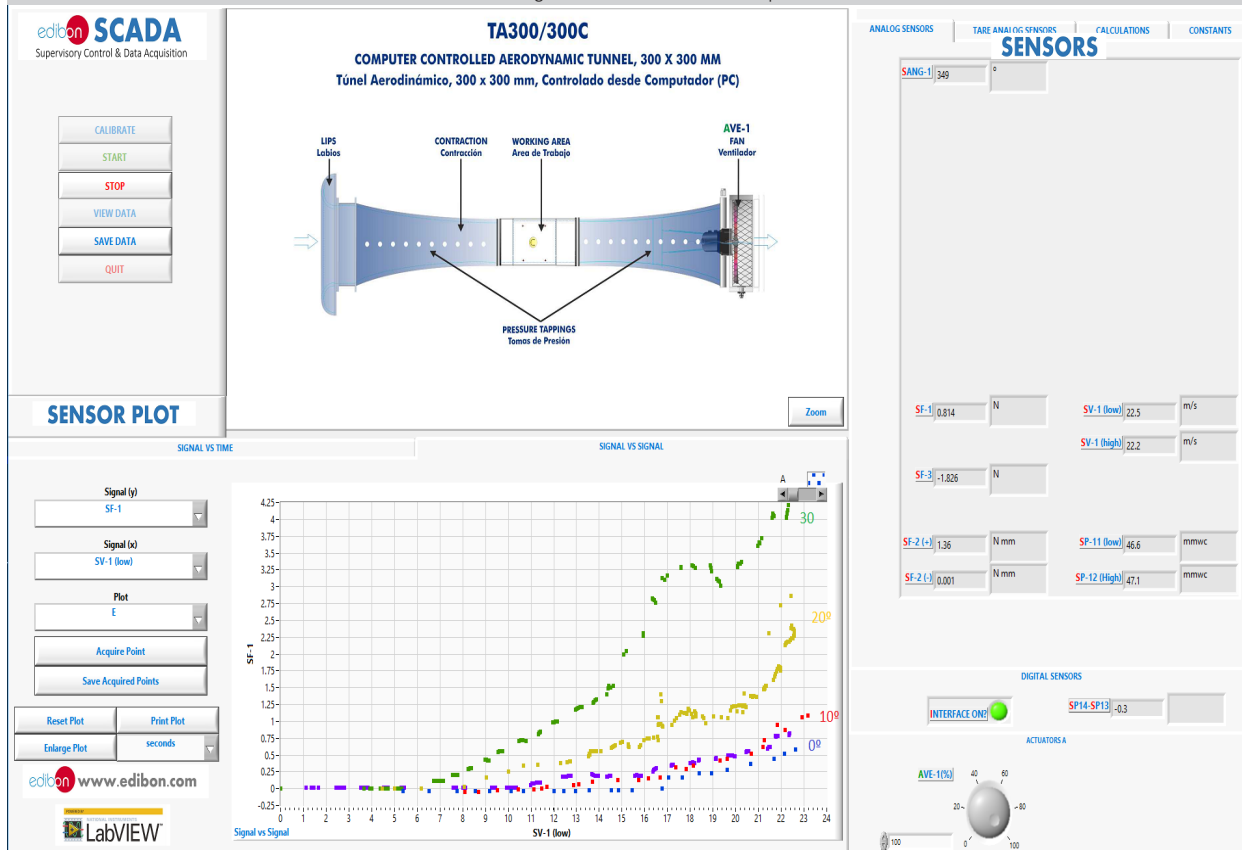
Pressure test: Pressure profile in a Wing Model with NACA 0015 Profile.



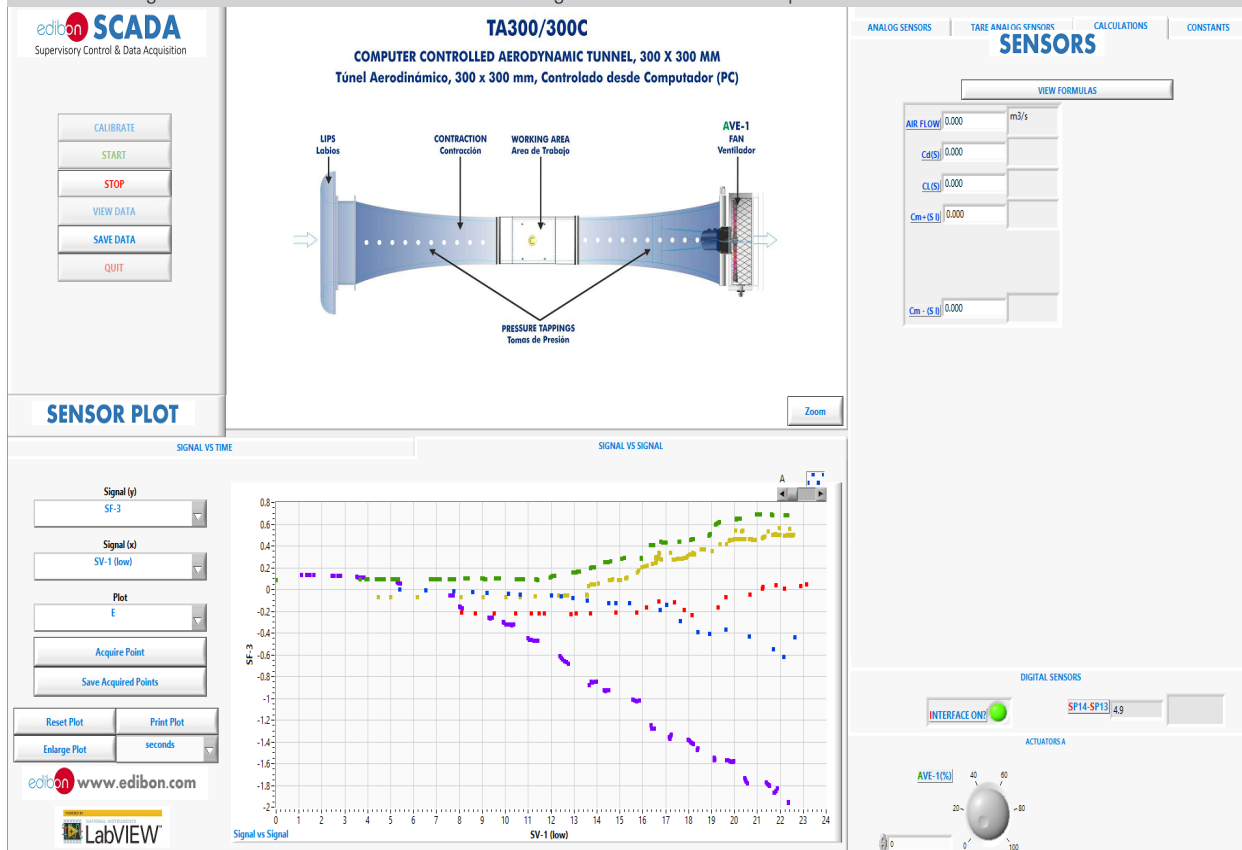
Force test: Lift force at different air velocities for various angles of incidence. Circular Plate Drag Model.



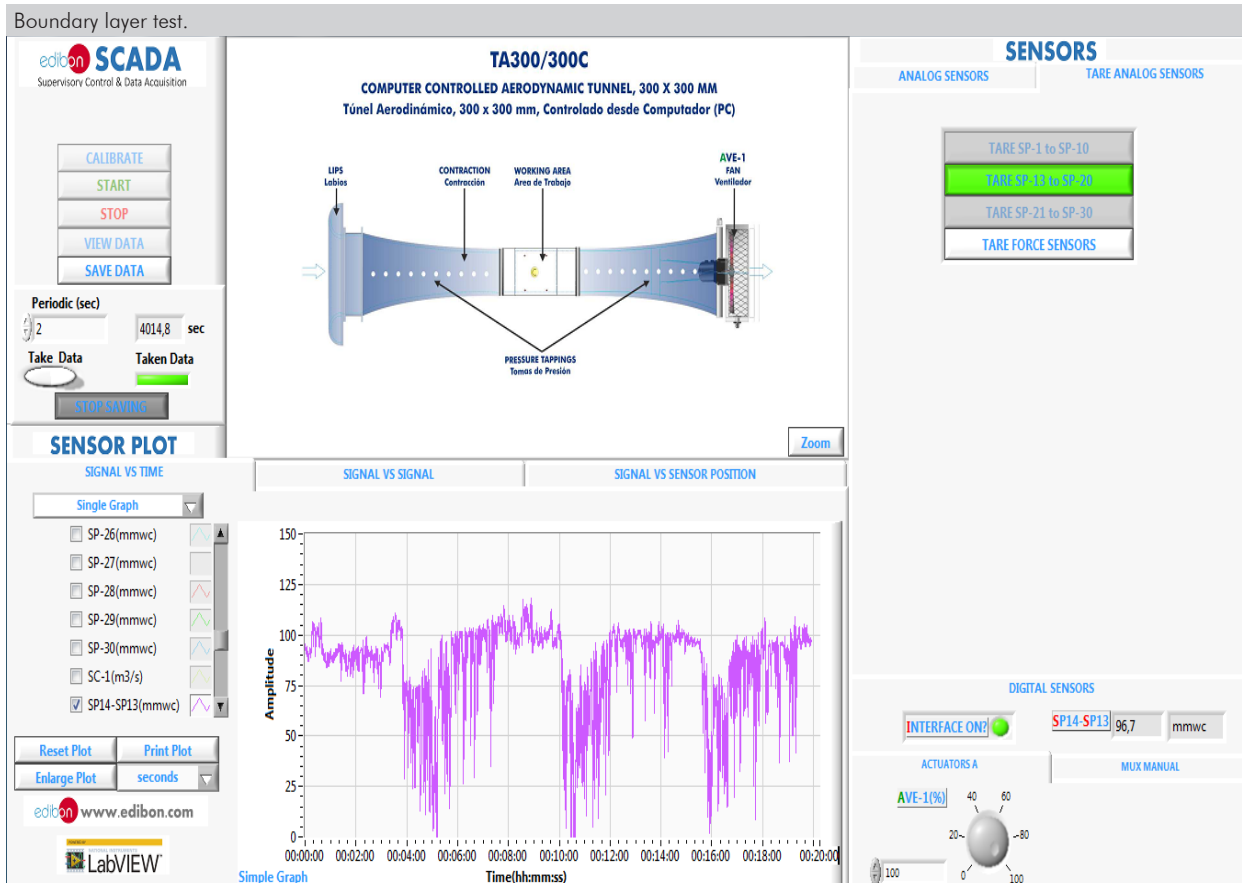
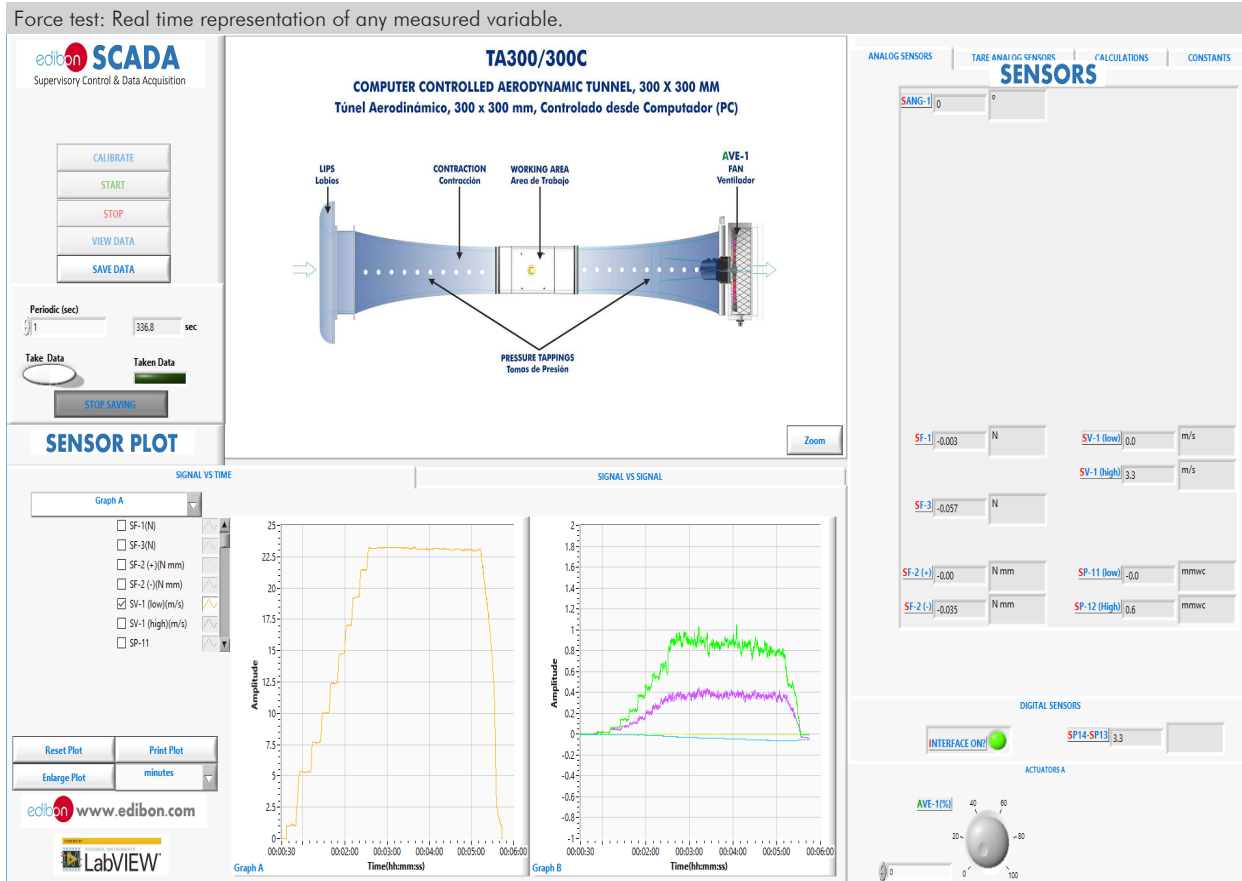
Force test: Lift force at different air velocities for various angles of incidence. F-16 Airplane Model.



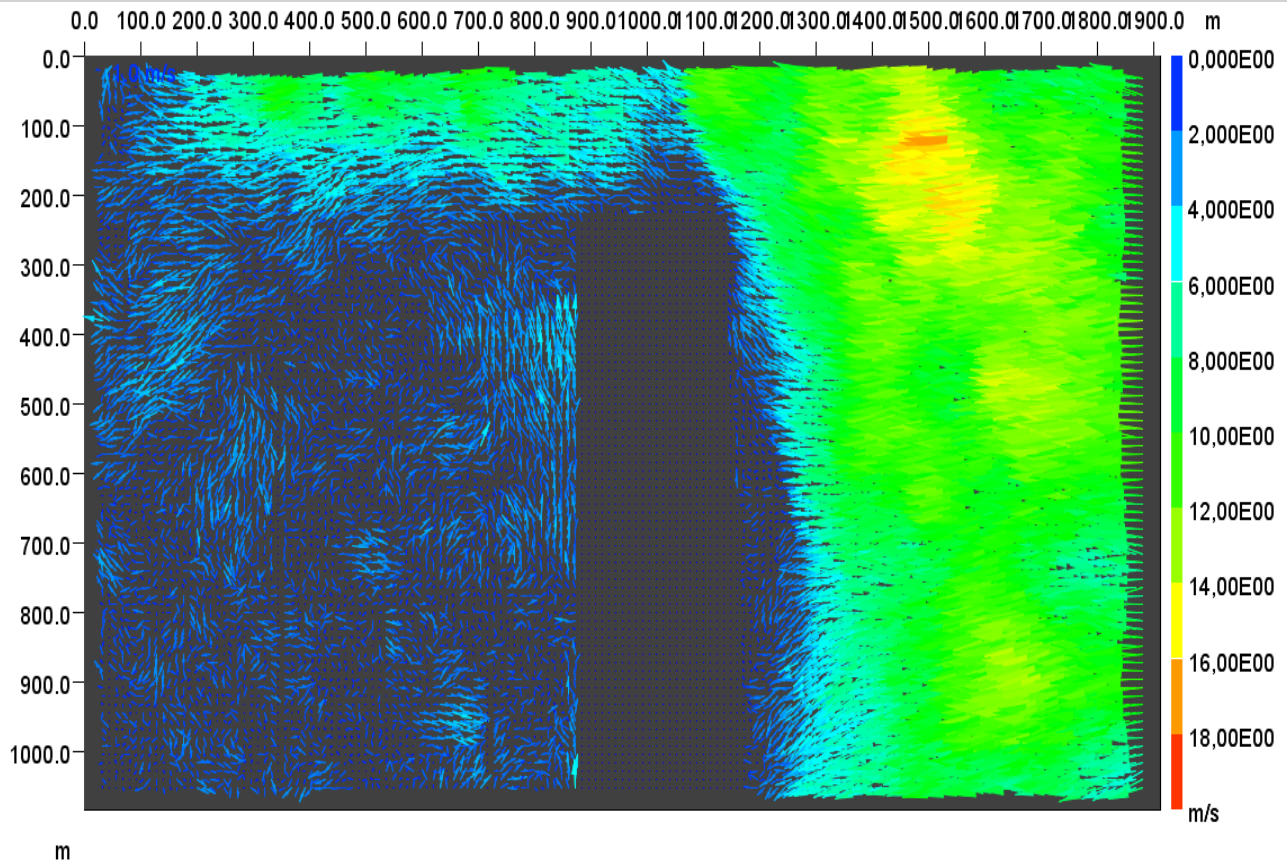
Force test: Drag force at different air velocities for various angles of incidence. F-16 Airplane Model.



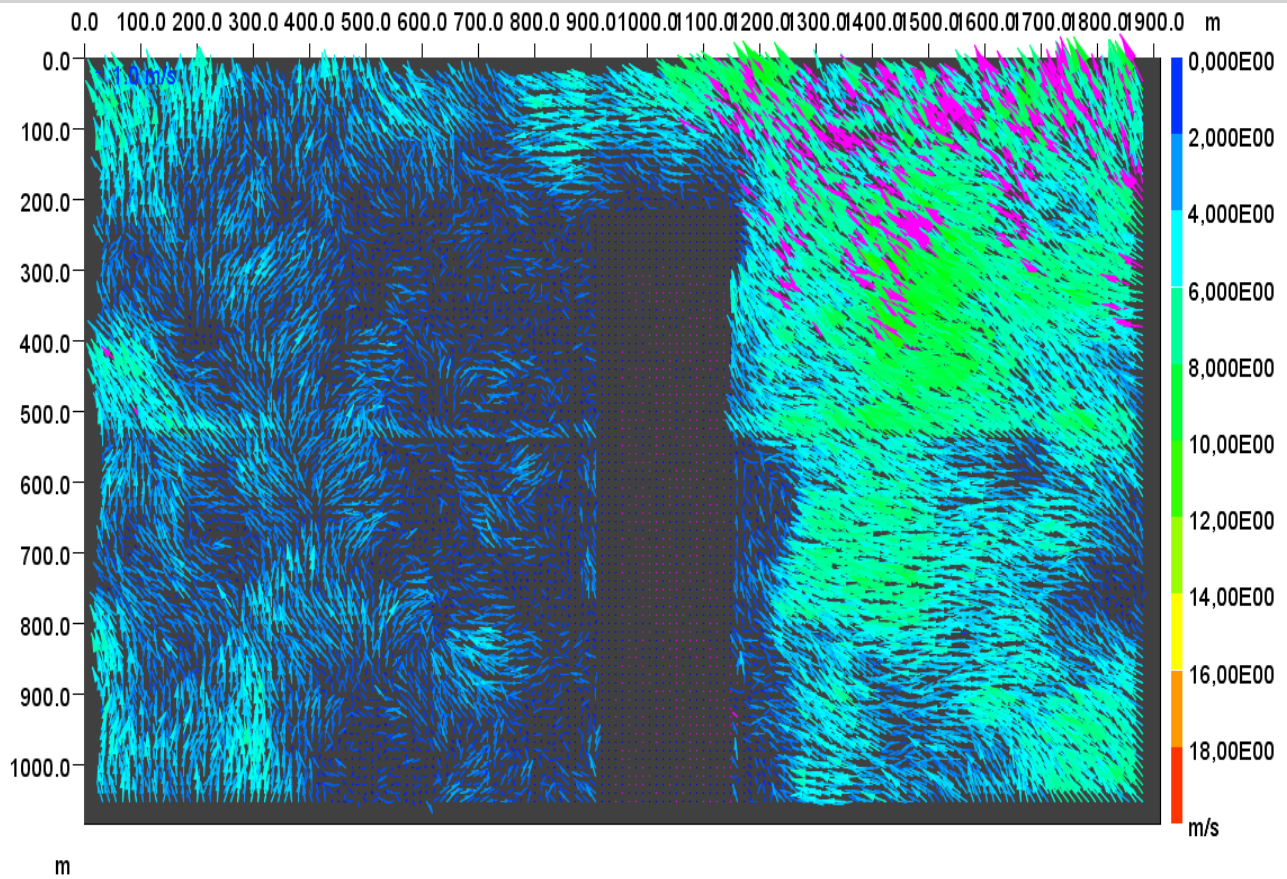
Some **real** results obtained from this unit



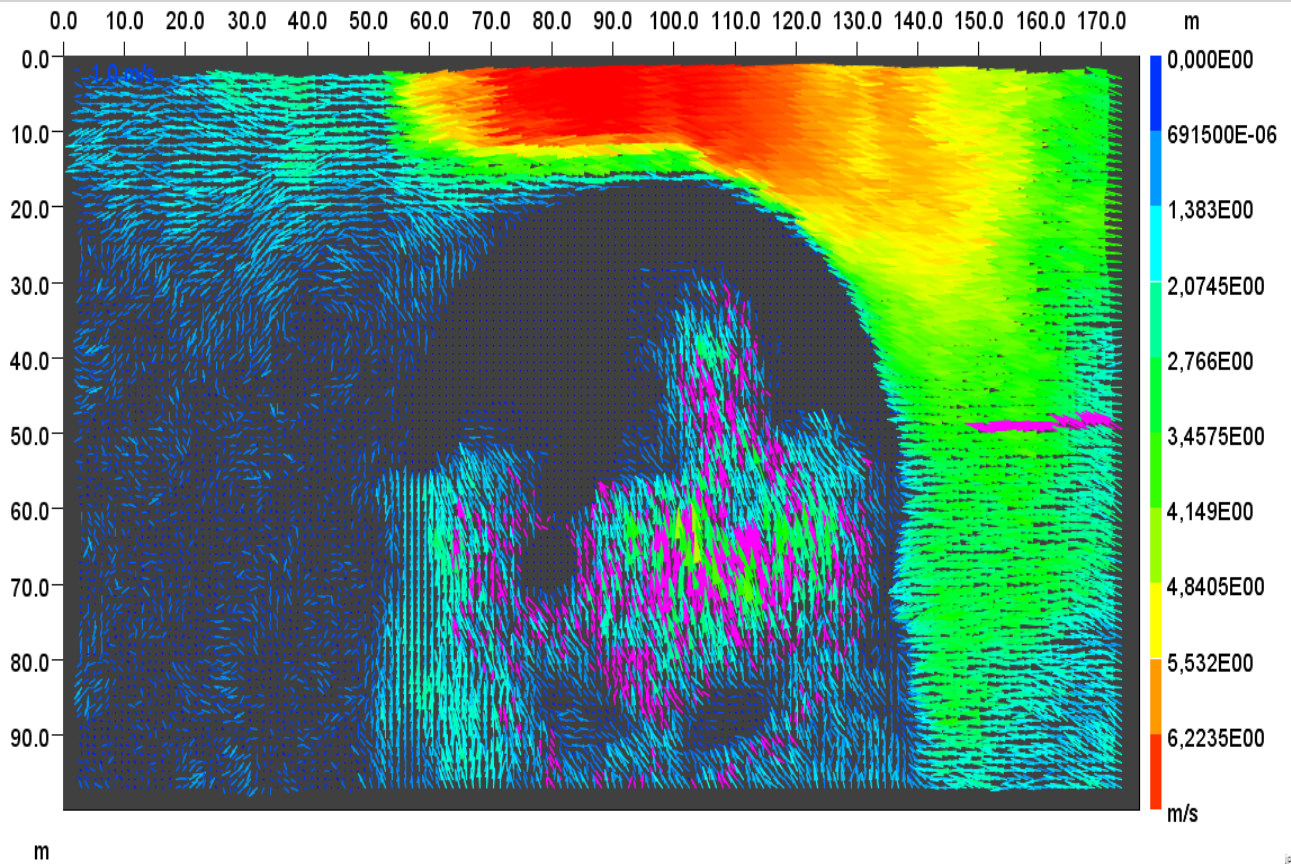
PIV test: The APIV/30 accessory measures speed from the particles displacement during a specific period of time using a double-pulse laser technique.



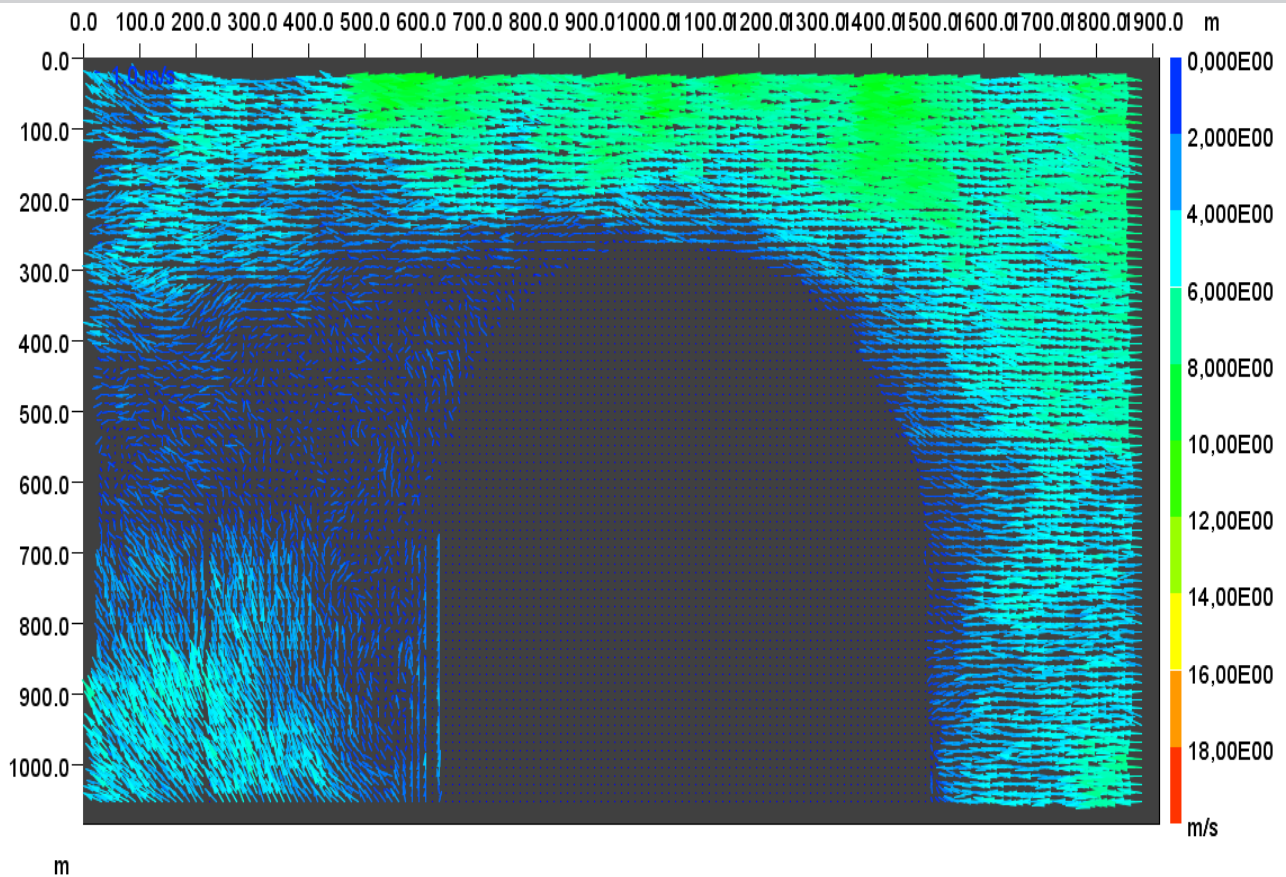
PIV test: With the APIV/30 accessory a laser beam plane lights the flow and the positions of the particles on that plane are registered with a high-speed camera. Soon after, a second laser pulse lights the plane again and the new positions of the particles are registered.



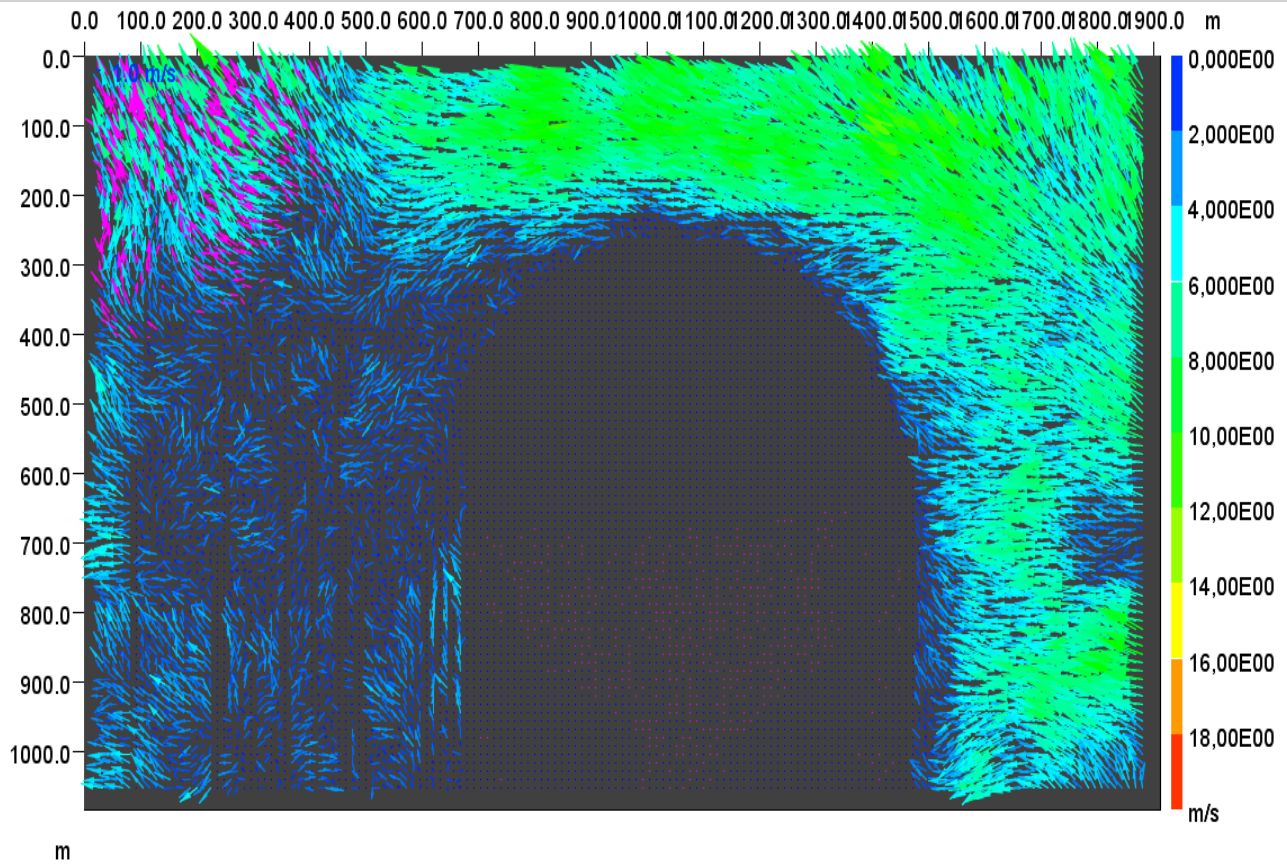
PIV test: Analysis of the flow velocity field with a Sphere Drag Model.



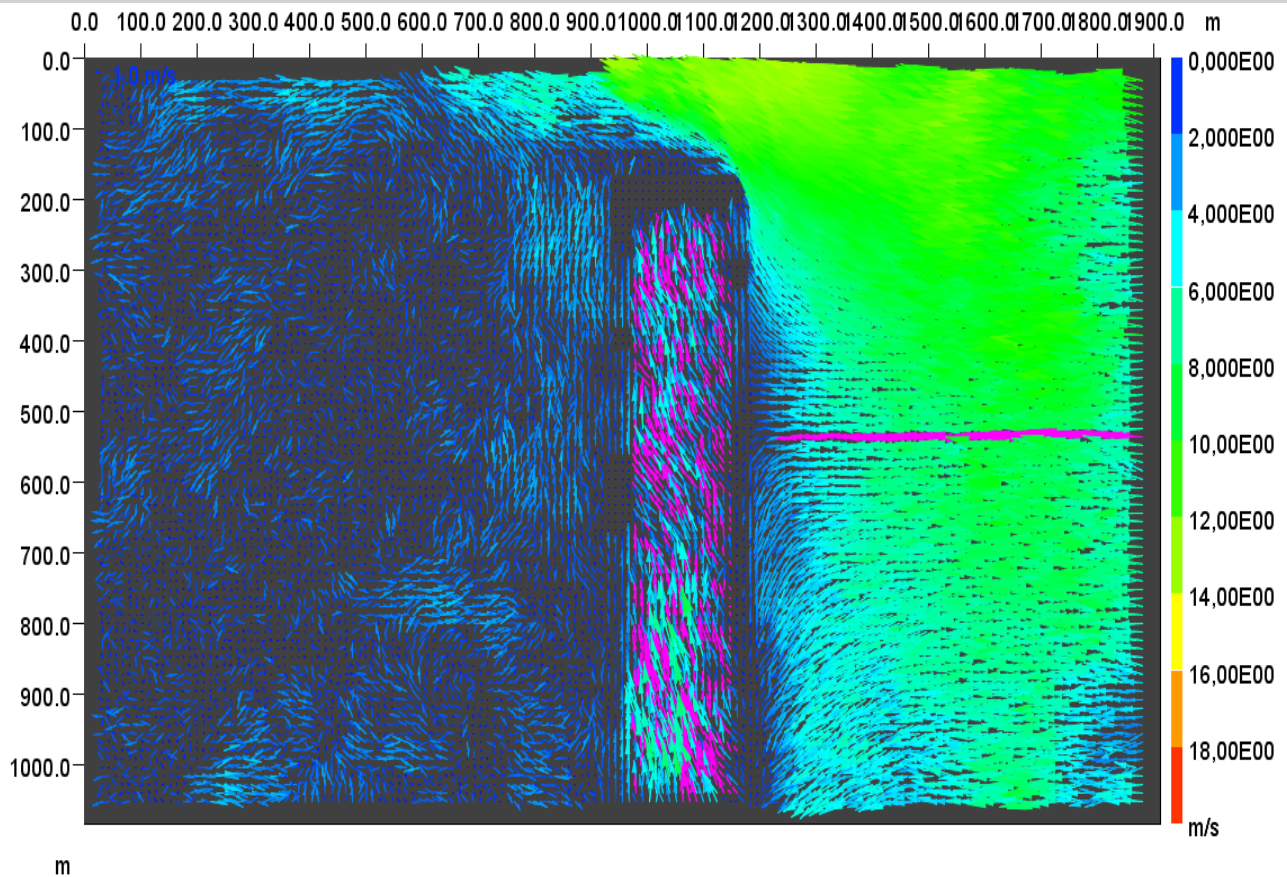
PIV test: Analysis of the flow velocity field with a Sphere Drag Model.



PIV test: Analysis of the flow velocity field with a Sphere Drag Model.



PIV test: Analysis of the flow velocity field with a Square Plate Drag Model.



COMPLETE TECHNICAL SPECIFICATIONS (for optional items)

Additionally to the main items (1 to 6) described, we can offer, as optional, other items from 7 to 10.

All these items try to give more possibilities for:

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

a) Technical and Vocational Education configuration

⑦ TA300/300C/ICAI. Interactive Computer Aided Instruction Software System.

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.

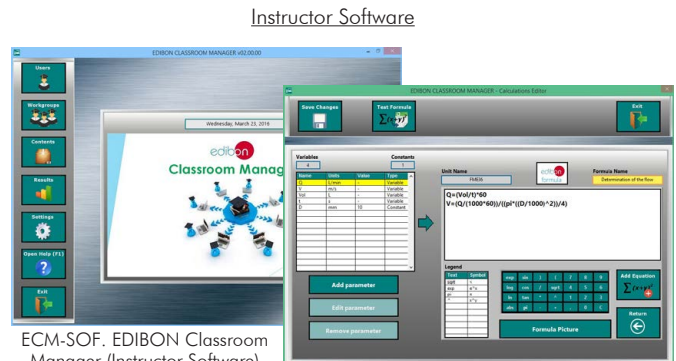
This software is optional and can be used additionally to items (1 to 6).

- 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

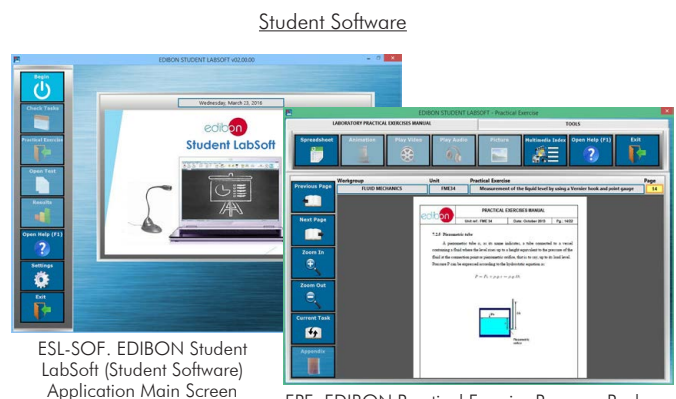
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

- 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 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.

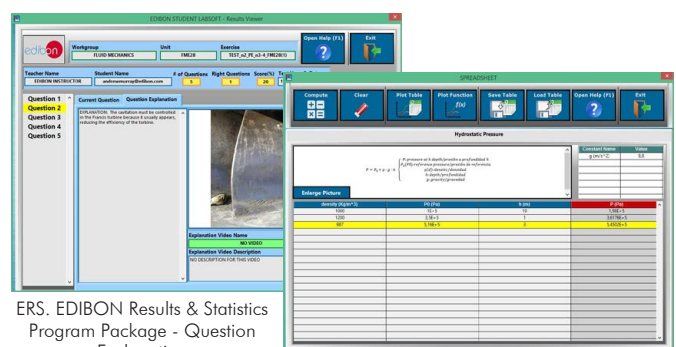
Innovative features:

- 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

⑧ TA300/300C/FSS. Faults Simulation System.

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit. It is useful for Technical and Vocational level.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them. There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- An incorrect calibration is applied to them.
- Non-linearity.

Faults affecting the actuators:

- Actuators channels interchange at any time during the program execution.
- Response reduction of an actuator.

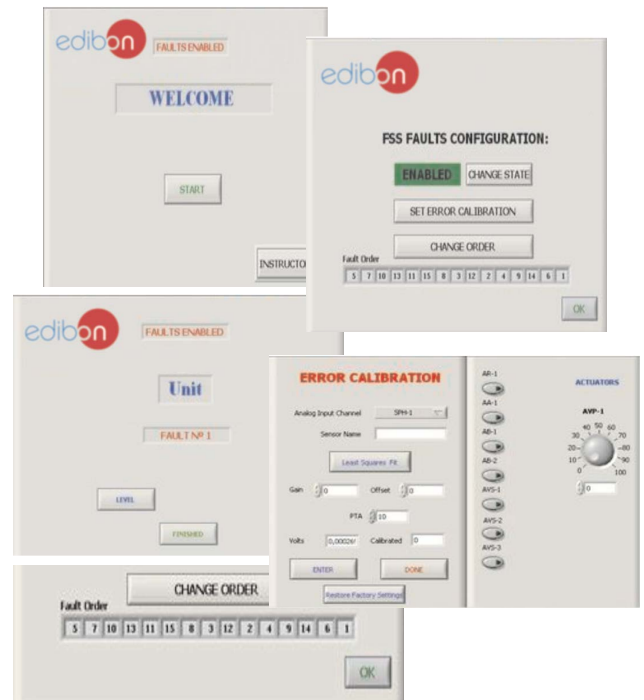
Faults in the controls execution:

- Inversion of the performance in ON/OFF controls.
- Reduction or increase of the calculated total response.
- The action of some controls is annulled.

On/off faults:

- Several on/off faults can be included.

Example of some screens



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

www.edibon.com/en/fault-simulation-system

b) Multipost Expansions options

⑨ 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:

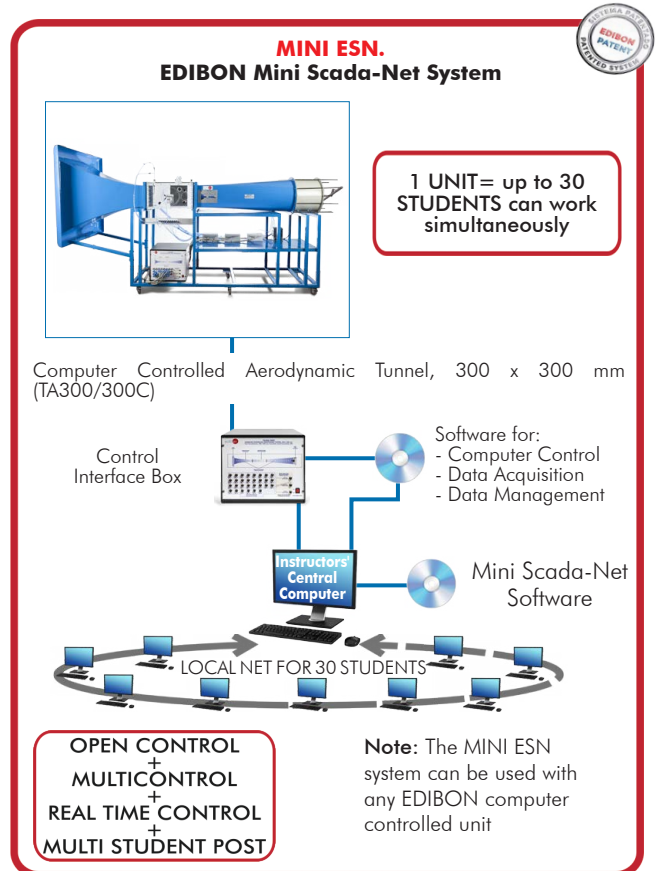
- It allows up to 30 students to work simultaneously with the EDIBON Computer Controlled Unit with SCADA, connected in a local net.
- Open Control + Multicontrol + Real Time Control + Multi Student Post.
- Instructor controls and explains to all students at the same time.
- Any user/student can work 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



⑩ 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

ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① **Unit: TA300/300C. Computer Controlled Aerodynamic Tunnel, 300 x 300 mm.**
- ② **TA300/300C/CIB. Control Interface Box.**
- ③ **DAB. Data Acquisition Board.**
- ④ **TA300/300C/CCSOF. Computer Control + Data Acquisition + Data Management Software.**
- ⑤ **Cables and Accessories**, for normal operation.
- ⑥ **Manuals.**

***IMPORTANT:** Under TA300/300C 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 Education configuration

- ⑦ TA300/300C/ICAL. Interactive Computer Aided Instruction Software System.
- ⑧ TA300/300C/FSS. Faults Simulation System.

b) Multipost Expansions options

- ⑨ MINI ESN. EDIBON Mini Scada-Net System for being used with EDIBON Teaching Units.
- ⑩ ESN. EDIBON Scada-Net Systems.

TENDER SPECIFICATIONS (for main items)

① **TA300/300C. Unit:**

Bench-top wind tunnel in open circuit and with incompressible subsonic flow.
Anodized aluminum frame and panels made of painted steel.
Main metallic elements made of stainless steel.
Diagram in the front panel with distribution of the elements similar to the real one.
Inlet section with lips, a haven section and a 9.5:1 contraction ratio.
Transparent working area of 300 x 300 mm and length of 600 mm to assemble and test the different models.
The working area includes a Pitot static tube mounted in the top side.
Outlet section with diffuser that allows to avoid the generation of turbulences, which can generate damages the current quality in the working area.
Variable speed axial-flow fan, computer controlled:
Air velocity in the working area: 0 – 34 m/s.
Power: 1.5 kW.
Sixty different pressure tapings (along the tunnel and in the models).
Thirty differential pressure sensors, range: 0 – 1 psi.
Several models and accessories are available, allowing a comprehensive study of subsonic aerodynamics.
Some models include several pressure tapings.
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.

Required elements (at least one) (Not included):

- TA1/300. Sphere Drag Model (requires the model TA300/300C-TARC).
- TA2/300. Drag Model of Hemisphere Convex to Airflow (requires the model TA300/300C-TARC).
- TA3/300. Circular Plate Drag Model (requires the model TA300/300C-TARC).
- TA4/300. Ring Drag Model (requires the model TA300/300C-TARC).
- TA5/300. Square Plate Drag Model (requires the model TA300/300C-TARC).
- TA6/300. Cylinder Drag Model (requires the model TA300/300C-TARC).
- TA7/300. Streamlined Shape Drag Model (requires the model TA300/300C-TARC).
- TA8/300. Paraboloid Drag Model (requires the model TA300/300C-TARC).
- TA9/300. Drag Model of Hemisphere Concave to Airflow (requires the model TA300/300C-TARC).
- TA10/300. Wing with Flaps Drag Model (requires the model TA300/300C-TARC).
- TA11/300. Flag Drag Model (requires the model TA300/300C-TARC).
- TA12/300. Wing Model with NACA 0015 Profile (requires the model TA300/300C-TARC).
- TA13/300. Wing Model with NACA 54118 Profile (requires the model TA300/300C-TARC).
- TA14/300. Wing Model with NACA 4415 Profile (requires the model TA300/300C-TARC).
- TA15/300. Dimpled Sphere Drag Model (requires the model TA300/300C-TARC).
- TA16/300. Set for Alternative Models Projects.
- TA17/300. Pitot Tube.
- TA18/300. Wake Survey Rake.
- TA19/300. Pressure Distribution in a Wing Model with NACA 0015 Profile.
- TA20/300. Pressure Distribution in a Wing Model with NACA 54118 Profile.
- TA21/300. Pressure Distribution in a Wing Model with NACA 4415 Profile.
- TA22/300. Pressure Distribution in a Cylinder.
- TA23/300. Bernoulli Apparatus Model (requires the model TA17/300).
- TA24/300. Spring-mounted Wing Model.
- TA25/300. Car Model.
- TA26/300. Prandtl Tube.
- TA300/A320. AIRBUS A-320 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/A380. AIRBUS A-380 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/B737. BOING 737 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBA36. BEECH BONANZA A-36 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/BBV35. BEECH BONANZA V-35 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/F16. F-16 Airplane Model (requires the model TA300/MP or the model TA300/300C-TARC).
- TA300/MP. Accessory for Models Positioning (requires at least an airplane model or the model TA300/YP).
- TA300/300C-TARC. Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model or an airplane model).
- TA300/300-BLE. Model to Study the Boundary Layer in a Flat Plate (requires the model TA17/300).
- TA300/300-SGI. Smoke Generator.
- TA300/MB. Manometers Board. 24 Manometric Tubes of 250 mm length.
- TA300/SC. Storage Cabinet.
- TA300/YP. Yaw Probe (requires the model TA300/MP).
- APIV/30. PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm.

② **TA300/300C/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.
The Data Acquisition board model may change at any moment, providing the same or better features than those required for the unit.

④ **TA300/300C/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.- Comprehensive study of subsonic aerodynamics and airflow studies.
 - 2.- Study of flow visualization.
 - 3.- Study of static pressure, dynamic pressure and total pressure using a Pitot' tube.
 - 4.- Study of velocity measurement using a Pitot tube.
 - 5.- Flux in a nozzle: Determination of the characteristics of the pressures field in a nozzle.
 - 6.- Flux in a nozzle: Observation of the local characteristics, depending on whether the walls have a curvature or not, as well as what happens at the inlet and outlet areas of the contraction.
- Additional practical possibilities:
- 7.- Sensors calibration.
- Additional practical possibilities to be done with the required elements (at least one) (Not included):
- 8.- Display of flows around different drag models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 9.- Determination of the drag coefficient and the lift coefficient in different models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 10.- Measurement of drag forces and lift forces in different models:
 - Sphere Drag Model (TA1/300).
 - Drag Model of Hemisphere Convex to Airflow (TA2/300).
 - Circular Plate Drag Model (TA3/300).
 - Ring Drag Model (TA4/300).
 - Square Plate Drag Model (TA5/300).
 - Cylinder Drag Model (TA6/300).
 - Streamlined Shape Drag Model (TA7/300).
 - Paraboloid Drag Model (TA8/300).
 - Drag Model of Hemisphere Concave to Airflow (TA9/300).
 - Wing with Flaps Drag Model (TA10/300).
 - Flag Drag Model (TA11/300).
 - Wing Model with NACA 0015 Profile (TA12/300).
 - Wing Model with NACA 54118 Profile (TA13/300).
 - Wing Model with NACA 4415 Profile (TA14/300).
 - Dimpled Sphere Drag Model (TA15/300).
 - 11.- Study of pressure and flow distribution around a model:
 - Pressure Distribution in a Wing Model with NACA 0015 Profile (TA19/300).
 - Pressure Distribution in a Wing Model with NACA 54118 Profile (TA20/300).
 - Pressure Distribution in a Wing Model with NACA 4415 Profile (TA21/300).
 - Pressure Distribution in a Cylinder (TA22/300).
 - 12.- Study of effect of changing in Bernoulli Apparatus Model (TA23/300) the cross section and application of the Bernoulli equation.
 - 13.- Investigation into the influence of models shape in the drag forces (Force Measurement Interface and Sensors, range: 0 – 2.5 kg (requires at least one resistance model) (TA300/300C-TARC)).
 - 14.- Study of static pressure, dynamic pressure and total pressure using a Pitot tube (TA17/300).
 - 15.- Study of Boundary Layer in a Flat Plate (TA300/300-BLE).
 - 16.- Demonstration of flow patterns around different objects with the Smoke Generator (TA300/300-SG1).
 - 17.- Study of static pressure, dynamic pressure and total pressure with the Wake Survey Rake (TA18/300).
 - 18.- Study of fluter (TA24/300).
 - 19.- Study of the PIV 2D flow Visualisation for Velocities up to 30 m/s and Area of 100 x 100 mm (APIV/30).
- Other possibilities to be done with this unit:
- 20.- Many students view results simultaneously.
To view all results in real time in the classroom by means of a projector or an electronic whiteboard.
 - 21.- 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.
 - 22.- The Computer Control System with SCADA allows a real industrial simulation.
 - 23.- This unit is totally safe as uses mechanical, electrical and electronic, and software safety devices.
 - 24.- This unit can be used for doing applied research.
 - 25.- This unit can be used for giving training courses to Industries even to other Technical Education Institutions.
 - 26.- Control of the TA300/300C unit process through the control interface box without the computer.
 - 27.- Visualization of all the sensors values used in the TA300/300C unit process.
- Several other exercises can be done and designed by the user.

a) Technical and Vocational Education configuration

⑦ **TA300/300C/ICAI. Interactive Computer Aided Instruction Software System.**

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.

⑧ **TA300/300C/FSS. Faults Simulation System.**

Faults Simulation System (FSS) is a Software package that simulates several faults in any EDIBON Computer Controlled Unit.

The "FAULTS" mode consists in causing several faults in the unit normal operation. The student must find them and solve them.

There are several kinds of faults that can be grouped in the following sections:

Faults affecting the sensors measurement:

- An incorrect calibration is applied to them.
- Non-linearity.

Faults affecting the actuators:

- Actuators channels interchange at any time during the program execution.
- Response reduction of an actuator.

Faults in the controls execution:

- Inversion of the performance in ON/OFF controls.
- Reduction or increase of the calculated total response.
- The action of some controls is annulled.

On/off faults:

- Several on/off faults can be included.

b) Multipost Expansions options

© **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.



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