



Engineering and Technical
Teaching Equipment

Computer Controlled Closed Aerodynamic Tunnel, 2000 x 2000 mm, with SCADA

TACL2000/2000C

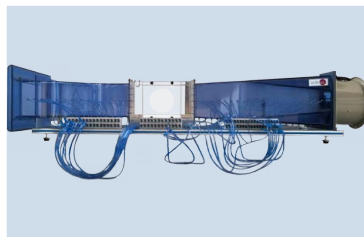


- ① Unit: TACL2000/2000C.
Computer Controlled Closed Aerodynamic
Tunnel, 2000 x 2000 mm
- ② Control Interface Box
- ③ Data Acquisition Board
- ④ Software for: Computer Control -
Data Acquisition - Data Management
- ⑤ Cables y Accesorios
- ⑥ Manuales

① Unit: TACL2000/2000C. Computer Controlled Closed Aerodynamic Tunnel, 1200 x 1200 mm

* Minimum supply always includes:

1 + 2 + 3 + 4 + 5 + 6 (Computer not included in the supply)



Key features:

(Example of some of the aerodynamic tunnel manufactured by EDIBON)

- **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.**
- **Totally safe, utilizing 4 safety systems (Mechanical, Electrical, Electronic & Software).**
- **Designed and manufactured under several quality standards.**

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



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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.

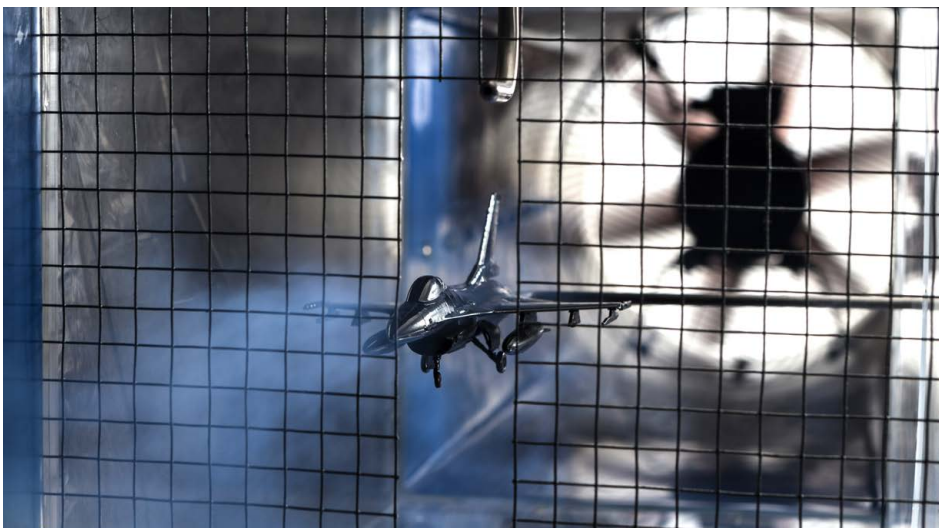
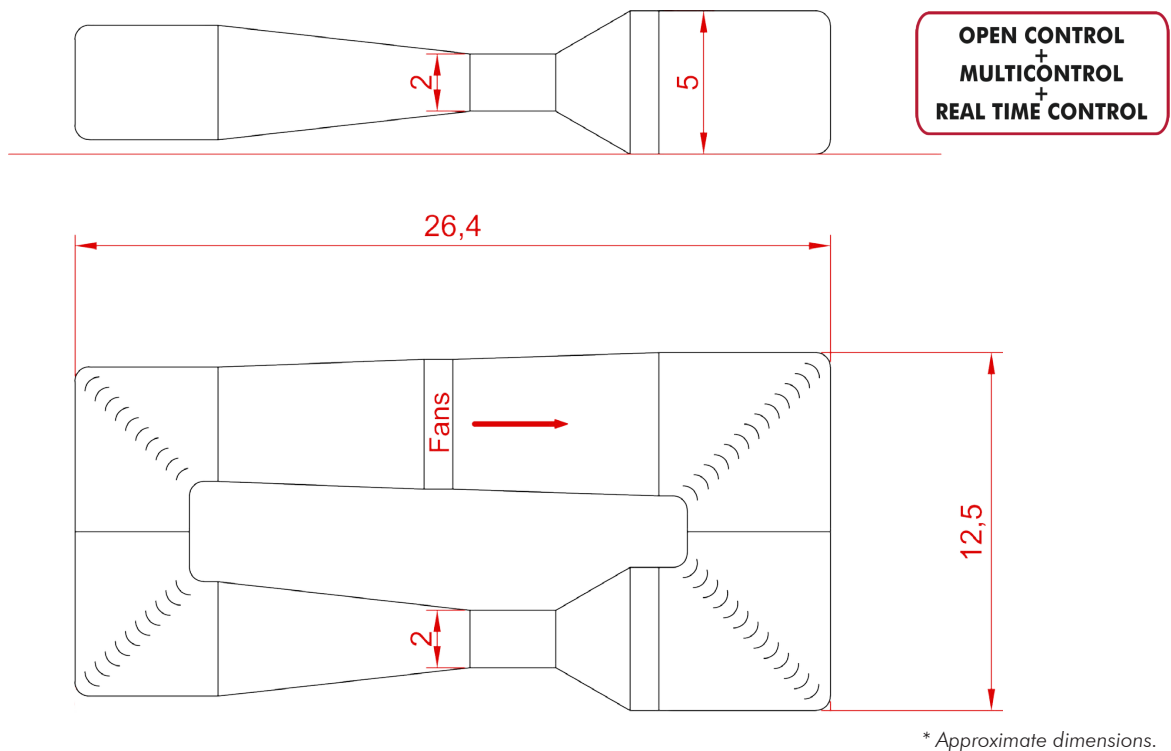
Knowing the aerodynamics principles is useful for many activities, from the take-off and piloting of an airplane to driving a car or kicking a ball. Every time we move or throw an object, there are many physical principles acting, but we do not notice them.

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.

There are two types of wind tunnels: open and closed. In an open tunnel, the air enters the tunnel from the outside, and once it has passed through the tunnel, it returns to the outside. In a closed tunnel, the air is recycled cyclically, thus allowing the thermodynamic variables of the air to be controlled: density, temperature and pressure.

The Computer Controlled Closed Aerodynamic Tunnel, 2000 x 2000 mm, "TACL2000/2000C", designed by EDIBON, is a wind tunnel designed to study subsonic aerodynamics in a tunnel in closed circuit and with incompressible subsonic flow.

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



With this unit there are several options and possibilities:

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

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

① TACL2000/2000C. Unit:

Wind tunnel in closed circuit and with incompressible subsonic flow.

Made of high quality resistant material.

Steel support frame.

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.

Guide veins of high quality.

Transparent working area of 2000 x 2000 mm to assemble and test the different models.

The working area includes a Pitot tube mounted in the top side to measure the flow rate and air velocity inside working area.

Outlet section with diffuser which allows the intensity of turbulences to be low.

Variable speed axial flow fan, computer controlled:

Maximum air velocity in the working area: 70 – 80 m/s (*other speeds available on request*).

Flow uniformity.

Turbulence intensity < 1.

Different pressure tapings.

Differential pressure sensors.

The complete unit includes as well:

Advanced Real-Time SCADA.

Open Control + Multicontrol + Real-Time Control.

Specialized EDIBON Control Software based on LabVIEW.

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

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

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

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

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

Designed and manufactured under several quality standards.



Unit: TACL2000/2000C

Additional recommended elements (Not included):

- TACL1/2000. External Pyramidal Balance for 2000X2000 mm Closed Tunnel:
 - Drag force: 378 N.
 - Side force: 422 N.
 - Lift force: 1223 N.
 - Rolling moment: 81 N·m.
 - Pitching moment: 81 N·m.
 - Yawing moment: 81 N·m.
- TACL2/2000. Internal Sting Balance for 2000X2000 mm Closed Tunnel:
 - Drag force: 355 N.
 - Side force: 667 N.
 - Lift force: 1334 N.
 - Rolling moment: 28 N·m.
 - Pitching moment: 56 N·m.
 - Yawing moment: 28 N·m.
- TACL3/2000. Model Positioning System for 2000X2000 mm Closed Tunnel.
- TACL4/2000. Refrigeration System for 2000X2000 mm Closed Tunnel.
- TACL5/2000. Airplane Model for 2000X2000 mm Closed Tunnel.
- TACL6/2000. Car Model for 2000X2000 mm Closed Tunnel.
- TACL7/2000. Wind Turbine Model for 2000X2000 mm Closed Tunnel.
- TACL8/2000. Blunt Body Model for 2000X2000 mm Closed Tunnel.
- APIV/80. PIV 2D flow Visualisation for Velocities up to 80 m/s and Area of 500 x 500 mm.

② TACL2000/2000C/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.

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 TACL2000/2000C/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.



TACL2000/2000C/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: TACL2000/2000C + TACL2000/2000C/CIB + DAB + TACL2000/2000C/CCSOF + Cables and Accessories + Manuals are included in the minimum supply for enabling normal and full operation.

REQUIRED SERVICES

- Electrical supply; three-phase 380 VAC – 400 VAC/50 Hz or 200 VAC – 240 VAC/50 Hz.
- Computer.

ADDITIONAL RECOMMENDED ELEMENTS (Not included)

- TACL1/2000. External Pyramidal Balance for 2000X2000 mm Closed Tunnel.
- TACL2/2000. Internal Sting Balance for 2000X2000 mm Closed Tunnel.
- TACL3/2000. Model Positioning System for 2000X2000 mm Closed Tunnel.
- TACL4/2000. Refrigeration System for 2000X2000 mm Closed Tunnel.
- TACL5/2000. Airplane Model for 2000X2000 mm Closed Tunnel.
- TACL6/2000. Car Model for 2000X2000 mm Closed Tunnel.
- TACL7/2000. Wind Turbine Model for 2000X2000 mm Closed Tunnel.
- TACL8/2000. Blunt Body Model for 2000X2000 mm Closed Tunnel.

* Other models available on request.

ORDER INFORMATION

Main items (always included in the supply)

Minimum supply always includes:

- ① Unit: TACL2000/2000C. Computer Controlled Closed Aerodynamic Tunnel, 2000 x 2000 mm.
- ② TACL2000/2000C/CIB. Control Interface Box.
- ③ DAB. Data Acquisition Board.
- ④ TACL2000/2000C/CCSOF. Computer Control + Data Acquisition + Data Management Software.
- ⑤ Cables and Accessories, for normal operation.
- ⑥ Manuals.

*IMPORTANT: Under TACL2000/2000C we always supply all the elements for immediate running as 1, 2, 3, 4, 5 and 6.

① TACL2000/2000C. Unit:

Wind tunnel in closed circuit and with incompressible subsonic flow.
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 Steel support frame.
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 The working area includes a Pitot tube mounted in the top side to measure the flow rate and air velocity inside working area.
 Outlet section with diffuser which allows the intensity of turbulences to be low.
 Variable speed axial flow fan, computer controlled:
 Maximum air velocity in the working area: 70 – 80 m/s (*other speeds available on request*).
 Flow uniformity.
 Turbulence intensity < 1.
 Different pressure tapings.
 Differential pressure sensors.
 The complete unit includes as well:
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* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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REPRESENTATIVE:

