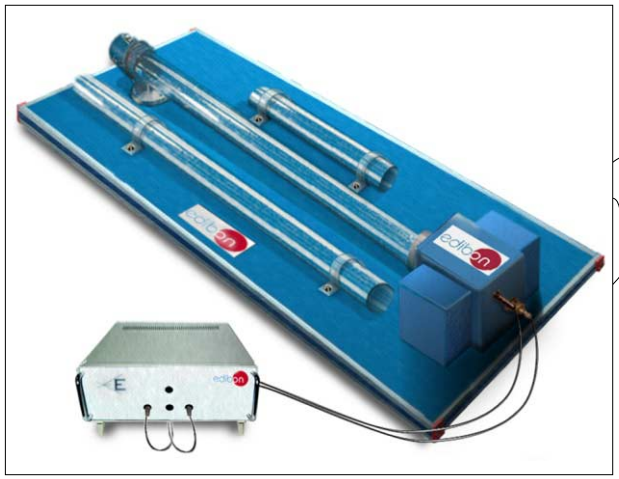
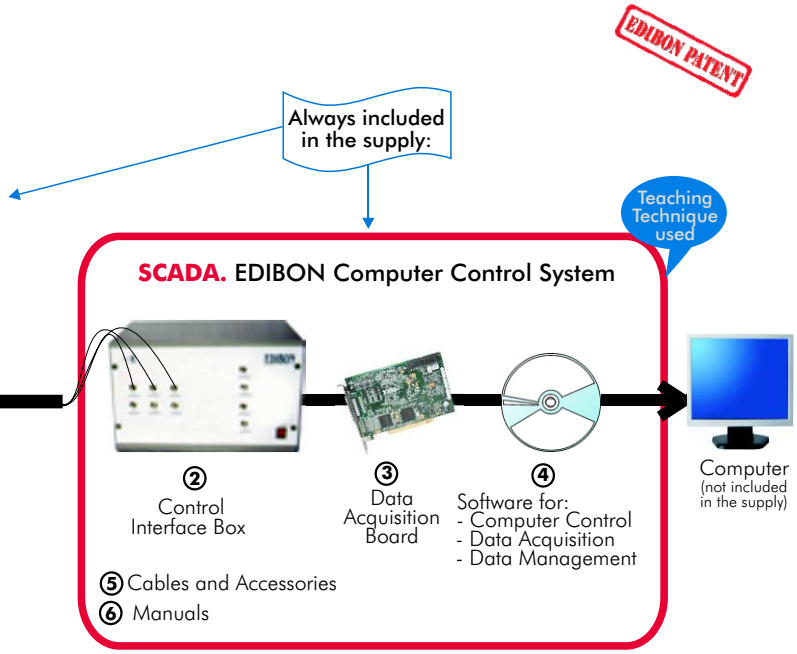
Computer Controlled **Acoustic Impedance Tube/ Acoustic Insulation Test Unit**

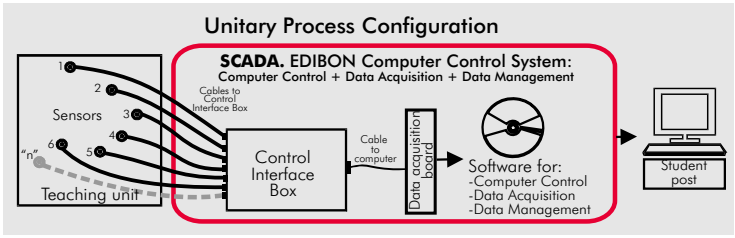
TIAC

Technical Teaching Equipment



① Unit: TIAC. Acoustic Impedance Tube/ Acoustic Insulation Test Unit





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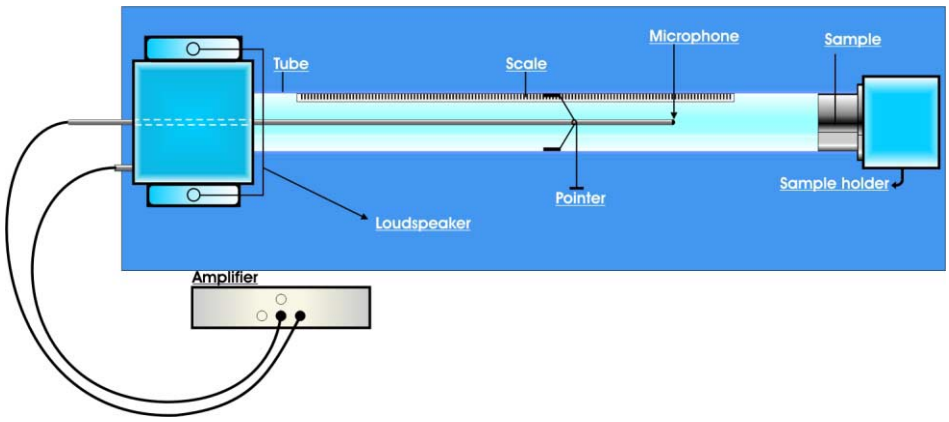
Products
Products range
Units
7.-Mechanics & Materials

PROCESS DIAGRAM AND ELEMENTS ALLOCATION

OPEN CONTROL + MULTICONTROL + REAL TIME CONTROL



ISO:9001-2000 Certificate of Approval. Reg. No. E204034

European Union Certificate

Certificates ISO 14001: 2004 and **ECO-Management and Audit Scheme** (environmental management)

Worlddidac Quality Charter Certificate
Worlddidac Member

Items supplied as standard

①TIAC. Unit:

This unit has been designed to provide students with an easy and simple method for understanding and investigating the relative acoustic properties of several materials.
Anodized aluminium structure.
Main metallic elements in stainless steel.
Diagram in the front panel with similar distribution that the elements in the real unit.
An acoustics standing wave unit driven by two loudspeakers and a separate console mounted power amplifier.
A small microphone travelling in the transparent plastic tube allows the acoustic signal to be fed to the console mounted microphone amplifier.
The transparent plastic tube combine with a scale and marker allow the microphone axial position to be measured.
Wide range of tested samples allow a wide range of tests on differing materials.
The units is very useful for the teaching of students in different areas as: Sound and Vibration, Mechanical, Aeronautical, Building, Health and Safety, etc.

②TIAC/CIB. Control Interface Box :

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 for -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.
Simultaneously 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 placed in only one computer screen.
Shield and filtered signals to avoid external interferences.
Real time control with flexibility of modifications from the computer keyboard of the parameters, at any moment during the process.
Real time control and on/off control for pumps, compressors, resistances, control valves, etc.
Open control allowing modifications, at any time and in a real time , of parameters involved in the process simultaneously.
Three safety levels, one mechanical in the unit, other electronic in control interface and the third one in the control software.

③DAB. Data Acquisition Board:

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

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)= ±10V.
- Data transfers=DMA, interrupts, programmed I/0.
- Number of DMA channels=6.

Analog output:
- Number of **channels=2**.
- **Resolution=16 bits**, 1 in 65536.
- Maximum output rate up to: 833 KS/s.
- Output range(V)=±10V.
- Data transfers=DMA, interrupts, programmed I/0.

Digital Input/Output:
- Number of **channels=24 inputs/outputs**.
- D0 or DI Sample Clock frequency: 0 to 1 MHz.

Timing:
- **Counter/timers=2**. Resolution: Counter/timers: 32 bits.

④TIAC/CCSOF Control+Data Acquisition+Data Management Software:

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 simultaneously 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 250,000 data per second guaranteed.
Student calibration system for all 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 to the process and modification of the conditions during the process.
Open software, allowing to 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 at different work levels.
This unit allows that the 30 students of the classroom can visualize simultaneously all results and manipulation of the unit, during the process, by using a projector.

⑤Cables and Accessories, for normal operation

⑥Manuals:

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: TIAC + TIAC/CIB + DAB + TIAC/CCSOF + Cables and Accessories + Manuals are included in the minimum supply, enabling a normal operation.

Continue...

Complementary items to the standard supply

PLC. Industrial Control using PLC (7 and 8):

⑦ PLC-PI. PLC Module:

Circuit diagram in the front panel.

Front panel:

Digital inputs(X) and Digital outputs (Y) block:

16 Digital inputs, activated by switches and 16 LEDs for confirmation (red).

14 Digital outputs (through SCSI connector) with 14 LEDs for message (green).

Analog inputs block:

16 Analog inputs (-10V. to + 10V.)(through SCSI connector).

Analog outputs block:

4 Analog outputs (-10V. to + 10V.)(through SCSI connector).

Touch screen:

High visibility and multiple functions.
Display of a highly visible status.
Recipe function.
Bar graph function.
Flow display function.
Alarm list.
Multi language function.
True type fonts.

Back panel:

Power supply connector.
Fuse 2A.
RS-232 connector to PC.

Inside:

Power supply outputs: 24 Vdc, 12 Vdc, -12 Vdc, 12 Vdc variable.

Panasonic PLC:

High-speed scan of 0.32 μsec. for a basic instruction.
Program capacity of 32 Ksteps, with a sufficient comment area.
Free input AC voltage(100 to 240 V AC).
DC input:16 (24 V DC).
Relay output: 14 (250 V A AC/2 A).
High-speed counter.
Multi-point PID control.
Digital inputs/outputs and analog inputs/outputs Panasonic modules.

Communication RS232 wire, to computer (PC).

PLC-PI

⑧ TIAC/PLC-SOF. PLC Control Software:

For this particular unit, always included with PLC supply.

Items available on request

⑨ TIAC/CAL. Computer Aided Learning Software (Results Calculation and Analysis).

⑩ TIAC/FSS. Faults Simulation System.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

1.- Study and investigation of the relative acoustic properties of different materials.
2.- Determination of the sound absorption coefficient for many of the normal building lining materials such as carpet, cork, fibre board and many of the better acoustic attenuating materials.
3.- To determine the speed of sound in air at ambient temperature and comparison of this with the calculated value.
4.- Determine the sound absorption coefficient of the these and some poor absorbers at a range of frequencies between approximately 500 and 4000 Hz.

Other possible practices:

5.- Sensors calibration.

Practices to be done by PLC Module (PLC-PI)+PLC Control Software:

6.- Control of the TIAC unit process through the control interface box without the computer.
7.- Visualization of all the sensors values used in the TIAC unit process.
8.- Calibration of all sensors included in the TIAC unit process.
9.- Hand on of all the actuators involved in the TIAC unit process.
10.- Realization of different experiments, in automatic way, without having in front the unit.(This experiment can be decided previously).
11.- Simulation of outside actions, in the cases do not exist hardware elements. (Example: test of complementary tanks, complementary industrial environment to the process to be studied, etc).
12.- PLC hardware general use and manipulation.
13.- PLC process application for TIAC unit.
14.- PLC structure.
15.- PLC inputs and outputs configuration.
16.- PLC configuration possibilities.
17.- PLC program languages.
18.- PLC different programming standard languages (literal structured, graphic, etc.).
19.- New configuration and development of new process.
20.- Hand on an established process.
21.- To visualize and see the results and to make comparisons with the TIAC unit process.
22.- Possibility of creating new process in relation with the TIAC unit.
23. PLC Programming Exercises.
24.- Own PLC applications in accordance with teacher and student requirements.

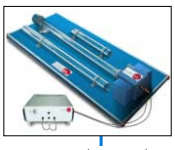
POSSIBILITIES OF OTHER AVAILABLE EXPANSIONS

Expansion 1:

EDIBON PATENT

Teaching Technique used

⑪ **Mini ESN.** Multipost EDIBON Mini Scada-Net System



1 UNIT = 30 STUDENTS can work simultaneously

Acoustic Impedance Tube /Acoustic Insulation Test Unit (TIAC)

Control Interface Box

Computer Control Software: Computer Control+ Data Acquisition+ Data Management

Teacher's Central Computer

Mini Scada-Net Software

30 Student Post

LOCAL NET

OPEN CONTROL + MULTICONTROL + MULTI STUDENT POST

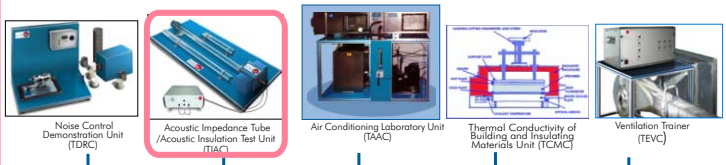
Note: The Mini ESN system can be used with any EDIBON computer controlled unit.

Expansion 2:

EDIBON PATENT

Teaching Technique used

⑫ **ESN.** Multipost EDIBON Scada-Net System



PLC

CENTRAL PLC

"REAL TIME MULTICONTROL SYSTEMS"

"SCADA" CENTRAL COMPUTER

Option

"ETDL" EDIBON TECHNICAL DISTANCE LEARNING SYSTEM

30 Student Post

LOCAL NET

OPEN CONTROL + MULTICONTROL + MULTI STUDENT POST

30 students can work at the same time

Note: The ESN system can use any EDIBON computer controlled unit.

ORDER INFORMATION

Items supplied as standard

Minimum configuration for normal operation includes:

① Unit:TIAC. Acoustic Impedance Tube/Acoustic Insulation Test Unit.
② TIAC/CIB.Control Interface Box.
③ DAB.Data Acquisition Board.
④ TIAC/CCSOF. Computer Control + Data Acquisition + Data Management Software.
⑤ Cables and Accessories.
⑥ Manuals.

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

Complementary items to the standard supply

PLC. Industrial Control using PLC (7 and 8):
⑦PCL-PI.PLC Module.
⑧TIAC/PLC-SOF. PLC Control Software.
⑨TIAC/CAL. Computer Aided Learning Software (Results Calculation and Analysis). (Available on request).
⑩TIAC/FSS. Faults Simulation System. (Available on request).

Expansions

⑪Mini ESN. Multipost EDIBON Mini Scada-Net System.
⑫ESN. Multipost EDIBON Scada-Net System.

REQUIRED SERVICES

- Electrical supply: single- phase, 220V./50 Hz or110V./ 60Hz, 300 W.
- Computer (PC).

OPTIONAL ACCESSORIES

Function Generator.
Oscilloscope.
EDAS/VIS. EDIBON Data Acquisition System/ Virtual Instrumentation System.

DIMENSIONS & WEIGHTS

TIAC Unit:	-Dimensions:1500x500x200 mm. Approx. -Weight :10 Kg. approx.
Control Interface Box:	-Dimensions: 490x330x310 mm. approx. -Weight: 10 Kg. approx.
PLC Module (PLC-PI):	-Dimensions: 490x330x310 mm. approx. -Weight: 30 Kg. approx.

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

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