



## INTRODUCTION

The fresh air contains around 23% oxygen and 76% of nitrogen mass. The rest, 1%, it is made up of other gases and steams. Among these, the most important is the water steam.

Although the content of water steam is usually very small, it has an important effect in the evaporation rate of the surfaces and wet materials.

The Air Conditioning Laboratory Unit "TAAB" main objective is to introduce the student in the complex world of the air conditioning installations, as well as to study and determine the optimal parameters for the unit operation in function of the environmental requirements (humidity, heat, temperature and refrigeration, etc.).

## GENERAL DESCRIPTION

The Air Conditioning Laboratory Unit, "TAAB", has been designed to study the change of the air conditions and the refrigeration circuit.

The unit consists of a testing tunnel made in stainless steel, in which there have installed two windows. Inside of the tunnel there is an axial fan and two heating elements, one situated at the evaporator inlet and other situated at the evaporator outlet.

The unit has an inclined manometer to measure the air flow and four hygrometers situated along the tunnel. These hygrometers are formed by two temperature sensors (wet and dry bulb).

Two steam lines inject steam from a steam generator (not included) to the tunnel to modify the air characteristics.

The tunnel includes an evaporator in the middle. It consists of a finned radiator through which a coolant flow circulates. This radiator is placed perpendicular to the air flow generated by the fan.

Coolant flows through a closed circuit. It enters to the compressor and circulates through a filter (to retain particles of condensate), a flow meter, an expansion valve, the tunnel evaporator (the coolant absorbs the air heat flowing through the evaporator) and a condenser.

Several temperature sensors, manometers and a flow meter have been strategically located, allowing to study the refrigeration cycle and quantify the evaporation and condensation capacity. In addition, the unit includes a high pressure control to avoid an excess of pressure in the unit.

## SPECIFICATIONS

Anodized aluminum frame and panels made of painted steel.

The unit includes wheels to facilitate its mobility.

Main metallic elements made of stainless steel.

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

Tunnel:

Material: stainless steel.

Dimensions: 300 x 300 x 1600 mm.

It includes:

An axial fan, with speed regulation, max. speed: 2500 rpm., max. flow: 2160 m<sup>3</sup>/h.

Two heating elements: one (pre-heater) situated at the evaporator inlet, power: 2000 W, and other (re-heater) situated at the evaporator outlet, power: 1000 W.

Four hygrometers, placed along the tunnel, formed each one by two temperature sensors (wet and dry bulb).

Two steam lines inject steam from a steam generator (not included) to the tunnel to modify the air characteristics.

Two windows of 200 x 300 mm to visualize the tunnel inside.

Evaporator. It consists of a finned radiator where a coolant flow circulates.



TAAB detail

Cooling circuit. It includes:

Compressor, 1/2 CV.

Filter.

Condenser.

High-pressure switch (it switch off the compressor when the pressure reach the fix pressure).

Expansion valve.

12 temperature sensors, type "J":

Eight temperature sensors (four temperature sensors (dry bulb) and four temperature sensors (wet bulb) to form four hygrometers).

Four temperature sensors in the cooling circuit:

Two temperature sensors at the inlet and outlet of the evaporator and two temperature sensors at the inlet and outlet of the condenser.

A flow meter to measure the coolant flow, range: 5 - 60 l/h.

A inclined manometer to measure the air flow, range: 0 - 1" w.c. (water column).

Three Bourdon manometers:

A manometer is situated at the evaporator inlet, other is situated at the evaporator outlet and the last one is situated at the condenser outlet.

Psychometric chart and enthalpy diagram of R134a.

Electronic console:

Metallic box.

Temperature sensors connectors.

High pressure switch connector.

ON/OFF controller for the compressor.

ON/OFF controller for the fan.

Fan speed controller.

Selector for temperature sensors.

Digital display for temperature sensors.

Heating elements controllers.

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.

Recommended element: (not included in the minimum supply):

-TGV. Steam Generator.

## EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Demonstration of the process and components used in heating, cooling, humidification, dehumidification.
  - 2.- Obtaining the steam generator efficiency curve.
  - 3.- Energy balance in the steam generator.
  - 4.- Efficiency determination of preheating element.
  - 5.- Preheating effect in an air conditioning installation.
  - 6.- Dehumidification process study.
  - 7.- Mass balance in the evaporator.
  - 8.- Energy balance in the evaporator.
  - 9.- Re-heat effect.
  - 10.- Experimental determination of the air specific heating capacity.
- Additional practical possibilities:
- 11.- Psychrometric chart.
  - 12.- Usage of psychrometric chart.
  - 13.- Example of the air properties determination.
  - 14.- Properties of the refrigerant R134a.
  - 15.- Enthalpy-Pressure diagram for the refrigerant R134a.

### REQUIRED SERVICES

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

### DIMENSIONS AND WEIGHTS

- TAAB:
- Unit:
- Dimensions: 1600 x 570 x 1500 mm approx.  
(62.99 x 22.44 x 59.05 inches approx.)
  - Weight: 200 Kg approx.  
(441 pounds approx.).
- Electronic console:
- Dimensions: 490 x 330 x 310 mm approx.  
(19.29 x 12.99 x 12.20 inches approx.)
  - Weight: 10 Kg approx.  
(22 pounds approx.).

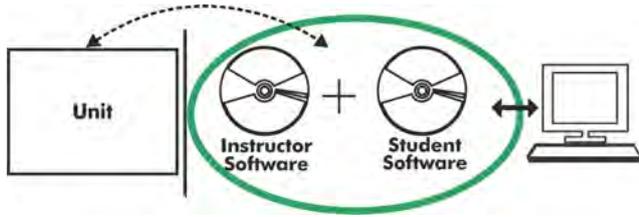
### RECOMMENDED ELEMENTS (Not Included)

- EDIBON Steam Generator (TGV), or any steam generator with similar characteristics.
- For refilling R134a refrigerant and maintenance, we recommend:
  - T/KIT1. Maintenance Kit, containing: vacuum pump, hoses and manometers.
  - T/KIT2. Maintenance Kit, containing: leakage detector.
  - R134a refrigerant (to be acquired by the customer locally).

### AVAILABLE VERSIONS

- Offered in this catalogue:
- TAAB. Air Conditioning Laboratory Unit.
- Offered in other catalogue:
- TAAC. Computer Controlled Air Conditioning Laboratory Unit.

**TAAB/ICAI. Interactive Computer Aided Instruction Software System:**



With no physical connection between unit and computer, 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.

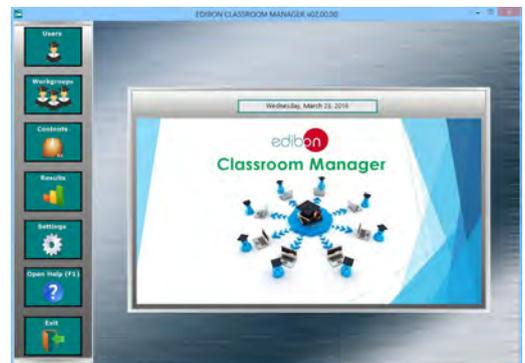
Instructor Software

**- ECM-SOF. EDIBON Classroom Manager (Instructor Software).**

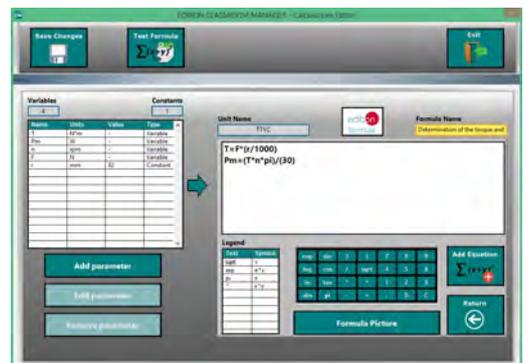
ECM-SOF is the application that allows the Instructor to register students, manage and assign tasks for workgroups, create own content to carry out Practical Exercises, choose one of the evaluation methods to check the Student knowledge and monitor the progression related to the planned tasks for individual students, workgroups, units, etc... so the teacher can know in real time the level of understanding of any student in the classroom.

Innovative features:

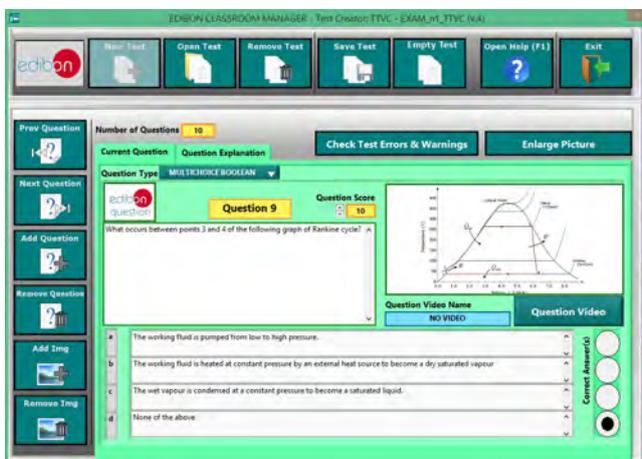
- User Data Base Management.
- Administration and assignment of Workgroup, Task and Training sessions.
- Creation and Integration of Practical Exercises and Multimedia Resources.
- Custom Design of Evaluation Methods.
- Creation and assignment of Formulas & Equations.
- Equation System Solver Engine.
- 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



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



ERS. EDIBON Results & Statistics Program Package - Student Scores Histogram

Optional  
Student Software

- **ESL-SOF. EDIBON Student Labsoft (Student Software).**

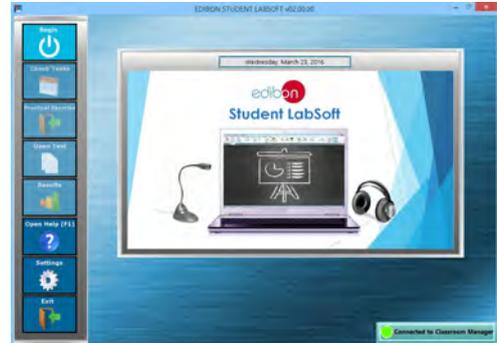
ESL-SOF is the application addressed to the Students that helps them to understand theoretical concepts by means of practical exercises and to prove their knowledge and progression by performing tests and calculations in addition to Multimedia Resources. Default planned tasks and an Open workgroup are 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.**

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

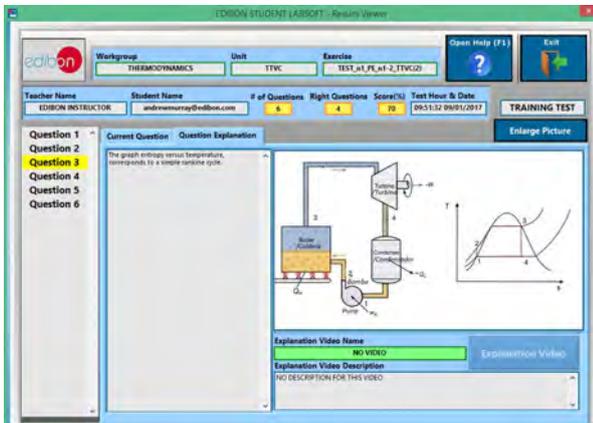
[www.edibon.com/en/files/expansion/ICAI/catalog](http://www.edibon.com/en/files/expansion/ICAI/catalog)



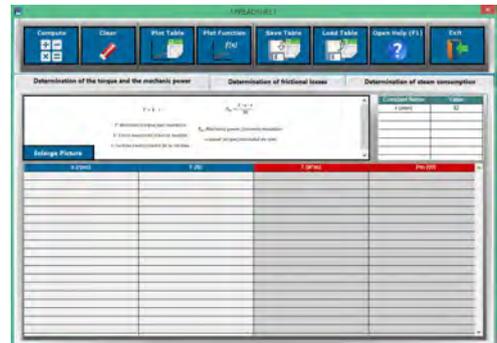
ESL-SOF. EDIBON Student LabSoft (Student Software)  
Application Main Screen



EPE. EDIBON Practical Exercise Program Package Main Screen



ERS. EDIBON Results & Statistics Program Package - Question Explanation



ECAL. EDIBON Calculations Program Package Main Screen

\* Specifications subject to change without previous notice, due to the convenience of improvement of the product.



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Edition: ED01/18  
Date: November/2018

REPRESENTATIVE:

