Recirculating Air Conditioning Unit

TARB

Electronic console

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION
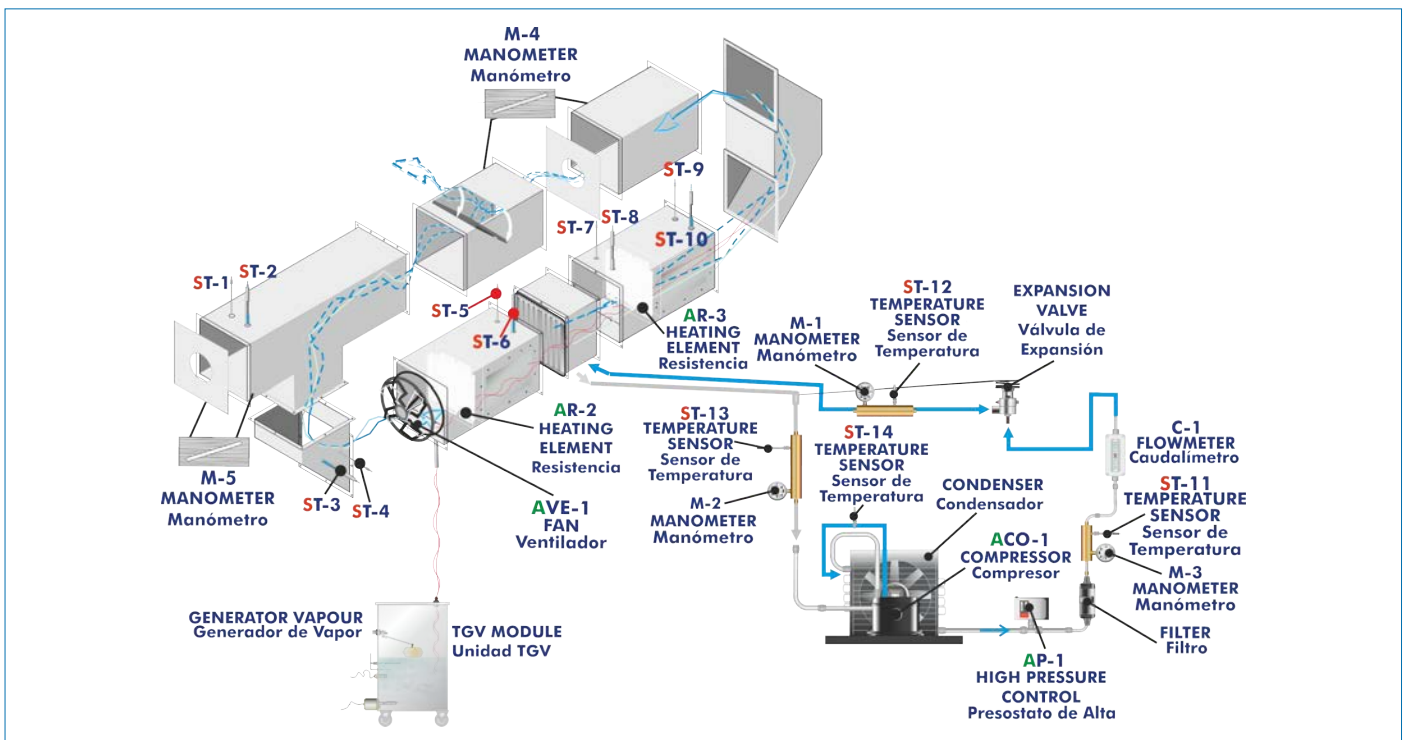
M-4 MANOMETER Manómetro

ST-9

ST-7 ST-8

ST-10

ST-1 ST-2

ST-5

AR-3 HEATING ELEMENT Resistencia

ST-12 TEMPERATURE SENSOR Sensor de Temperatura

EXPANSION VALVE Válvula de Expansión

ST-6

M-1 MANOMETER Manómetro

AR-2 HEATING ELEMENT Resistencia

ST-13 TEMPERATURE SENSOR Sensor de Temperatura

ST-14 TEMPERATURE SENSOR Sensor de Temperatura

C-1 FLOWMETER Caudalímetro

M-5 MANOMETER Manómetro

ST-3 ST-4

AVE-1 FAN Ventilador

M-2 MANOMETER Manómetro

CONDENSER Condensador

ST-11 TEMPERATURE SENSOR Sensor de Temperatura

ACO-1 COMPRESSOR Compresor

M-3 MANOMETER Manómetro

GENERATOR VAPOUR Generador de Vapor

TGV MODULE Unidad TGV

AP-1 HIGH PRESSURE CONTROL Presostato de Alta

FILTER Filtro

INTRODUCTION

The objective of the Recirculating Air Conditioning Unit, "TARB", is to introduce the student into the complex world of air conditioning systems, as well as studying and determining the optimal parameters for the operation of the unit in function of the environmental requirements (humidity, heat, temperature and cooling, etc.).

Although air does not usually contain much steam, it has an important effect in the rate of evaporation of wet surfaces and materials. Understating the humidity content in the atmosphere and how to control it is an important part of engineers and technologists training.

GENERAL DESCRIPTION

The Recirculating Air Conditioning Unit, "TARB", has been designed to study both the changes in the air conditions and the refrigeration circuit. For that purpose, temperature sensors, pressure meters and flow meters have been strategically located, allowing to study the refrigeration cycle and to quantify the capacity of the evaporation and condensation unit.

It can work with fresh air and recycled air.

The unit basically consists of a testing tunnel made of stainless steel, which has four windows (sight glasses). Inside there is an axial fan, two heating elements, one at the inlet of the evaporation unit of 2000 W and other at the outlet of 1000 W. There are also five hygrometers strategically located along the tunnel. These hygrometers consist of two temperature sensors (wet and dry bulb).

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 made of stainless steel of 300 x 300 x 4000 mm, in which there has been installed four windows of 200 x 300 mm to visualize the tunnel inside.

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

Axial fan, with speed regulation, 2500 rpm, maximum flow: 2160 m³/h.

Evaporator.

Condenser unit, consists of:
  Compressor, 1/2 HP, 4.48 A.
  Condenser, 1591 BTU.
  Air flow 900 m³/h.

High-pressure cut-out, regulated at 14 bar. It switch off the compressor when the pressure reach the fix pressure.

Filter dryer.

TARB detail

Three Bourdon manometers, two of 10 bar and one of 25 bar:
  Bourdon manometer (condenser outlet).
  Bourdon manometer (evaporator inlet).
  Bourdon manometer (evaporator outlet).

Two flow meters for air flow measurement in the tunnel.

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

Thirteen temperature sensors:
  Ten temperature sensors, placed in the tunnel to form five hygrometers:
    Five "J" type temperature sensors (dry buld).
    Five "J" type temperature sensors (wet bulb).
  Three temperature sensors, placed in the refrigeration circuit:
    "J" type temperature sensor (condenser outlet).
    "J" type temperature sensor (evaporator inlet).
    "J" type temperature sensor (evaporator outlet).

Flow meter for refrigerant flow measurement, range: 5 – 60 l/min.

With the trapdoor we can adjust the percentage of recirculating air.

Psychrometric chart and Enthalpy diagram of R134a.

Electronic console:
  Metallic box.
  Temperature sensors connections.
  Selector for temperature sensors.
  Digital display for temperature sensors.
  Heating elements temperature controls.
  Compressor switch.
  Fan regulator.
  High pressure control connection.

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 processes of air heating, cooling, humidification, de-humidification, recirculating and mixing.

2.- Efficiency determination of the preheating element.

3- Preheating effect in an air conditioning installation.

4.- Dehumidification process study.

5.- Mass balance in the evaporator.

6.- Energy balance in the evaporator.

7.- Re-heat effect.

8.- Experimental determination of the air specific heating capacity.

9.- Study of de-humidification in a recycling process.

Additional practical possibilities:

10.-Psychrometric chart.

11.-Usage of Psychrometric chart.

12.-Determination of the air flow.

13.-Example of the air properties determination.

14.-Properties of the refrigerant R134a.

15.-Enthalpy-Pressure diagram for the refrigerant R134a.

16.-Demonstration of recirculating and the "adiabatic" mixing of two air streams at different states.

17.-Obtaining of the steam generator efficiency curve.

18.-Energy balance in the steam generator.

REQUIRED SERVICES

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

DIMENSIONS AND WEIGHTS

TARB:
  Unit:
      -Dimensions: 2100 x 1200 x 1700 mm approx.
                (82.67 x 47.24 x 66.92 inches approx.)
      -Weight: 250 kg approx.
                (551 pounds approx.).
  Electronic console:
      -Dimensions: 490 x 330 x 310 mm approx.
                (19.29 x 12.99 x 12.20 inches approx.)
      -Weight: 15 kg approx.
                (33 pounds approx.).

RECOMMENDED ELEMENTS (Not included)

- EDIBON Steam Generator (TGV), or 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:

-TARB. Recirculating Air Conditioning Unit.

Offered in other catalogue:

-TARC. Computer Controlled Recirculating Air Conditioning Unit.

TARB/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.
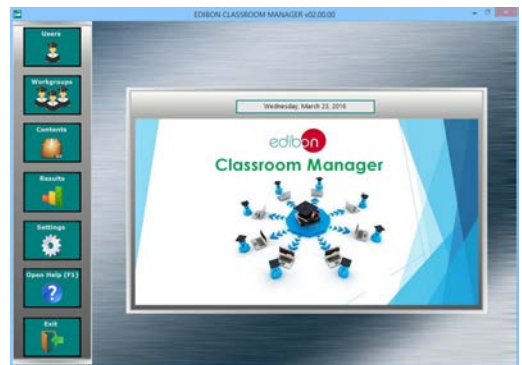

Instructor Software

**- 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
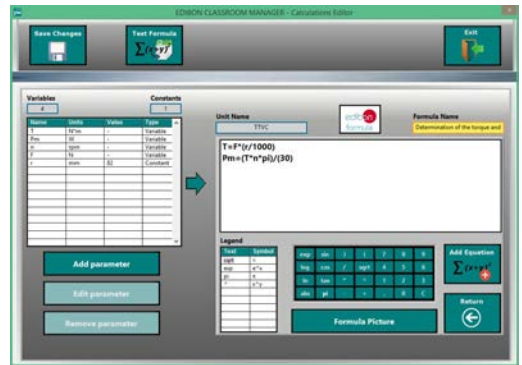
ECAL. EDIBON Calculations Program Package - Formula Editor Screen
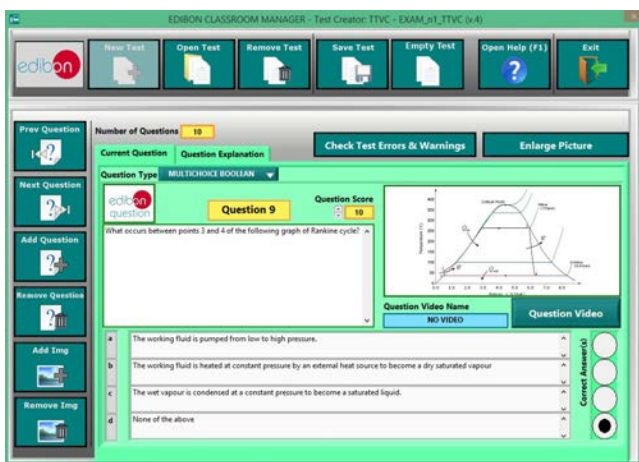
ETTE. EDIBON Training Test & Exam Program Package - Main Screen with Numeric Result Question

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

- 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.

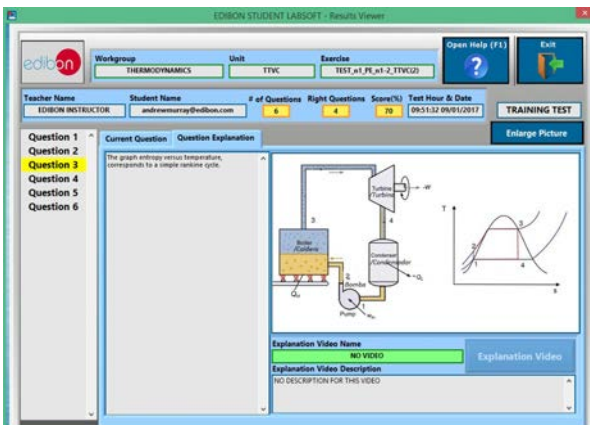For more information see **ICAI** catalogue. Click on the following link:
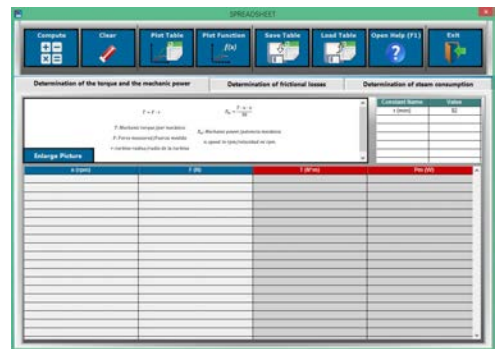www.edibon.com/en/files/expansion/ICAI/catalog

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.

edibon
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REPRESENTATIVE: