Recirculating Air Conditioning Unit

TARB

Technical Teaching Equipment

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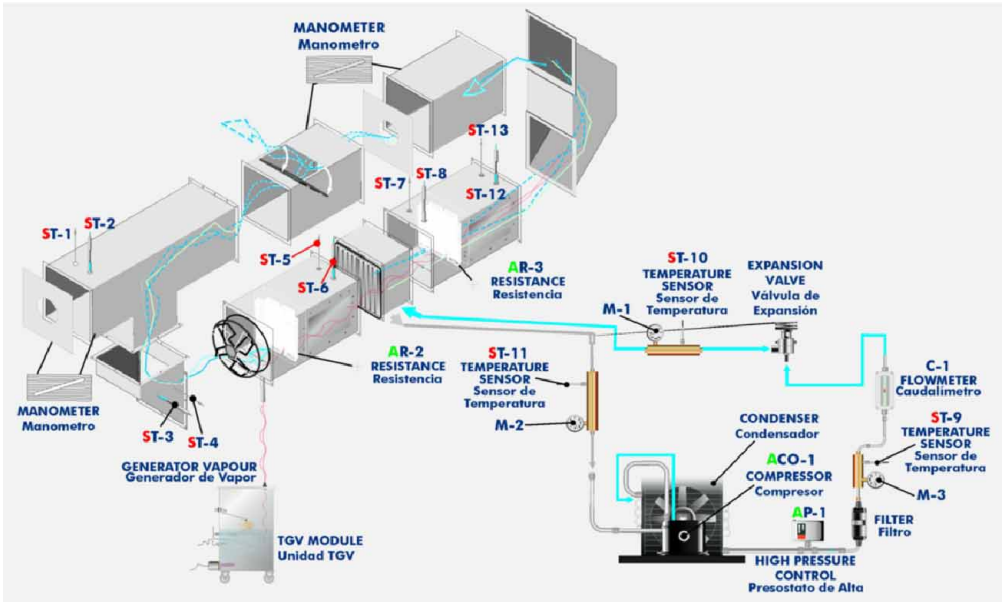
Products
Products range
Units
9.-Thermodynamics & Thermotechnics

Electronic console

PROCESS DIAGRAM AND ELEMENTS ALLOCATION

ST-1 Temperature sensor of dry bulb, "J" type.
ST-2 Temperature sensor of wet bulb, "J" type.
ST-3 Temperature sensor of dry bulb, "J" type.
ST-4 Temperature sensor o f wet bulb, "J" type.
ST-5 Temperature sensor of dry bulb, "J" type.
ST-6 Temperature sensor of wet bulb, "J" type.
ST-7 Temperature sensor of dry bulb, "J" type.
ST-8 Temperature sensor of wet bulb, "J" type.
ST-9 Temperature sensor (condenser outlet), "J" type.
ST-10 Temperature sensor (evaporator inlet), "J" type.
ST-11 Temperature sensor (evaporator outlet), "J" type.
ST-12 Temperature sensor of dry bulb, "J" type.
ST-13 Temperature sensor of wet bulb, "J" type.
C-1 Flow meter
M-1 Bourdon manometer.
M-2 Bourdon manometer.
M-3 Bourdon manometer.
AP-1 High-pressure cut-out.
AR-2 Pre-heater.
AR-3 Re-heater.
Evaporator.
Compressor.
Condenser.
Fan with speed control.



ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

Certificates ISO 14000 and **ECO-Management and Audit Scheme**
(environmental management)

Worlddidac Quality Charter Certificate
(Worlddidac Member)

DESCRIPTION

This unit has as objective to introduce the student in the world of the air conditioning installations, as well as to study and determine the good parameters for the unit operation in function of the environmental demands (humidity, heat, temperature and refrigeration, etc). It allows to work with recirculating air and fresh air modes.

The unit has been designed to study, besides the change of the air conditions, the refrigeration circuit placing strategically temperature sensors, pressure meters and flowmeters that allow us to study the refrigeration cycle and quantify the capacity of the evaporation and condensation unit.

SPECIFICATIONS

Anodized aluminium structure and panels in painted steel (epoxy paint).

Main metallic elements in stainless steel.

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

Tunnel made in stainless steel of 300 x 300 x 4000 mm., in which there has been installed 4 windows of 200 x 300 mm. to visualize the tunnel inside.

2 Electrical heating resistances: one of 2000W (pre-heater) at the inlet of the evaporator and other of 1000W (re-heater) at the outlet of the evaporator.

Axial fan, with speed regulation, 2500 r.p.m., maximum flow: 2160 m^3/h.

Evaporator.

Condenser unit, composed by:

- Compressor, 1/2 Cv, 4.48 A.
- Condenser, 1591 BTU's.
- Air flow 900 m^3/h.

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

Filter dryer.

3 Bourdon manometers, two of 10 bar and one of 25 bar:

- Bourdon manometer (condenser outlet).
- Bourdon manometer (evaporator inlet).
- Bourdon manometer (evaporator outlet).

2 Flow meters for air flow measurement in the tunnel.

5 Hygrometers, placed along the tunnel, formed each one by 2 temperature sensors (wet and dry bulb).

13 Temperature sensors:

- 10 Temperature sensors, placed in the tunnel to form 5 hygrometers:
  - 5 "J" type temperature sensors (dry buld).
  - 5 "J" type temperature sensors (wet bulb).
- 3 temperature sensors, placed in the refrigeration circuit:
  - 1 "J" type temperature sensor (condenser outlet).
  - 1 "J" type temperature sensor (evaporator inlet).
  - 1 "J" type temperature sensor (evaporator outlet).

Flow meter for refrigerant flow measurement, range: 0-60 l./min.

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

Psychrometric chart and Enthalpy diagram of R134a.

The unit incorporates wheels for its mobility.

Electronic Console:

- Metallic box.
- Temperature sensors connections.
- Selector for temperature sensors.
- Digital display for temperature sensors.
- Heating resistances 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.

EXERCISES AND PRACTICAL POSSIBILITIES

Some Practical Possibilities of the Unit:

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

2.- Efficiency determination of the preheating resistance.

3- Preheating effect in an air conditioning installation.

4.- Dehumidification process study.

5.- Material balance in the evaporator.

6.- Energy balance in the evaporator.

7.- Re-heat effect.

8.- Dehumidification process study recirculating air.

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

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

11.- It enables the condensate formed during de-humidification to be compared with that expected from the change of air properties across the evaporator.

12.- Comparison of the heat transfer at the boiler with the enthalpy increase of the air during steam injection.

13.- Obtaining of the steam generator efficiency curve.

14.- Energy balance in the steam generator.

Other possible practices:

15.- Psychrometric chart.

16.- Determination of the air flow.

17.- Example of the air properties determination.

18.- Usage of Psychrometric chart.

19.- Properties of the refrigerant R134a.

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

REQUIRED SERVICES

- Electrical supply: 220V., 1-phase+ neutral+ ground, 50 Hz., or 110V., 1-phase+ neutral+ ground, 60Hz.; and 3 CV max.
- EDIBON Steam Generator (TGV), or steam generator with similar characteristics.
- Water supply and drainage.

DIMENSIONS & WEIGHTS

TARB:

-Unit: -Dimensions: 2100 x 1100 x 1700 mm. approx.

-Weight: 250 Kg. approx.

-Electronic Console: -Dimensions: 490 x 330 x 310 mm. approx.

-Weight: 20 Kg. approx.

RECOMMENDED ACCESSORIES

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.**

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

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