



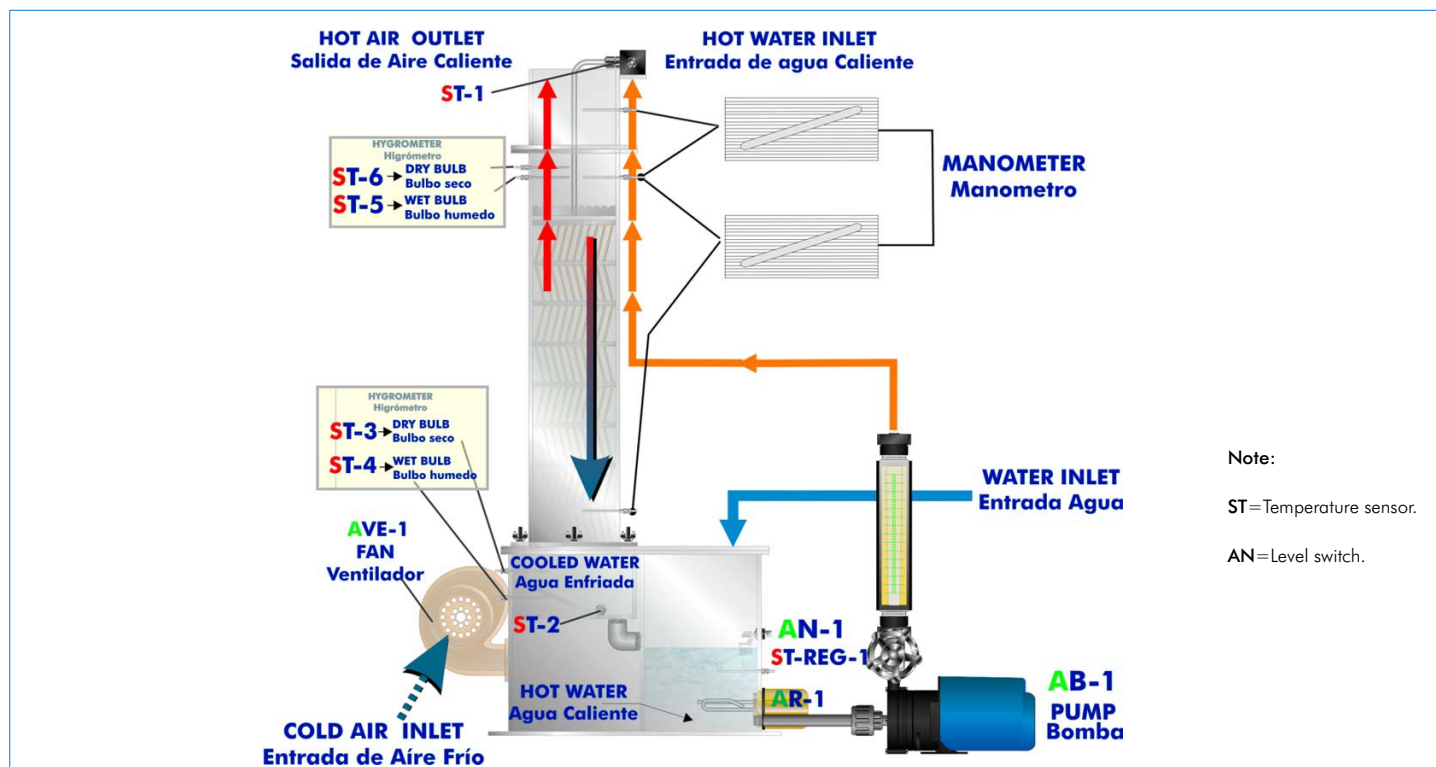
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Products
Products range
Units
9.-Thermodynamics
& Thermotechnics



Electronic Console

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



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
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DESCRIPTION

The Bench Top Cooling Tower has been perfectly developed to offer to the students the opportunity of appreciate the construction, design and operative characteristics of a modern cooling system by evaporating water. The unit is a good example of "open system" through which two currents of fluids (water and air) flow and where a transfer of matter from one current to the other occurs.

With this unit, the performance of the cooling system will be studied, as well as balances of matter and energy, and the effects of:

- Volume of air flowing.
- Volume of water flowing.
- Water temperature.
- Cooling load.
- Packing density.

For this last study it is necessary to have at least several types of columns with different packing factors at one's disposal.

SPECIFICATIONS

Bench top unit.

Anodized aluminium structure.

Panels and main metallic elements in stainless steel.

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

Water propeller pump, maximum flow of water of 120 l/h. - 2l./min.

Air propeller with a fan speed control (145 m³/h. max., 3000 rpm).

Heater resistance (60° C. max.).

Water tank (14 l. capacity), with water level gauge.

On/Off level switch for filling the tank.

Flow meter, range: 0-2 l/min.

Valves.

7 Temperature sensors, "J" type.

2 inclined manometers, 300 mm. length.

Column type B: N° of levels: 8. N° of sheets by level: 10. Total surface: 1.013 m². Height of packaging: 650mm. Density Area/volume: 58 m²/m³.

-Optional Columns: (not included in the standard supply)

Column type A: N° of levels: 8. N° of sheets by level: 19. Total surface: 1.915 m². Height of packaging: 650 mm. Density Area/volume: 112.64 m²/m³.

Column type C: N° of levels: 8. N° of sheets by level: 7. Total surface: 0.680 m². Height of packaging: 650 mm. Density Area/volume: 40.02 m²/m³.

Column type D: No packaging.

Column type E: Packing characteristics column): with packing arranged to allow measurement of air and water properties within column. Fitted with temperature sensors in 3 points.

Sensors: 7 temperature sensors of Dry Bulb, 7 temperature sensors of Wet Bulb and 3 water temperature sensors.

N° of levels: 8. N° of sheets by level: 19. Height of column: 1100mm. Height of packaging: 650 mm. Density Area/volume: 112.64 m²/m³.

Electronic Console:

Metallic box.

Temperature sensors connections.

Digital display for temperature sensors.

Selector for temperature sensors.

Heater resistance controller.

Pump switch.

Fan switch and fan controller.

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.- Process observation inside a bench top cooling tower.
- 2.- Determination of evaporation velocity.
- 3.- Mass balance. Use of psychrometric charts.
- 4.- Energy balance.
- 5.- Effect of cooling load against "Wet bulb approach".
- 6.- Relation between air velocity, wet bulb approach and head loss.
- 7.- Determination of the cooling capacity.
- 8.- Determination of the cooling capacity for different cooling towers.
- 9.- Thermodynamic properties.
- 10.- Evaporation from a wet bed.
- 11.- Observation of water flow pattern and distribution.

Other possible practices:

- 12.- Variation of specific enthalpy with pressure.
- 13.- Properties of air.
- 14.- Use of a psychrometric map.
- 15.- Determination of water flow.

REQUIRED SERVICES

-Electrical supply: 220V./50Hz or 110V./60Hz.
-Water supply.

DIMENSIONS & WEIGHTS

Unit: -Dimensions: 1000x450x1400 mm. approx.
-Weight : 100 Kg. approx.
Electronic Console : -Dimensions: 490x330x310 mm. approx.
-Weight: 10 Kg. approx.

OPTIONAL COLUMNS

Column type A:

Nº of levels: 8
Nº of sheets by level: 19
Total surface: 1.915 m²
Height of packaging: 650 mm
Density Area/volume: 112.64 m²/m³



Column type C:

Nº of levels: 8
Nº of sheets by level: 7
Total surface: 0.680m²
Height of packaging: 650 mm
Density Area/volume: 40.02 m²/m³



Column type D:

No packaging.



Column type E

(Packing characteristics column):

with packing arranged to allow measurement of air and water properties within column. Fitted with temperature sensors in 3 points.

Sensors:

- 7 Temperature sensor of Dry Bulb.
- 7 Temperature sensors of Wet Bulb.
- 3 Water temperature sensors.

Nº of levels: 8
Nº of sheets by levels: 19
Height of column: 1100 mm
Height of packing: 650 mm
Density Area/volume: 112.64 m²/m³



AVAILABLE VERSIONS

Offered in this catalogue:

-TTEB. **Bench Top Cooling Tower.**

Offered in other catalogue:

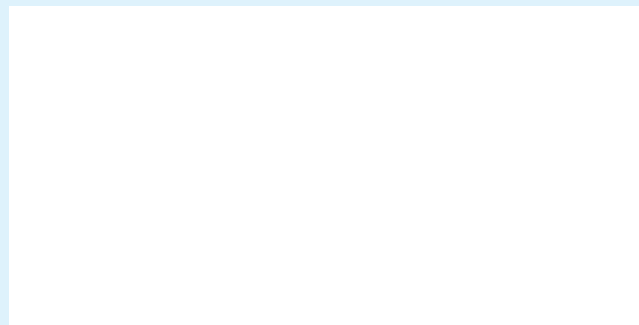
-TTEC. **Computer Controlled Bench Top Cooling Tower.**

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



C/ Del Agua, 14. Polígono San José de Valderas. 28918 LEGANES. (Madrid). SPAIN.
Phone: 34-91-6199363 FAX: 34-91-6198647
E-mail: edibon@edibon.com WEB site: www.edibon.com

REPRESENTATIVE:



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