Fluidisation and Fluid Bed Heat Transfer Unit

TTLFB

Technical Teaching Equipment

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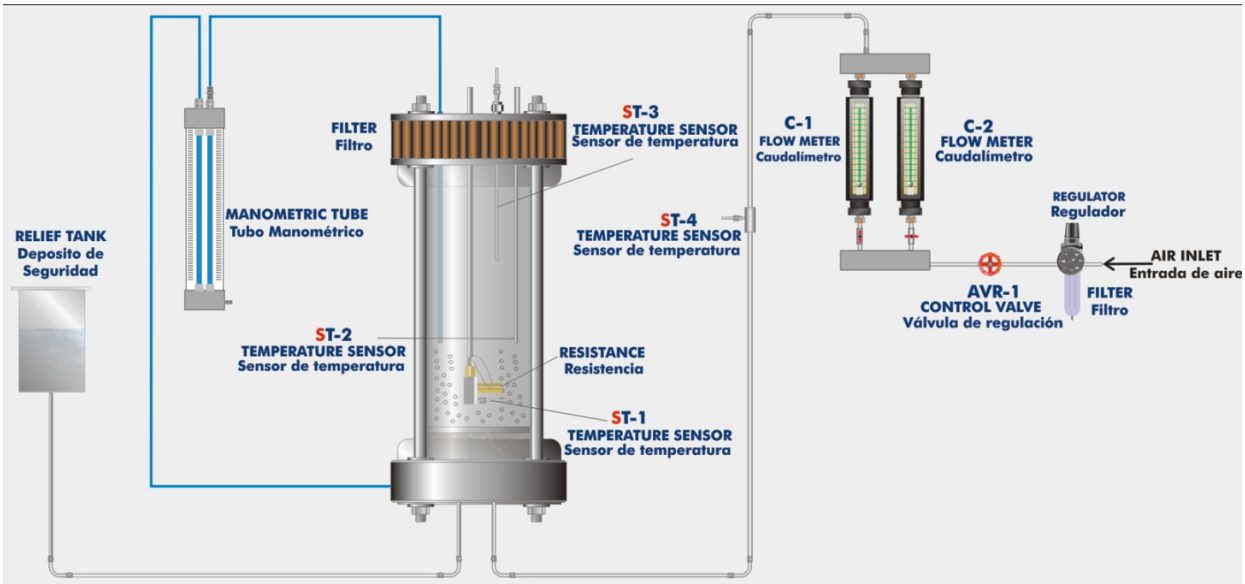
Products
Products range
Units
9.-Thermodynamics & Thermotechnics

Detail of the distributors

Electronic Console

PROCESS DIAGRAM AND ELEMENTS ALLOCATION



ISO 9001:2000 Certificate of Approval

European Union Certificate

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

Worlddidac Quality Charter Certificate
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DESCRIPTION

Heat transmission in a fluidised bed is the base of many industrial processes (grain drying, combustion...).

Fluidisation is the contact process that occurs between a solid and a fluid (gas or liquid). In this process, the bed formed by solid particles is suspended and shaked by a fluid ascendant flow.

A bed is fluidised when the solid particles that form the bed start to move acquiring a similar behaviour to the one of a fluid.

In a completely fluidised bed there is a high index of mixing and a wide zone of contact between the gas and the particles. This way, the heat transmission gets improved. Due to this fact, gradient temperature does not exist practically, and the gas acquires a similar temperature to the one of the bed.

The TTLFB unit has been designed to provide visual and quantitative results related to the flow of air through both a packed and a fluidised bed of granular material. Clear experimental set-up for investigations of the heat transfer in a fluidised bed. It also provides quantitative results related to heat transfer in a fluidised bed.

SPECIFICATIONS

Unit:

Bench-top unit.

Anodized aluminium structure and panels in painted steel.

Main metallic elements in stainless steel.

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

Bed chamber: crystal cylinder in which is contained a granular material through which a fluid (air) passes and which feeds the bed through a distributor in its lower part. It has two temperature sensors ("J" type, range: -40 to 750°C) and two stainless steel couplings that carry a heating resistance and the pressure probes. Both temperature sensors and the heating element can move vertically allowing taking measures both of pressure and temperature in different chamber's levels.

Granular material (glass perls):

- 1 Kg. (170-300 microns).
- 1 Kg. (250-420 microns).

Distributor: in the lower part of the bed chamber. It provides a regular air supply without causing a significant load loss. The air goes through the particle bed causing their fluidization. Available 9 different type of distributors.

Air filter: it is situated on the bed chamber top part.

Heating element (Max. power: 150W. D=10 mm., L=65 mm. Transmission area: 20.4 cm^2.): cylindrical heating with a copper-covered resistance.

Heat transference through the heating element is controlled through potentiometer, which regulates the current towards the resistance. The heating power is displayed on the wattmeter display (in the electronic console). It has two temperature sensors ("J" type, range: -40 to 750°C) on the surface, one indicates the surface temperature, and the other is associated to a controller that prevents the temperature from exceeding a pre-established value.

Power regulator to vary the heater (resistance power input) (in the electronic console).

Regulator and filter. Input pressure range: regulating filter adjusted to 3 bar.

Pressure relief tank.

2 Air flowmeters:

Flowmeter: 22-130 l./min.

Flowmeter: 1-5.5 l./min.

2 Manometric tubes, to measure pressure drop through bed, range: 0-500 mm/H_2O.

Temperature sensor ("J" type, range: -40 to 750°C) in the chamber air intake. It measures the air temperature before entering the chamber.

Electronic Console, including:

Metallic box.

Temperature sensors connections.

Digital display for temperature sensors (temperature display).

Selector for temperature sensors.

Wattmeter display.

Heating resistance switch.

Heating resistance power selector.

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.- Observation of the behaviour in a fluidised bed of a wide range of granular materials, from onset of fluidisation to entrainment.

2.- Study of the behaviour of particles in a bed when an ascendant airflow is applied.

3.- Study of the relation between bed height, drop of pressure and ascendant air velocity through the particle bed.

4.- Investigation of the effect of distributor design on bed behaviour.

5.- Measurement of air flow and pressure drop through a variety of granular materials.

6.- Demonstration of separation by particle size and density.

7.- Study of the variation of the heat transfer coefficient in a fluidised bed by effect of the following parameters:

superficial velocity,

depth of immersion of the hot surface in the bed.

particle size.

REQUIRED SERVICES

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

-Compressed air supply.

DIMENSIONS & WEIGHTS

Unit:	-Dimensions: 750 x 500 x 750 mm. approx.
	-Weight: 40 Kg. approx.
Electronic Console:	-Dimensions: 490 x 330 x 310 mm. approx.
	-Weight: 15 Kg. approx.

AVAILABLE VERSIONS

Offered in this catalogue:

-TTLFB. **Fluidisation and Fluid Bed Heat Transfer Unit.**

Offered in other catalogue:

-TTLFC. Computer Controlled **Fluidisation and Fluid Bed Heat Transfer Unit.**

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

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