

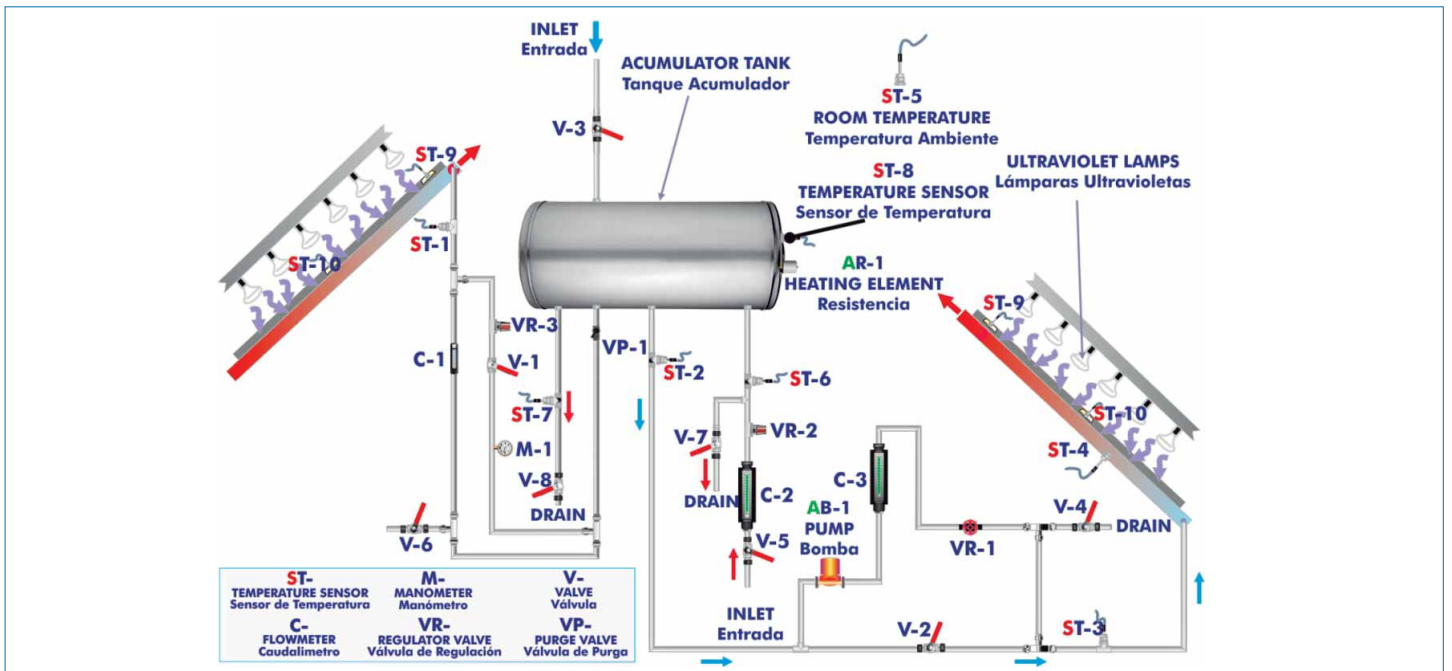
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Products  
 ↳ Products range  
 ↳ Units  
 ↳ 5.-Energy



Electronic console

## PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION



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  
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## INTRODUCTION

The sun provides us a wide spectrum of solar energy. Except for the light that we see around us every day, all of the other types of solar energy are invisible. The other parts of the spectrum consist of cosmic rays, gamma rays, x-rays, infrared, heat and ultraviolet energy.

Thermal solar systems convert solar energy into usable thermal energy.

Thermal Solar Energy Unit (EEST) allows to demonstrate solar thermal heating of domestic water in an illustrative manner.

## GENERAL DESCRIPTION

The unit is a system that transforms solar energy into usable thermal energy. It uses the thermosiphon solar system to heat water or the traditional pumping system. In both cases, the absorbed thermal energy is given by the simulated solar radiation; in our case, it is done using a panel with powerful luminous sources.

The EEST unit mainly consists of the following elements:

- Thermal solar collector.
- Accumulator tank.
- Solar simulator.
- Pumping system.

The solar collector is mounted on an aluminum frame and the fluid (water) flows through copper tubes. It has been developed in such a way that the geometrical shape of the surface allows the most efficient absorption.

The accumulator tank is protected with an anti-corrosive material. It has a heating element with a safety device to prevent over-temperatures.

Lamps of the solar simulator emit radiation similar to the sun radiation and allows a range of exercises to be carried out in the laboratory. The light is converted into heat in the solar collector and transferred to the heat transfer fluid. Three different configurations can be simulated with the solar simulator: all the lamps are turned on, half of the lamps are turned on in zig zag, or only one lamp is turned on.

Besides, the unit includes a pump to perform a forced convection of the heat transfer fluid through the accumulator tank.

The unit is fitted with sensors and meters to record the relevant parameters (temperature and flow) and are included safety valves for overpressure protection.

## SPECIFICATIONS

Metallic structure.

Main metallic elements in steel.

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

Solar panel (thermal solar collector):

Anodized aluminum structure.

Copper pipes, wrapped with insulating material, to connect the panel and the accumulator tank.

Area of the panel: 1.92m<sup>2</sup>.

Material: tempered glass.

Accumulator tank:

Vacuum vitrified boiler, high efficiency heating circuit and anti-corrosion protections.

It has a supporting heating group with a heating element, power: 2400 W.

Contact thermostat to control the temperature.

Volume: 154 l.

Max. pressure: 8 bar.

Max. temperature: 110°C.

Solar simulator:

Aluminum structure with adjustable height.

Sixteen solar spectrum lamps of 300 W. each one, distributed into independent circuits.

Electricity security group, made up by magnetothermics.

Three different configurations can be simulated with the solar simulator: all the lamps are turned on, half of the lamps are turned on in zig zag, or only one lamp is turned on.

Pumping system:

Pump, flow range: 0-2 l./min., max. pressure: 0.6 bar.

Three flowmeters:

One of 0.2-2 l./min. in the primary circuit (forced circulation with pump).

One of 4-50 cc/min. in the primary circuit (free circulation, without pump).

One of 1.5-10 l./min. in the secondary circuit.

10 Temperature sensors, "J" type.

1 Manometer, range: 0-4 bar.

2 Safety valves for over-pressure protection.

The unit includes two "Venetian" type blinds to reduce a direct visual contact with the lamps and to reduce the direct contact with the solar panel when the unit is working.

Electronic console:

Metallic box.

Connections for the temperature sensors. Digital display for the temperature sensors. Selector for the temperature sensors.

Pump switch.

Heating element switch.

3 Switches for the different configurations of the solar simulator: one for all the lamps on, other for half of the lamps on and another for only one lamp on.

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

- 1.- Study of the thermosiphon operation.
- 2.- Study of the luminosity profile of the lamps.
- 3.- Study of the efficiency of the solar panel.
- 4.- Study of the influence of the tilt angle of the lamps panel on the unit efficiency.
- 5.- Study of relation between the flow and the temperature.
- 6.- Study of energy balance of the solar collector.
- 7.- Study of energy balance of the accumulator tank.
- 8.- Determination of the experimental efficiency.
- 9.- Study of the influence of the angle of incidence on the temperature.

## REQUIRED SERVICES

- Electrical supply: single-phase, 220V./50 Hz or 110V/60 Hz, minimum power 6000W.
- Water supply: 2 bars.

## DIMENSIONS & WEIGHTS

EEST:

Unit: -Dimensions: 2200 x 1200 x 2005 mm. approx.  
(86.61 x 47.24 x 78.94 inches approx.)  
-Weight: 290 Kg. approx.  
(639.34 pounds approx.).

Electronic console: -Dimensions: 490 x 330 x 310 mm. approx.  
(19.29 x 12.99 x 12.2 inches approx.)  
-Weight: 10 Kg. approx.  
(22 pounds approx.).

## AVAILABLE VERSIONS

Offered in this catalogue:

- EEST. Thermal Solar Energy Unit.

Offered in other catalogues:

- EESTC. Computer Controlled Thermal Solar Energy Unit.
- MINI-EEST. Thermal Solar Energy Basic Unit.
- MINI-EESTC. Computer Controlled Thermal Solar Energy Basic Unit.

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



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