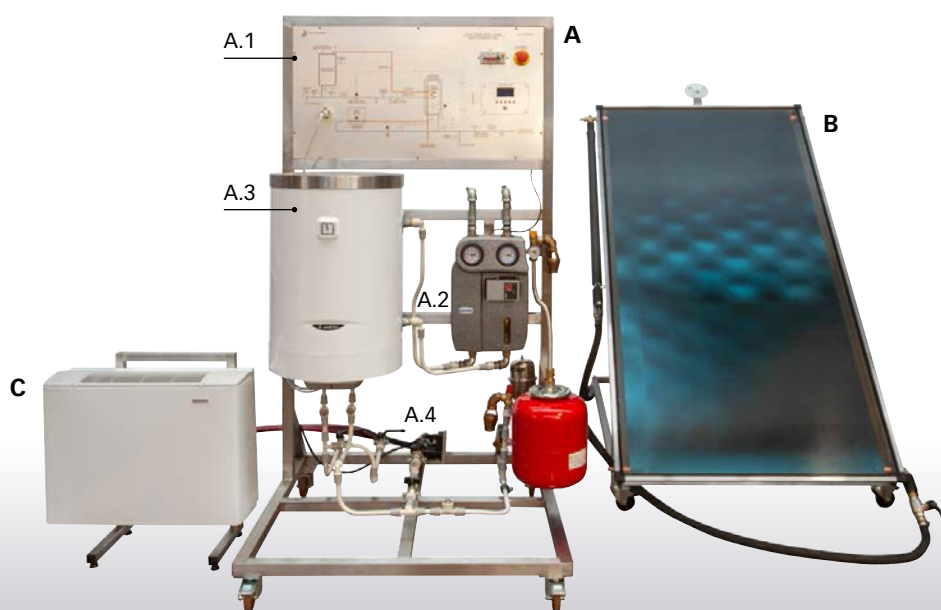


# COMPUTERIZED SOLAR THERMAL ENERGY TRAINER

## Mod. STETCP/EV

ST



RENEWABLE ENERGIES

www.elettronicaveneta.com

28A-E-ST-STETCP-1

## INTRODUCTION

Energy saving and environmental pollution reduction are crucial global issues. Using renewable energies as alternative sources to fossil fuels can address both issues, with great benefits especially in countries where traditional energy sources are scarce.

Considering the above, this system enables experimental investigation on the conversion of solar radiation into thermal energy by means of a flat plate solar collector. The equipment is manufactured using real components available on the market.

## DESCRIPTION

### Relevant features:

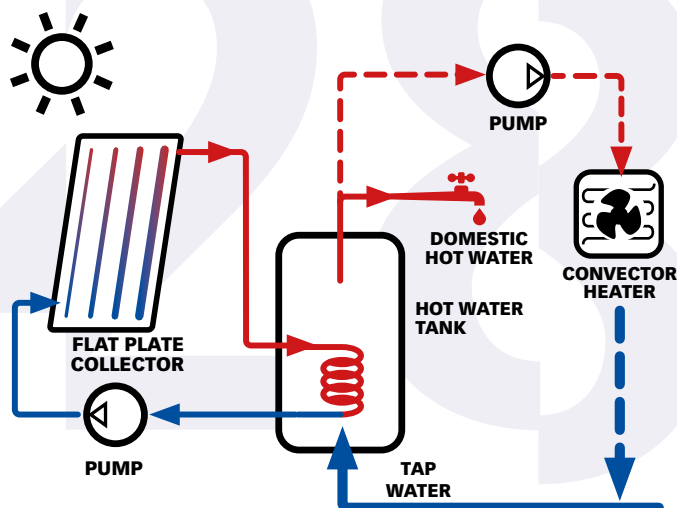
- The collector can be used outdoors and indoors. In case of indoor use, the lighting device SS-1/EV is required (**optional item** - refer to the end of this data sheet)
- The solar collector is mounted on castors; the frame can be tilted to compare system performance under different inclination and orientation
- The hot water stored in the tank is used as domestic hot water or to power the convective heater

A video demonstration is available on Elettronica Veneta YouTube channel



Scan code to watch



**Operating principle:**

The solar rays strike the flat plate collector highly absorbent surface heating the water there contained. After reaching a temperature slightly higher than that of the water contained in the storage tank hydraulically connected to the collector, the circulation pump switches on and transfers heat from the collector to the tank. The hot water stored in the tank can be used for space heating using the convector or for sanitary use.

**TRAINING PROGRAM**

- Physical principles whereby solar energy heats water exploiting flat plate collectors
- Identification of all installed components
- Interpretation of technical parameters of all components
- Local control
- Convector heater, storage tank and pumps operation
- Sizing criteria for DHW facilities, air conditioning, etc.
- Assembly and maintenance criteria for facilities
- PC data acquisition and supervision

**TECHNICAL SPECIFICATIONS****Main module (A)**

The components are placed vertically on a base, facilitating comfortable access to all components. The trainer design allows the students to see its part from each side. It is mounted on castors and includes:

- Front control panel placed in the top part (A.1)
  - System block diagram
  - Data acquisition card with USB interface for connection to the PC
  - Situation lights
  - Thermomagnetic differential switch

- Electric water heater with solar circuit heat exchanger (A.2):
  - magnesium anode
  - capacity: 80 litres
  - solar circuit heat exchanger surface: 0,15 m<sup>2</sup>
  - power: 1,2 kW
  - heating time ( $\Delta T = 45 \text{ }^\circ\text{C}$ ): h, min: 3,16
  - max working temperature: 75  $^\circ\text{C}$
  - thermal dispersion at 65  $^\circ\text{C}$ : kWh/24h 1,51
  - max working pressure: bar 8
- Solar circuit including (A.3):
  - loading/unloading valve
  - flow regulator
  - air release valve
  - safety valve
  - manometer
  - thermometer
  - check valve
  - expansion tank
  - solar circuit pump
- DHW circuit including (A.4):
  - water filling unit
  - DHW pump for convector feeding

The hydraulic sockets for cold water inlet, hot sanitary water outlet, connection to the solar panel, etc., are located at the back of this module.

**Real flat plate solar collector mounted on castors (B)**

- Steel frame with adjustable inclination
- Connected to the main module through flexible pipes
- Flat plate collector:
  - Dimension: 1004 x 2004 x 78 mm
  - Aperture area: 1,83 m<sup>2</sup>
  - Absorber area: 1,74 m<sup>2</sup>
  - Volume of the fluid: 1 l
- Provided with manual air venting valve and shut-off valves

**Convector heater (C)**

- 3 speed fan
- Thermal power: max / med / min 1250 / 1100 / 850 W
- Air flow rate: max / med / min 227 / 189 / 136 m<sup>3</sup>/h

**Sensors**

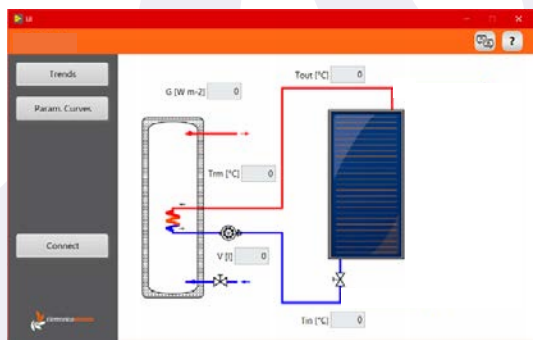
The Trainer includes the following Pt100 range -50 ÷ +150  $^\circ\text{C}$  temperature sensors:

- Collector sensor hot side
- Collector sensor cold side
- Tank sensor hot side
- Tank sensor cold side
- DHW return sensor
- Cold water inlet sensor

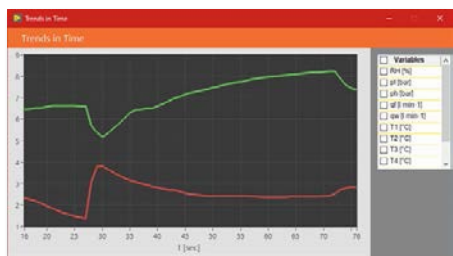
Furthermore, a solar radiation sensor is included, range 0 ÷ 2000 W/m<sup>2</sup>.

## PC data acquisition

The trainer is supplied with a specific software for monitoring the system parameters



- Displayed parameters:
  - Collector inlet/outlet temperature
  - Tank inlet/outlet temperature
  - DHW return temperature
  - Cold water inlet temperature
  - Solar radiation
- The software enables to:
  - Visualize the trend of all the process temperatures and the solar radiation



- Save the exercises data for future analysis or project work

**Power supply:** 230 Vac 50 Hz single-phase - 1500 VA  
(Other voltage and frequency on request)

### Dimensions

Main unit: 100 x 100 x 190 cm  
Solar collector: 120 x 190 x 180 cm (assembly)  
Convactor: 70 x 30 x 70 cm

**Total net weight:** 200 kg

## REQUIRED

**PERSONAL COMPUTER**  
- NOT INCLUDED -



## UTILITIES (PROVIDED BY THE CUSTOMER)

- **Water supply:** min pressure 1 bar - max pressure 2,5 bar

**SUPPLIED WITH**  
**THEORETICAL-EXPERIMENTAL**  
**HANDBOOK**



## OPTIONAL (REF. ACCESS. AND INSTRUMENTS)

**INDOOR LIGHTING DEVICE**  
**Mod. SS-1/EV**

To operate the solar collector indoor

