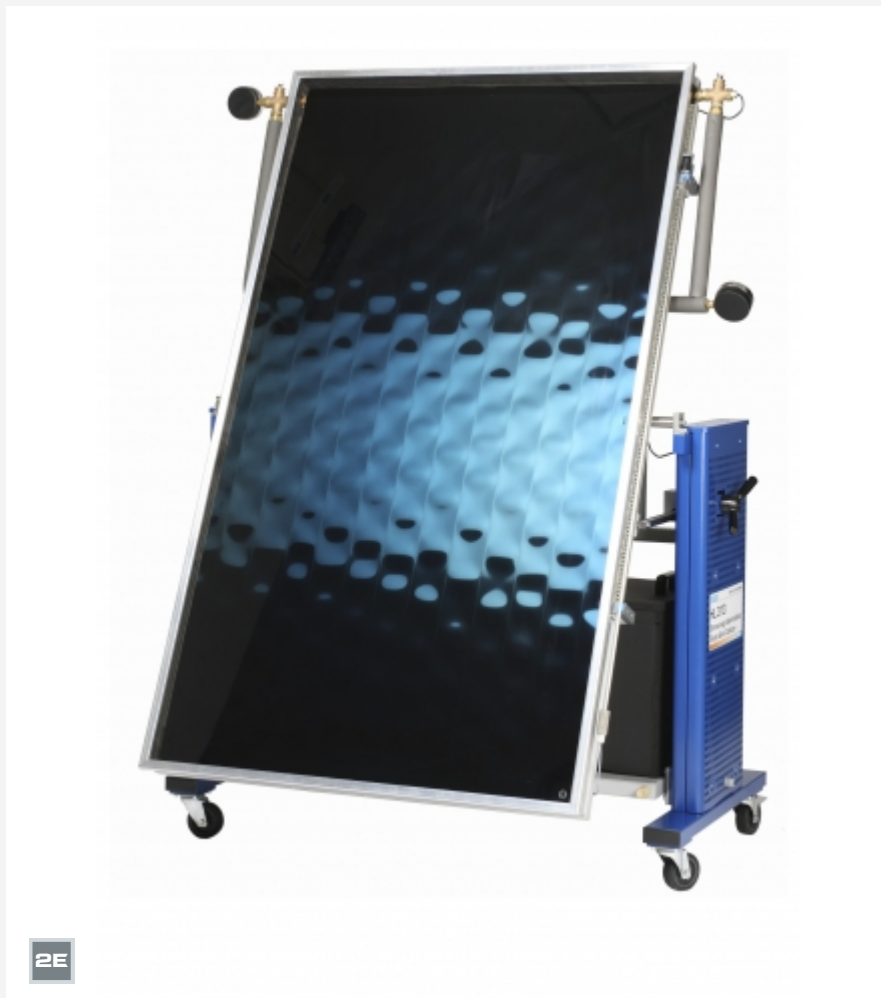


HL 313

Domestic water heating with flat collector



Learning objectives/experiments

- familiarisation with the functions of the flat collector and the solar circuit
- determining the net power
- relationship between flow and net power
- determining the collector efficiency
- relationship between temperature difference (collector/environment) and collector efficiency

Description

- conversion of solar energy into heat
- trainer with real-world components
- pivotable flat collector
- system with heat exchanger and two separate circuits
- solar controller with data logger and USB interface

The HL 313 trainer can be used to demonstrate the principal aspects of solar thermal domestic water heating in a system with components used in real world applications.

Radiant energy is converted into heat in a commercially available flat collector and transferred to a heat transfer fluid in the solar circuit. The heat then gets into the hot water circuit via a heat exchanger.

A solar controller controls the pumps for the hot water and solar circuits. The solar circuit is protected by an expansion tank and a safety valve.

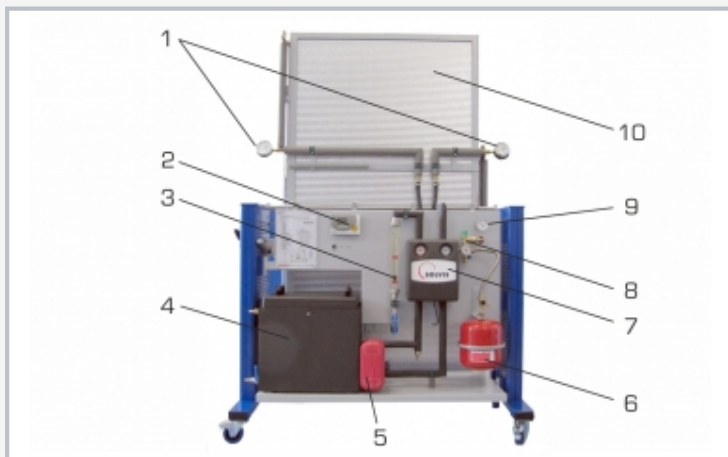
The trainer has been designed so that it is possible to carry out a complete pre-heating as part of a practical experiment.

The temperatures in the storage tank, at the outlet from and the inlet to the collector are measured, as is the flow in the solar circuit. Additionally, as in practice, the temperatures of the inlet and return are displayed on the solar circulation station.

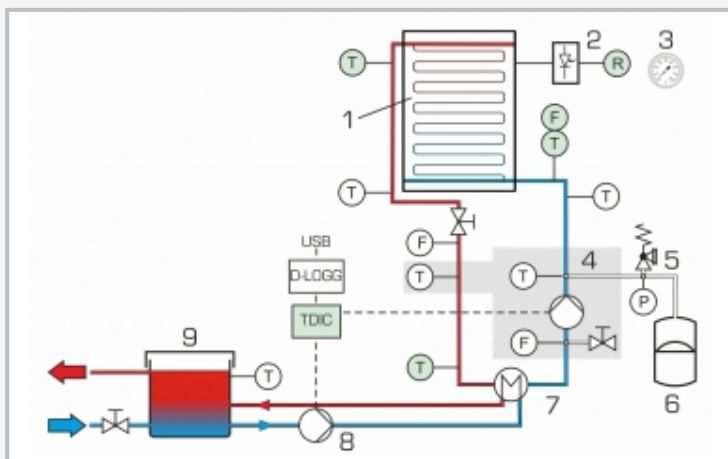
In order to ensure there is sufficient illumination, the system should be operated with solar radiation or the optionally available HL 313.01 Artificial light source.

HL 313

Domestic water heating with flat collector



1 inlet and return thermometer, 2 solar controller, 3 flow meter, 4 buffer tank, 5 heat exchanger, 6 expansion vessel, 7 solar circuit pump, 8 pressure relief valve, 9 ambient air thermometer, 10 collector



TDIC solar controller with USB interface
 1 collector, 2 illuminance sensor, 3 ambient air thermometer, 4 solar circulation station with solar circuit pump, 5 safety valve, 6 expansion tank, 7 heat exchanger, 8 hot water circuit pump, 9 buffer tank
 F flow rate, T temperature, P pressure, R illuminance

Specification

- [1] trainer for investigating the function and operating behaviour of a flat collector
- [2] solar thermal flat collector with selectively absorbing coating
- [3] adjustable collector inclination angle
- [4] solar circuit with collector, pump, expansion vessel and safety valve
- [5] hot water circuit with buffer tank, pump and plate heat exchanger
- [6] 4 bimetallic thermometers
- [7] solar controller with temperature, flow rate and illuminance sensors
- [8] data logger with USB interface
- [9] operation with solar radiation or HL 313.01 Artificial light source

Technical data

Solar circuit

- collector
 - ▶ absorbing surface: 2,3m²
 - ▶ rated throughput: 20...70L/h
 - ▶ operating pressure: 1...3bar
- safety valve 4bar

Hot water circuit

- plate heat exchanger: 3kW, 10 plates
- buffer tank 70L

Measuring ranges

- flow rate: 20...150L/h
- temperature: 4x 0...120°C

230V, 50Hz, 1 phase
 230V, 60Hz, 1 phase
 120V, 60Hz, 1 phase
 UL/CSA optional
 LxWxH: 1660x800x2300mm
 Weight: approx. 240kg

Scope of delivery

- 1 trainer
- 1 set of instructional material

HL 313

Domestic water heating with flat collector

Optional accessories

065.31301 HL 313.01 Artificial light source