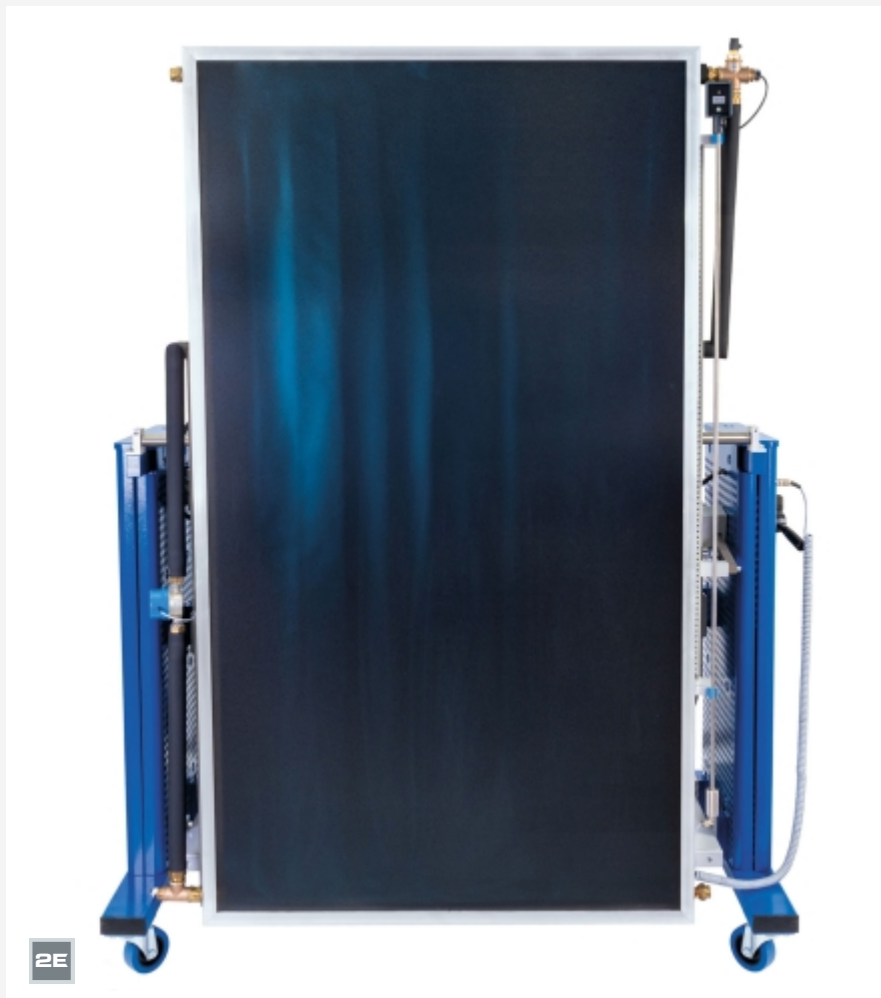


## HL 320.03

### Flat collector



#### Learning objectives/experiments

- layout and function of the flat collector
- determining the net power
- how temperature, illuminance and angle of incidence affect the collector efficiency
- integration of a flat collector in a modern heating system
- hydraulic and control engineering operating conditions
- energy balances
- optimisation of operating conditions for different types of use

#### Description

- **pivotal flat collector for converting solar energy into heat**
- **heat source with connections for the HL 320 modular system**
- **components for operational and system reliability from real-world modern heating technology**
- **suitable for sunlight and artificial light**

A widespread type of collector, which collects solar energy in a non-concentrating way, is the flat collector. The absorber is a selectively coated metal sheet that conducts heat well. The flat collector is mainly used for hot water preparation and heating support. It represents a balanced compromise between simple, cost-effective construction and efficiency.

HL 320.03 is one of the modules from the HL 320 modular system and allows you to convert solar energy into heat using a modern flat collector.

HL 320.03 can be incorporated into the HL 320 modular system in a variety of different ways. The trainer can be used both for generating heated domestic water and for the combined production of domestic hot water and for heating rooms. Modules are connected rapidly and easily via hoses and quick-release couplings. Different combinations for renewable heat sources can be tested and optimised in conjunction with other modules from the HL 320 system.

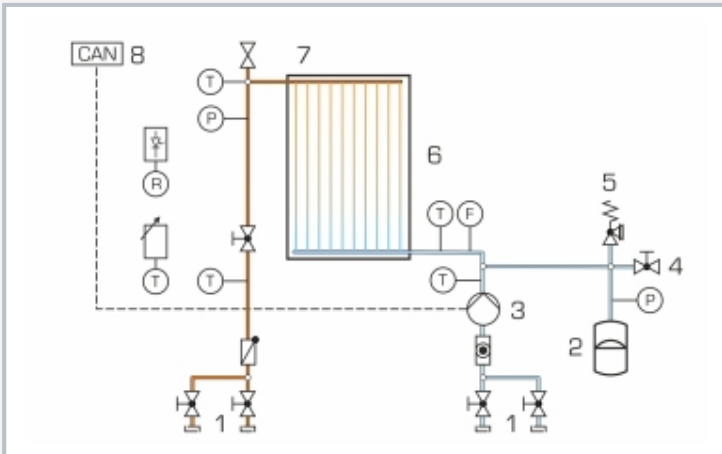
Carefully structured instructional materials have been created for the intended modular combinations with the HL 320.03 module. As part of the documentation for the HL 320 modular system, these materials set out the basic principles and provide a step-by-step guide through the experiments.

# HL 320.03

## Flat collector



1 vent valve, 2 temperature sensor, 3 illuminance sensor, 4 thermometer collector outlet, 5 shut-off valve, 6 connectors for hot water, 7 connectors for cold water, 8 expansion vessel, 9 pump, 10 pressure relief valve, 11 pressure sensor, 12 bubble separator



1 connections for heat transfer pipes with shut-off valves and quick-release coupling, 2 expansion vessel, 3 pump, 4 filling valve, 5 pressure relief valve, 6 flat collector, 7 bleed valve, 8 CAN bus; R illuminance, F flow rate, T temperature, P pressure

	1	2	3	4	5
HL 320.01			X	X	X
HL 320.02		X			X
HL 320.03	X	X		X	X
HL 320.04	(X)	(X)		(X)	(X)
HL 320.05	X	X		X	X
HL 320.07		X	X	X	X
HL 320.08			X	X	X

Recommended combinations of the HL 320 modular system

### Specification

- [1] together with HL 320 modular system: investigation of functional and operational behaviour of a flat collector
- [2] solar thermal flat collector with selectively absorbing coating
- [3] adjustable collector tilt angle
- [4] solar circulation station with pump, expansion tank and safety valve
- [5] measurement instruments and controls by HL 320.05
- [6] operation with solar radiation or HL 313.01 artificial light source

### Technical data

#### Collector

- absorbing surface: 1,8m<sup>2</sup>
- rated throughput: 40...150L/h
- operating pressure: 1...3bar

#### Solar circuit station

- solar pump: variable
- safety valve: 6bar
- balancing valve: 1...13L/min

#### Measuring ranges

- temperature:
  - ▶ 2x 0...160°C
  - ▶ 3x -50°C...180°C
- flow rate: 20...2500L/h
- pressure: 0...6bar

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase, 120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1500x810x2225mm

Weight: approx. 220kg

### Scope of delivery

- 1 trainer
- 1 set of cables
- 1 set of instructional material

# HL 320.03

## Flat collector

### Required accessories

#### Combination 1

HL 320.05 Central storage module with controller

#### Combination 2

HL 320.02 Conventional heating

HL 320.05 Central storage module with controller

HL 320.07 Underfloor heating / geothermal energy absorber

#### Combination 4

HL 320.01 Heat pump

HL 320.05 Central storage module with controller

HL 320.07 Underfloor heating / geothermal energy absorber

HL 320.08 Fan heater / air heat exchanger

#### Combination 5

HL 320.01 Heat pump

HL 320.02 Conventional heating

HL 320.05 Central storage module with controller

HL 320.07 Underfloor heating / geothermal energy absorber

HL 320.08 Fan heater / air heat exchanger

### Optional accessories

#### Combination 1, 2, 4, 5

HL 320.04 Evacuated tube collector

HL 313.01 Artificial light source