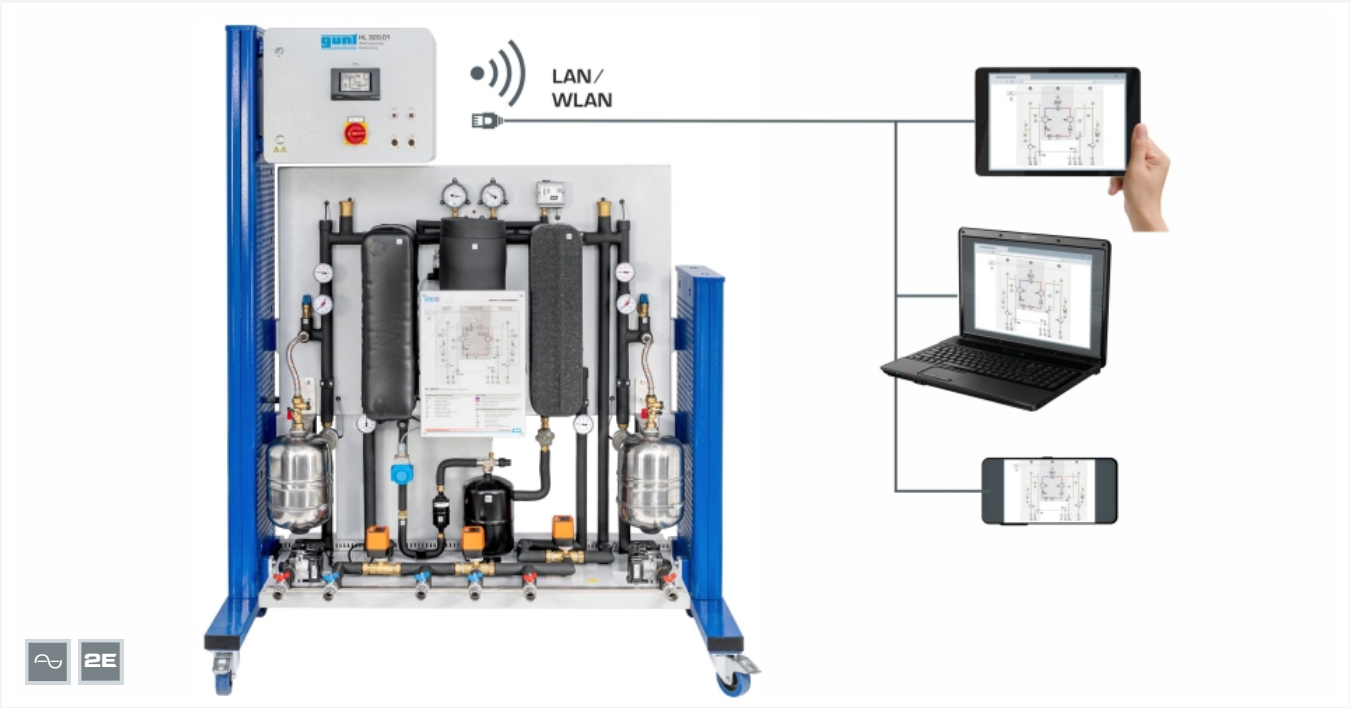
HL 320.01
Heat pump



Display of the heating controller's user interface on any number of end devices

Description

- **heat pump for operation with different sources**
- **multiple system variants possible in conjunction with other HL 320 modules**
- **heating controller with data logger and integrated WLAN router for operation via web browser**
- **network capability: access to ongoing experiments from external workstations**

The HL 320 modular system allows experiments on the generation, storage and use of heat from renewable energies. HL 320.01 includes a heat pump that can be connected to different heat sources and consumers. Together with other HL 320 modules it is possible to systematically investigate the possible variants for incorporating a heat pump into a modern heating system.

The heat pump comprises a compressor, a condenser, an expansion valve and an evaporator. These components are connected to each other via a refrigeration circuit. The refrigerant circulates in the refrigeration circuit powered by the compressor. A source's thermal energy is absorbed at the evaporator. Additional energy is added to the evaporated refrigerant in the compressor. This energy can be output to a consumer as heat.

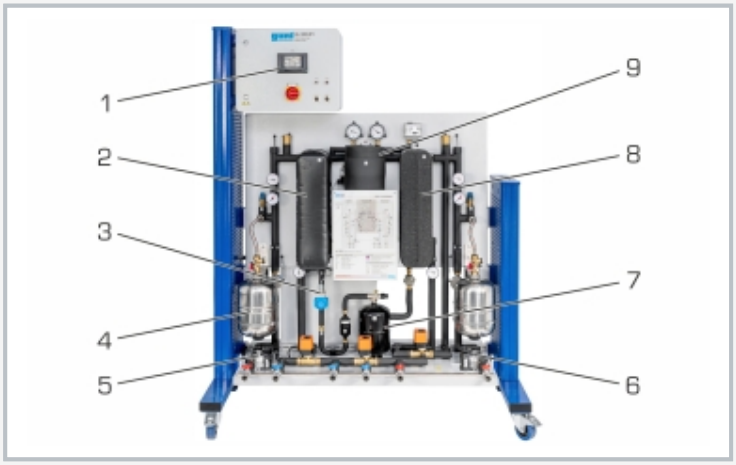
On the HL 320.01 trainer, the condenser can be incorporated into a heating circuit consisting of various consumers. The evaporator can be connected to a source circuit with different heat sources. The pipes with quick quick-release couplings, circulation pumps and accessories necessary to create these connections are provided.

The freely programmable heating controller is operated via touch screen or web browser with LAN/WLAN connection. An integrated WLAN router enables access to ongoing experiments from any number of external workstations. Different user levels with different functions can be selected. A LAN /WLAN connection with the local network allows the evaluation of the recorded measured values on a PC. An additional manufacturer software of the heating controller is supplied for this purpose.

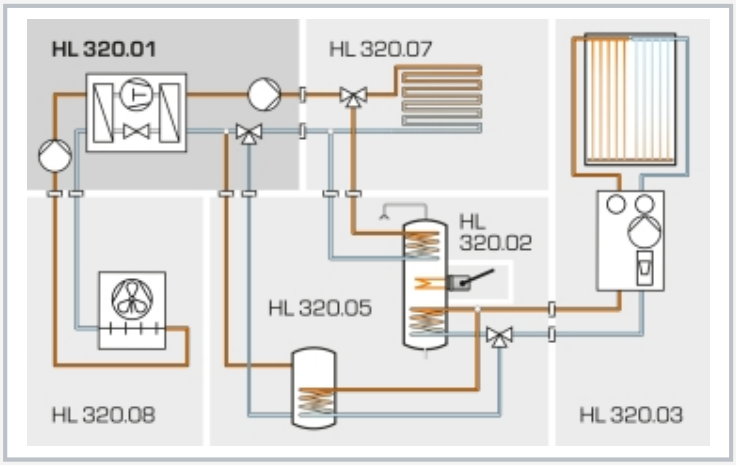
Learning objectives/experiments

- familiarisation with heat pump applications for heating rooms and hot water
- using the heat pump for cooling
- advantages and disadvantages of various system configurations (brine heat pump, air heat pump)
- configuration and adjustment of a heating controller for heat pump control
- operating behaviour under varying heat supply and demand
- dependence of the coefficient of performance on source and sink temperature
- possibilities for optimising the seasonal performance factor

HL 320.01
Heat pump



1 freely programmable heating controller: operation via touch screen or web browser, 2 evaporator, 3 expansion valve, 4 expansion vessel, 5 pump source circuit, 6 pump heating circuit, 7 receiver, 8 condenser, 9 scroll compressor



Inclusion of HL 320.01 in one possible configuration of the HL 320 modular system

	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

Recomended combinations of the HL 320 modular system

Specification

[1] heat pump for the HL 320 modular system
[2] connections for various heat sources and sinks
[3] one circulation pump and one safety module each with expansion vessel for heating and source circuit
[4] freely programmable heating controller with data logger, operation via touch screen or web browser with LAN/ WLAN connection
[5] WLAN router with data logger, SD memory card included
[6] sensors for temperature, flow rate and pressure with connection to the heating controller
[7] remote learning: integrated WLAN router for access to ongoing experiments from any number of external workstations
[8] experiment evaluation with additional manufacturer software of the heating controller
[9] refrigerant R410A, GWP: 2088

Technical data

Heat pump
- heating capacity: approx. 2,3 kW at 5/65°C

Heating and source circuit pumps
- max. flow rate: 3m^3/h
- max. head: 4m

Heating controller
- inputs/outputs: each up to 16
- interfaces: CAN, LAN/WLAN via CMI/router

Refrigerant
- R410A, GWP: 2088, filling volume: 2,4kg, CO_2-equivalent: 5t

Measuring ranges
- temperature:
  - 4x -50...180°C
  - 3x 0...120°C
  - 1x -20...60°C
- flow rate: 2x 20...2500L/h (water)
- pressure:
  - 1x -1...15bar
  - 1x -1...49bar
  - 2x 0...6bar
  - 2x 0...10bar

400V, 50Hz, 3 phases; 400V, 60Hz, 3 phases
230V, 60Hz, 3 phases; UL/CSA optional
LxWxH: 1500x790x1900mm; Weight: approx. 125kg

Required for operation

PC with Windows

Scope of delivery

trainer, set of instructional material

HL 320.01
Heat pump

Required accessories

Combination 3	
HL 320.07	Underfloor heating / geothermal energy absorber
HL 320.08	Fan heater / air heat exchanger
Combination 4	
HL 320.03	Flat collector
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 320.02	Conventional heating
HL 320.03	Flat collector
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 4, 5	
HL 313.01	Artificial light source
HL 320.04	Evacuated tube collector