

# HL 300

## Central heating system



The illustration shows a similar unit.

### Learning objectives/experiments

- familiarisation with the components of a modern heating system and their function
- operating behaviour of a digitally controlled heating circuit with three-way mixing valve
- operating behaviour of a digitally controlled heating circuit with four-way mixing valve
- investigations on a plate heat exchanger operated in counterflow
- investigation of pressure loss on different valves and fittings
- filling heating systems
- commissioning heating systems
- hydronic balancing of radiators
- determination of pump curves
- determination of pipework characteristics
- behaviour of system with air in the pipework

### Description

- **modern heating system with digital controller**
- **closed water circuit with expansion vessel**

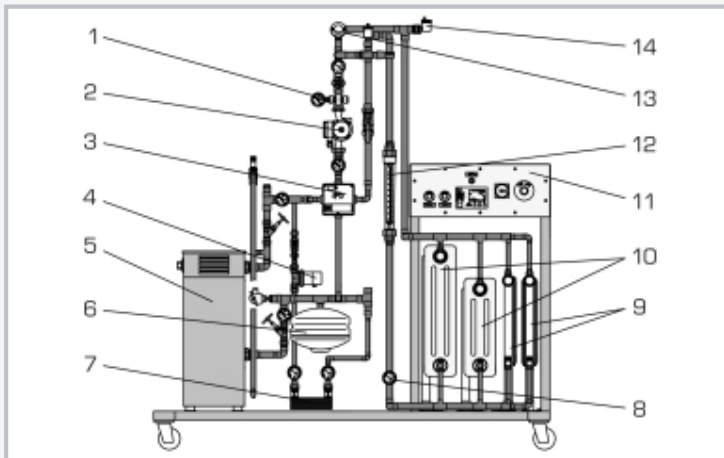
The trainer contains two independent heating circuits that are equipped with a three-way mixing valve and a four-way mixing valve.

The heat provided by an electric boiler can be dissipated via four different radiators. To investigate the full load behaviour of the boiler over an extended period, a plate heat exchanger is fitted in the domestic water circuit. The system has a closed water circuit with expansion vessel. Relevant temperatures and pressures are indicated on easy-to-read instruments.

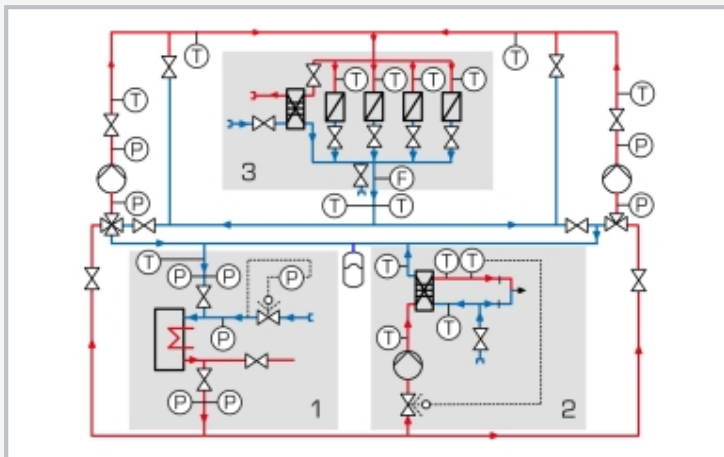
The system is controlled using a state-of-the-art digital controller.

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## Central heating system



1 manometer, 2 pump, 3 four-way mixing valve, 4 domestic water pump, 5 electric boiler, 6 expansion vessel, 7 plate heat exchanger, 8 thermometer, 9 flat radiators, 10 tubular radiators, 11 switch cabinet with digital heating controller, 12 rotameter, 13 temperature sensor, 14 vent valve



Process schematic: 1 heat generator, 2 heating and consumption of domestic water, 3 heating system; red: feed flow pipe, blue: return flow pipe

### Specification

- [1] function and operating behaviour of a modern heating system with digital heating controller
- [2] 4-way mixing valve and 3-way mixing valve
- [3] electric boiler
- [4] 2 circulating pumps, 1 domestic water pump
- [5] 4 different radiators and additional plate heat exchanger as domestic water consumer
- [6] coloured pipes indicate feed and return flow
- [7] measurement of temperature, pressure and flow rate

### Technical data

Electric boiler, 4 stages

- power: 6-9-12-15kW
- max. feed temperature: 95°C
- water tank capacity: 16L

Pump

- power consumption: 70W
- max. flow rate: 6L/min
- max. head: 4m

Domestic water pump

- power consumption: 20W
- max. flow rate: 640L/h
- max. delivery pressure: 0.14bar

Plate heat exchanger: 3kW, 10 plates

Water meter: 2.5m<sup>3</sup>/h

Measuring ranges

- temperature: 3x 20...120°C / 2x 0...120°C / 2x 0...100°C / 4x 0...80°C
- pressure: 8x 0...2,5bar
- flow rate: 100...1000L/h

400V, 50Hz, 3 phases

230V, 60Hz, 3 phases

LxWxH: 1800x780x2000mm

Weight: approx. 280kg

### Required for operation

water connection

### Scope of delivery

- 1 trainer
- 1 manual