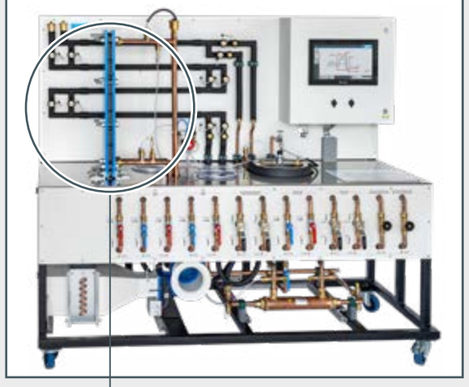
WL 315C
Comparison of various heat exchangers

The WL 315C trainer is used to study and compare different types of heat exchanger under experimental conditions. The most widespread design is the shell & tube heat exchanger, which is included here as double-tube and shell & tube heat exchangers. The plate heat exchanger is an equally frequently used design. One special design is the stirred tank with double jacket and coiled tube. In the model used here, hot water can flow through either the outer jacket or the inner coiled tube. The finned tube heat exchanger is a typical example of heat transfer between a liquid and a gaseous medium.

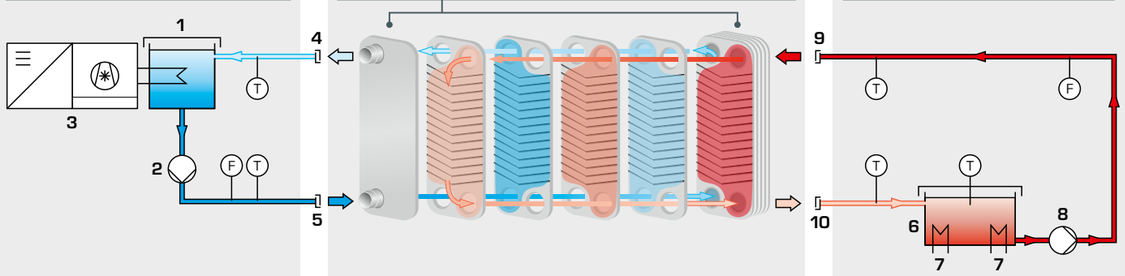
The types presented here are indirect heat exchangers, in which the material flows are conducted in parallel flow, counterflow or, in the case of the finned tube heat exchanger, in cross flow.

WL 312.11
Water chiller

WL 315C
Comparison of various heat exchangers



WL 312.10
Hot water generator



WL 312.11 Water chiller

1 water tank, **2** pump,
3 cold water set,
4+**5** connections to WL 315C;
T temperature measurement point,
F flow meter

WL 315C

Trainer with five different heat exchangers.
The plate heat exchanger is shown as an example.

WL 312.10 Hot water generator

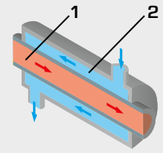
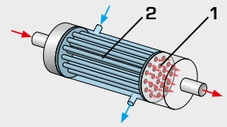
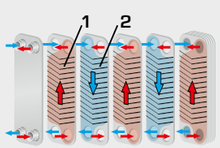
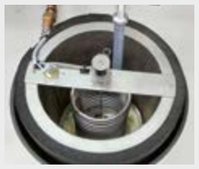
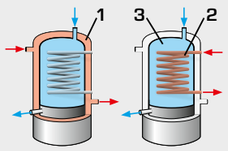
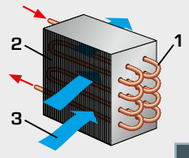
6 water tank,
7 heater, **8** pump,
9+**10** connections to WL 315C;
T temp. measurement point,
F flow meter

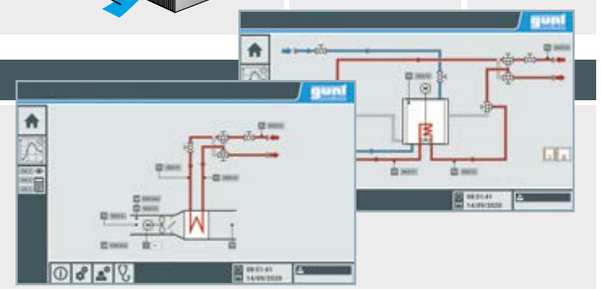
The accessories WL 312.11 Water chiller and WL 312.10 Hot water generator supply cold and hot water for the experiments independent of the laboratory supply. This means that the trainer can be operated as a stand-alone system with a closed water circuit.

WL 312.11 Water chiller
The water chiller enables meaningful operation at high ambient and water temperatures. The device is equipped with a closed refrigeration system, a water tank and a circulation pump.

WL 312.10 Hot water generator
The hot water generator provides hot water for the experiments. The device contains a water tank with two heaters and a pump that transports the heated water to the trainer. The water tank is equipped with two sight glasses to check the fill level.

Overview of the heat exchangers supplied

Type	Principle of operation	Operating mode	Media
Tubular heat exchanger	Two tubes carry media at different temperatures  **1** inner tube with hot water, **2** outer tube with cold water	parallel or counterflow	water-water
Shell & tube heat exchanger	A tube bundle, enclosed in a tube or housing, both of which carry media at different temperatures  **1** tube bundle with hot water, **2** jacket tube with cold water	parallel or counterflow	water-water
Plate heat exchanger	A pack of embossed plates in which media with different temperatures are carried alternately  **1** embossed plate red: flow chamber for hot water, **2** embossed plate blue: flow chamber for cold water	parallel or counterflow	water-water
Stirred tank with double jacket and coiled tube 	Stirred tank with flow-through jacket or coiled tube, media in the stirred tank and jacket/coiled tube have different temperatures  **1** jacket, through which hot water flows, **2** coiled tube, through which hot water flows, **3** stirred tank, filled with cold water	heated jacket or heated coiled tube	water-water
Finned tube heat exchanger	Pack of tubes with pressed-on fins through which air flows, medium in the tube and the air have different temperatures  **1** tubes, through which hot water flows, **2** fins on the tubes provide a larger heat transfer surface area, **3** cold air flows through the fins	cross parallel flow or cross counterflow	water-air

Plant control and data acquisition

The trainer is controlled by a PLC via touch screen. The PLC supports the range of experiments with the various types of heat exchanger: it displays temperature curves and calculates heat fluxes and mean overall heat transfer coefficients. The user interface can be mirrored on up to 10 end devices.