

WL 110

Heat exchanger supply unit



Description

- supply unit for different heat exchangers (WL 110.01-WL 110.04)
- heat exchanger operation in parallel flow or counterflow possible

Heat exchangers transfer thermal energy from the flow of one medium to another. The two flows do not come into direct contact with one another. Efficient heat transfer is a prerequisite for economical processes. Therefore, different heat exchanger types are used in practice depending on the requirements.

This experimental unit can be used to investigate and compare different heat exchanger designs. The complete experimental setup consists of two main elements: WL 110 as supply and control unit and choice of heat exchanger: Tubular heat exchanger (WL 110.01), plate heat exchanger (WL 110.02), shell and tube heat exchanger (WL 110.03) and stirred tank with jacketed vessel and coil (WL 110.04). Water is used as the medium.

The heat exchanger to be investigated is connected to the supply unit. The hot water flows through the heat exchanger. Part of the thermal energy of the hot water is transferred to the cold water.

Reversing the water connections changes the direction of flow and thus allows parallel flow or counterflow operation.

The main function of the WL 110 is to provide the required cold and hot water circuits. To do this, the supply unit is equipped with a heated tank and pump for the hot water circuit, connections for the cold water circuit and a switch cabinet with displays and controls. A temperature controller controls the hot water temperature. The flow rate in the hot water and cold water circuit is adjusted using valves. The cold water circuit can be fed from the laboratory mains or the WL 110.20.

The GUNT software consists of a software for data acquisition and an educational software. With explanatory texts and illustrations the educational software significantly aids the understanding of the theoretical principles. With the aid of an authoring system, the teacher can create further exercises.

Sensors record the temperatures and flow rates. The measured values are read from digital displays and can be transmitted simultaneously via USB directly to a PC where they can be analysed using the software.

Learning objectives/experiments

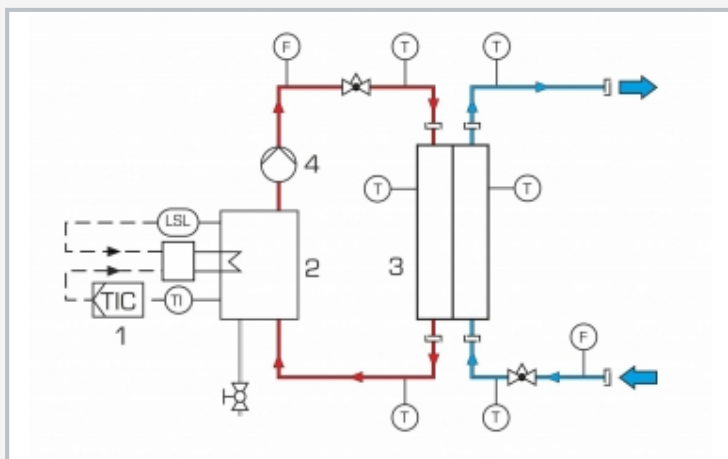
- in conjunction with a heat exchanger (WL 110.01 to WL 110.04)
 - ▶ plotting temperature curves
 - ▶ determining the mean heat transfer coefficient
 - ▶ comparing different heat exchanger types

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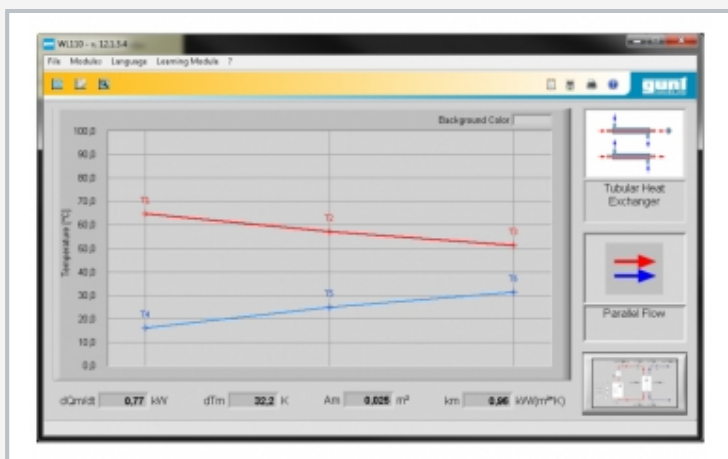
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1 temperature controller, 2 temperature displays, 3 flow rate displays, 4 stirred tank with jacketed vessel and coil WL 110.04, 5 cold water circuit connections, 6 process schematic, 7 hot water tank



1 temperature controller, 2 heated tank, 3 heat exchanger [WL 110.01 to WL 110.04 accessories], 4 pump; red = hot water circuit, blue = cold water circuit; F flow rate, T temperature



Software screenshot: temperature curve for WL 110.01 in parallel flow operation

Specification

- [1] supply unit for heat exchangers
- [2] hot water circuit with tank, heater, temperature controller, pump and protection against lack of water
- [3] cold water circuit from laboratory mains or water chiller WL 110.20
- [4] temperature controller controls the temperature of hot water
- [5] flow adjustable using valves
- [6] digital displays for 6 temperature and 2 flow rate sensors
- [7] water connections with quick-release couplings
- [8] stirring machine connection with speed adjustment [WL 110.04]
- [9] functions of the GUNT software: educational software and data acquisition
- [10] GUNT software for data acquisition via USB under Windows 7, 8.1, 10

Technical data

Pump

- power consumption: 120W
- max. flow rate: 600L/h
- max. head: 30m

Heater

- power output: 3kW
- thermostat: 0...70°C

Hot water tank: approx. 10L

Measuring ranges

- temperature: 6x 0...100°C
- flow rate: 2x 20...250L/h

230V, 50Hz, 1 phase
 230V, 60Hz, 1 phase; 230V, 60Hz, 3 phases
 UL/CSA optional
 LxWxH: 1000x670x550mm
 Weight: approx. 60kg

Required for operation

WL 110.20 or cooling water, drain
 PC with Windows recommended

Scope of delivery

- 1 experimental unit
- 1 CD with authoring system for GUNT educational software
- 1 GUNT software CD + USB cable
- 1 set of instructional material

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Required accessories

060.11001	WL 110.01	Tubular heat exchanger
or		
060.11002	WL 110.02	Plate heat exchanger
or		
060.11003	WL 110.03	Shell & tube heat exchanger
or		
060.11004	WL 110.04	Stirred tank with double jacket and coil

Optional accessories

060.11020	WL 110.20	Water chiller
020.30009	WP 300.09	Laboratory trolley