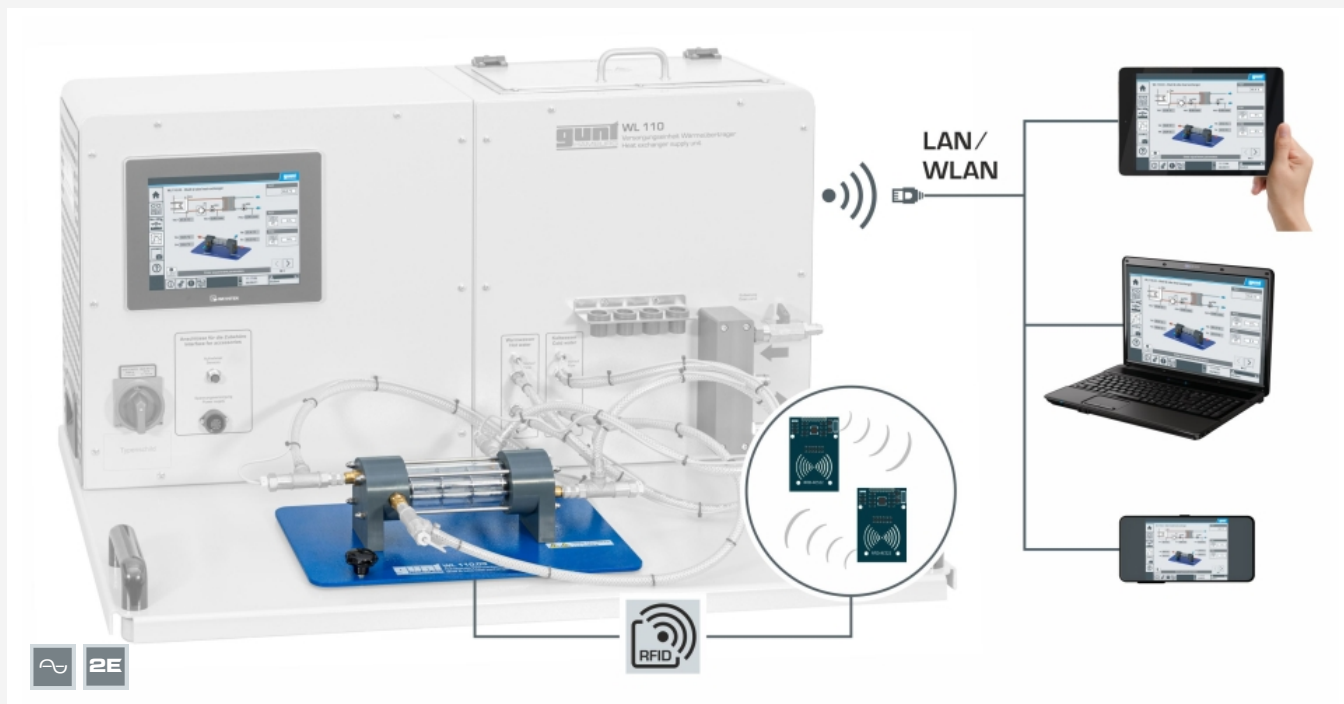


# WL 110.03

## Shell & tube heat exchanger



Complete experimental set-up with supply unit WL 110, screen mirroring is possible on up to 10 end devices

### Description

- **media flowing in cross-flow**
- **intuitive experiment execution via touch screen**
- **integrated router for operation and control via an end device and for screen mirroring on up to 10 end devices: PC, tablet, smart-phone**
- **automatic identification of accessories via RFID technology**

Shell and tube heat exchangers are in widespread use. The main advantages of this design are the large heat transfer surface and the compact design. Shell and tube heat exchangers are used in the chemical and pharmaceutical industries, in refineries and in process engineering plants.

The shell and tube heat exchanger WL 110.03 consists of seven tubes, surrounded by a transparent outer shell. The hot water flows through the tube space and the cold water through the space in the shell. Part of the thermal energy of the hot water is transferred to the cold water. Baffle plates are used to deflect the flow in the shell in such a way as to create greater turbulence and thus a more intensive transfer of heat. The supply hose can be reconnected using quick-release couplings, allowing the flow direction to be reversed.

This allows cross parallel flow or cross counterflow operation.

During experiments, temperature curves are plotted and displayed graphically. The mean heat transfer coefficient is then calculated as a characteristic variable.

The accessory WL 110.03 is easily and safely positioned on the worktop of the WL 110 supply unit. Via RFID technology the accessories are automatically identified, the appropriate PLC software is loaded and an automatic system configuration is performed. The intuitive user interface guides through the experiments. For tracking and evaluation of the experiments, up to 10 external workstations can be used simultaneously using the local network via LAN connection.

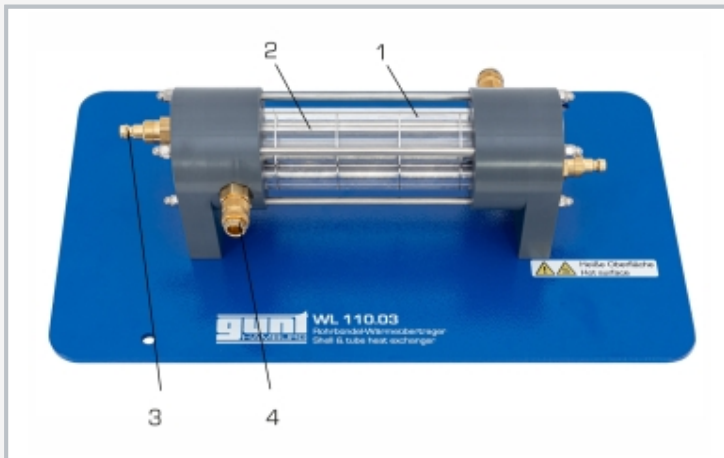
Temperature sensors for measuring the inlet and outlet temperatures are located at the supply connections of the WL 110. The supply of hot and cold water, the flow setting and the measurement of inlet and outlet temperatures are carried out via the supply unit.

### Learning objectives/experiments

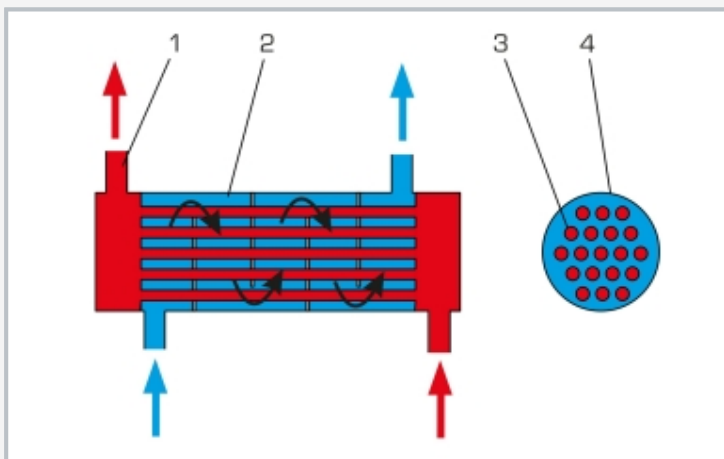
- in conjunction with WL 110 supply unit
  - ▶ function and behaviour during operation of shell and tube heat exchanger
  - ▶ plotting temperature curves:
    - in cross parallel flow operation
    - in cross counterflow operation
  - ▶ calculation of mean heat transfer coefficient
  - ▶ comparison with other heat exchanger types
- PLC software specifically adapted to the accessories used
  - ▶ learning module with theoretical fundamentals
  - ▶ device description
  - ▶ guided experiment preparation
  - ▶ execution of the experiment
  - ▶ graphical representation of the experimental section with measured values for temperature
  - ▶ data transfer via WLAN/LAN for versatile external use of measured values and screenshots e.g. evaluation in Excel

# WL 110.03

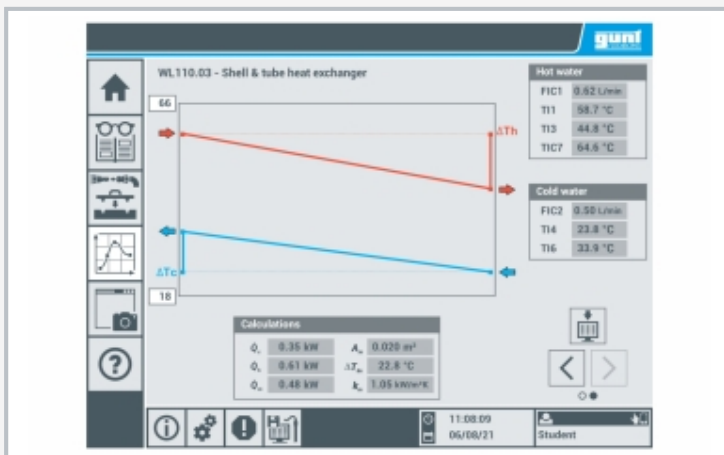
## Shell & tube heat exchanger



1 transparent shell, 2 tube bundle, 3 tube bundle water connection, 4 shell water connection



1 hot water, 2 cold water, 3 tube, 4 shell; red: hot water, blue: cold water



User interface on the touch screen: temperature curve in counterflow operation

### Specification

- [1] shell and tube heat exchanger (cross-flow) for connection to WL 110
- [2] cross parallel flow and cross counterflow operation possible
- [3] transparent shell, visible tube bundle
- [4] tube bundle consisting of 7 tubes and 4 baffle plates
- [5] recording of temperature using WL 110
- [6] automatic identification of accessories via RFID technology and use of the corresponding PLC software
- [7] experiment execution and display of the measured values via touch screen (HMI)
- [8] screen-mirroring: access to ongoing experiments and their results from up to 10 end devices simultaneously via the local network
- [9] hot and cold water supply from WL 110

### Technical data

Heat transfer surface: 200cm<sup>2</sup>

Tube bundle, stainless steel

- Ø outer: 6mm
- wall thickness: 1mm
- tubes, 7

Shell, transparent (PMMA)

- Ø outer: 50mm
- wall thickness: 3mm

LxWxH: 400x230x110mm

Weight: approx. 3kg

### Scope of delivery

- 1 shell and tube heat exchanger

# **WL 110.03**

## **Shell & tube heat exchanger**

Required accessories

WL 110                  Heat exchanger supply unit