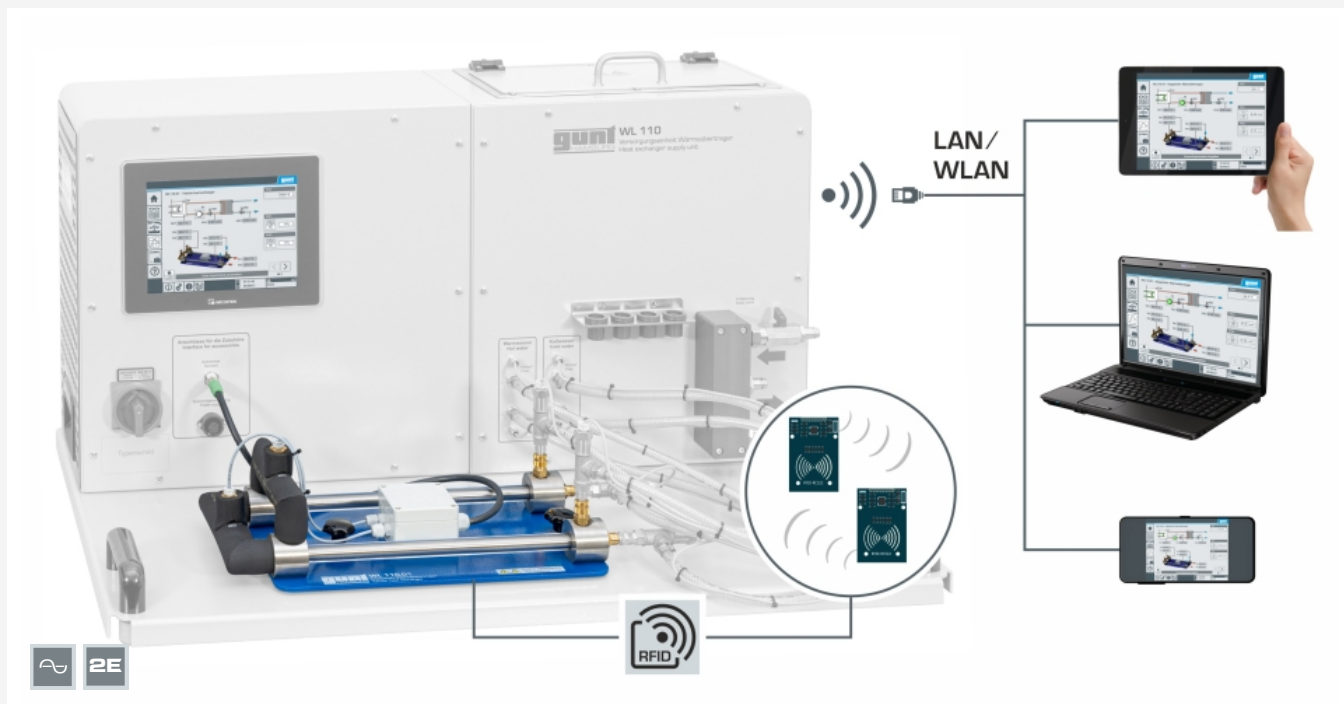


WL 110.01

Tubular heat exchanger



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

Description

- **visible flow channel due to transparent outer tube**
- **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, smartphone**
- **automatic identification of accessories via RFID technology**

Tubular heat exchangers represent the simplest type of heat exchangers and are the preferred solution for transferring heat with high pressure differences or between high viscosity media (e.g. sludge). An advantage is the uniform flow through the tube space. This space is free of flow dead zones.

Hot water flows through the inner tube and cold water through the outer tube of the tubular heat exchanger WL 110.01. Part of the thermal energy of the hot water is transferred to the cold water. Valves on the supply unit are used to adjust the flow rates of hot and cold water. The supply hose can be re-connected using quick-release couplings, allowing the flow direction to be reversed. This allows parallel flow or 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 110.01 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.

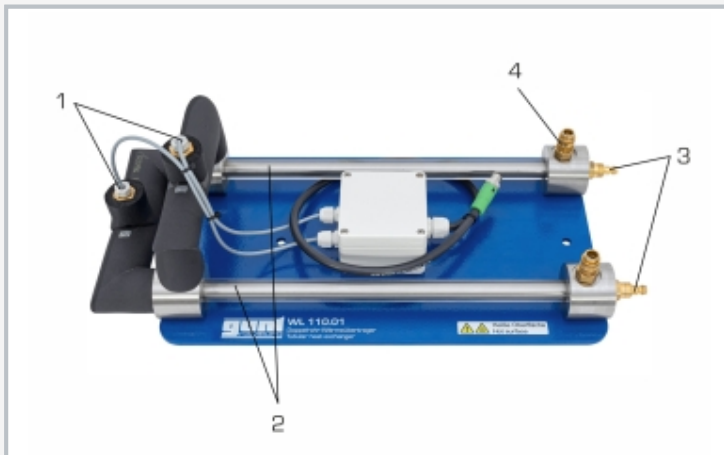
Temperature sensors for measuring the inlet and outlet temperatures are located at the supply connections of the WL 110. There are two additional temperature sensors on the tubular heat exchanger for measuring the temperature after half of the transfer distance. The supply of hot and cold water, the flow setting and the measurement of inlet and outlet temperatures are carried out via the supply unit.

Learning objectives/experiments

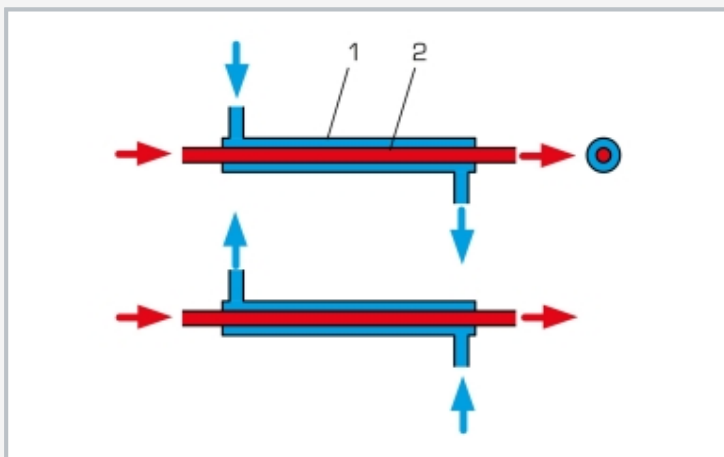
- in conjunction with WL 110 supply unit
 - ▶ function and behaviour during operation of a tubular heat exchanger
 - ▶ plotting temperature curves:
 - in parallel flow operation
 - in counterflow operation
 - ▶ calculation of mean heat transfer coefficient
 - ▶ comparison with other heat exchanger types
- 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 110.01

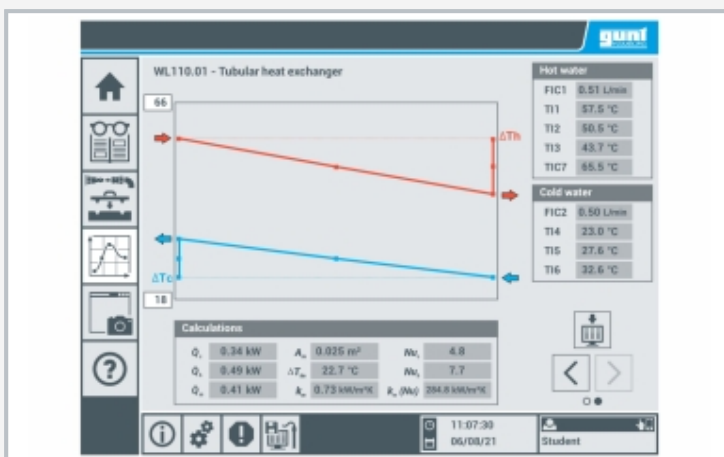
Tubular heat exchanger



1 temperature sensor, 2 concentric tubes, 3 hot water connections, 4 cold water connections



Functional principle of tubular heat exchanger
1 outer tube with cold water, 2 inner tube with hot water; red: hot water, blue: cold water



User interface on the touch screen: mean heat transfer coefficient k_m as function of flow rates cold water and hot water

Specification

- [1] tubular heat exchanger for connection to WL 110
- [2] parallel flow and counterflow operation possible
- [3] recording of temperature using WL 110 and two additional temperature sensors for measuring the central temperature
- [4] automatic identification of accessories via RFID technology and use of the corresponding PLC software
- [5] experiment execution and display of the measured values via touch screen (HMI)
- [6] screen-mirroring: access to ongoing experiments and their results from up to 10 end devices simultaneously via the local network
- [7] hot and cold water supply from WL 110

Technical data

Heat transfer surfaces

- mean transfer surface: 250cm²

Inner tube, stainless steel

- Ø outer: 12mm
- wall thickness: 1mm

Outer tube, transparent (PMMA)

- Ø outer: 20mm
- wall thickness: 2mm

Measuring ranges

- temperature: 2x 0...100°C

LxWxH: 480x230x150mm

Weight: approx. 4kg

Scope of delivery

- 1 tubular heat exchanger

WL 110.01

Tubular heat exchanger

Required accessories

WL 110 Heat exchanger supply unit