

WL 314.03

Heat transfer in a tube



Description

 flow in an externally heated pipe
convective heat transfer in the pipe cross-section and in the longitudinal profile of the pipe

The WL 314.03 accessory extends the experimental scope of WL 314 to include the topic: convective heat transfer inside the pipe. Convective heat transfer from the tube wall to the parallel flowing fluid is studied.

The core element of WL 314.03 is a pipe section, equipped with a heat mat to heat the outer surface of the pipe from the outside. There are six temperature measuring points in the pipe wall. A Pitot tube is used to measure the velocity distribution in the pipe cross-section. The accessory is inserted into the air duct of WL 314 using quick-release fasteners. A fan in the air duct sucks in ambient air and conveys it through the pipe section of the accessory. The air is directed past the transfer surfaces by forced convection and heats up.

The power and surface temperature of the electric heat mat and the temperatures in the pipe wall are measured and displayed on the WL 314 trainer.

Learning objectives/experiments

- heat transfer from the pipe shell to the fluid
- temperature profile along the pipe
- analysis of the interrelationships between Nusselt, Reynolds and Prandtl
- determination of the overall heat transfer coefficient
- determination of the flow velocity

Specification

- [1] heated pipe section as tube heat exchanger
- [2] pipe heated from the outside by heat mat
- [3] 6 thermocouples type K: measurement in the pipe wall
- [4] 1 thermocouple type K: measurement on the heat mat
- [5] moveable Pitot tube for determining a velocity profile
- [6] accessory installed in WL 314 by quick-release fasteners

Technical data

Pipe section

- ∎ Ø 32mm
- ∎ length: 0,5m
- heat transfer surface: 0,0503m²

Heat mat

- output: 250W
- length: 500mm
- Ø 35mm
- temperature limit: 120°C

LxWxH: 1050x210x320mm Weight: approx. 30kg

Scope of delivery

- 1 experimental unit
- 1 measuring amplifier
- 1 set of instructional material



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Required accessories

WL 314 Convective heat transfer in air flow

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