WL 312
Heat transfer in air flow

Description

- **investigation of convective heat transfer together with accessories**

In many industrial production processes, as well as in the air conditioning of buildings, heat transfer takes place with the assistance of air flow. In these cases, convective heat transfer is determined by the temperature differences of the media involved and the flow.

The WL 312 trainer studies convective heat transfer on various pipe surfaces. The flow movement takes place by forced convection.

An insulated air duct with fan serves as the measuring section. A streamlined inlet element and a flow straightener in the air duct provide a homogeneous flow for conducting the experiment. The volumetric flow rate is set via a throttle valve at the fan outlet and measured by a measuring nozzle at the inlet into the air duct.

Heat exchangers with different tube surfaces can be used in the air duct. Heat exchangers with smooth tubes, finned tubes or a refrigerant evaporator are available as accessories.

The air duct includes two windows to observe the experiments.

Combined sensors measure the temperature and relative humidity at the inlet and outlet of the heat exchanger. Pressures upstream and downstream of the measuring section are also recorded in order to determine the pressure loss at the heat exchanger. The velocity distribution in the air duct is measured by a Pitot tube. The temperatures, pressures and relative humidity are displayed digitally.

The following accessories are recommended for supplying the heat exchangers: Hot water generator (WL 312.10), water chiller (WL 312.11) and condensing unit (WL 312.12).

Learning objectives/experiments

- experiments without accessories
  - recording the fan characteristic
  - velocity distribution in the air duct
- experiments with accessories
  - heat transfer with plain tubes (WL 312.01, together with WL 312.10 / WL 312.11)
  - heat transfer with finned tubes (WL 312.02, together with WL 312.10 / WL 312.11)
  - heat transfer on refrigerant evaporator (WL 312.03, together with WL 312.12)

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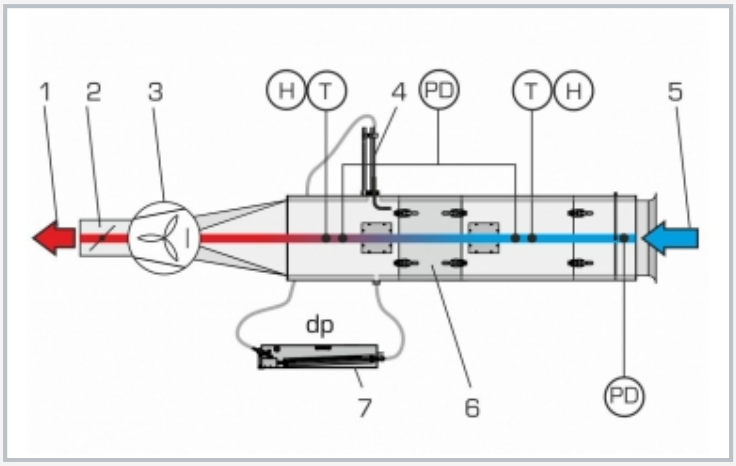
1 fan with throttle valve, 2 inclined tube manometer, 3 differential pressure sensor, 4 streamlined inlet, 5 pressure measurement via measuring nozzle, 6 air duct with windows, 7 measuring section for exchangeable accessories, 8 Pitot tube, 9 displays and controls



1 air outlet, 2 throttle valve, 3 fan, 4 Pitot tube, 5 air inlet, 6 measuring section for exchangeable accessories, 7 inclined tube manometer;
H humidity, T temperature, dp differential pressure, PD differential pressure sensor

Accessories for the trainer:
WL 312.01 Heat transfer with plain tubes
WL 312.02 Heat transfer with finned tubes
WL 312.03 Heat transfer on refrigerant evaporator

Specification

[1] air duct for studying heat transfer in air flows
[2] insulated air duct with flow straightener and streamlined inlet
[3] determination of the volumetric flow rate of the air via differential pressure at the measuring nozzle
[4] fan with adjustable flow rate
[5] movable Pitot tube with inclined tube manometer for measuring velocity distributions
[6] combined temperature and humidity sensor
[7] digital displays of differential pressure, temperature and relative air humidity
[8] various heat exchangers available as accessories

Technical data

Air duct cross-section: 150x300mm

Fan
- output: 1100W
- max. flow rate: 1680m^3/h
- max. pressure difference: 1000Pa
- rated speed: 2800min^{-1}
- air velocity: max. 10m/s

Pitot tube: travel 300mm

Measuring ranges
- temperature: 2x 0...50°C
- humidity: 2x 0...100%
- differential pressure: 1x 0...100Pa

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 2350x750x1800mm
Weight: approx. 150kg

Scope of delivery

1 trainer
1 set of accessories
1 set of instructional material

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Required accessories

060.31201	WL 312.01	Heat transfer with plain tubes
or		
060.31202	WL 312.02	Heat transfer with finned tubes
or		
060.31203	WL 312.03	Heat transfer on refrigerant evaporator
with		
060.31212	WL 312.12	Condensing unit

Optional accessories

060.31210	WL 312.10	Hot water generator
060.31211	WL 312.11	Water chiller