

HL 210

Installation technology: losses in a pipe system



Learning objectives/experiments

- pressure curve in a closed pipe system with circulation pump
- influence of pipe diameter, flow velocity, change in cross-section and pipe fittings on the pressure losses
- determination of pump characteristics, system characteristics and the operating point

Description

- visualisation of pressure losses
- comparison of losses of different pipe elements
- closed water circuit with circulation pump

When water flows through a pipe system there are resistances as a result of changes in direction, valves and fittings and pipe friction. The flow resistances are directly dependent on the geometry of the pipe elements and the number and type of fittings. In addition, the flow velocity plays a key role in the occurrence of pressure losses.

The HL 210 unit can be used to investigate and visualise the pressure distribution in a pipe system. The trainer enables the examination by experiment of different influencing factors on the pressure losses in real pipe systems.

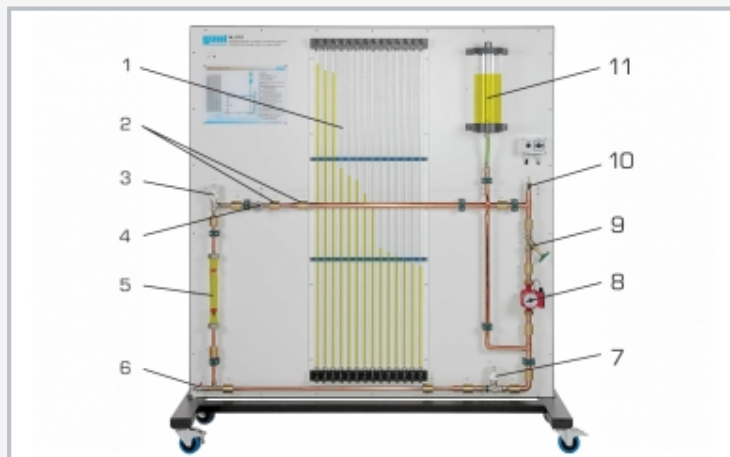
The relationship between pump characteristic and system characteristic is studied in the experiment. The pipe elements used are commercially standard components in heating and sanitary engineering. The clear panel is mounted on a sturdy, movable frame.

The trainer can be operated independently from the mains water network and is equipped with a pump and a water tank. Pipe elements with varying radii and straight pipes with varying diameters are located in a closed water circuit. In addition, various standard valves from heating engineering are also installed. There are pressure measuring points between the various elements in order to determine the pressure loss of each pipe element.

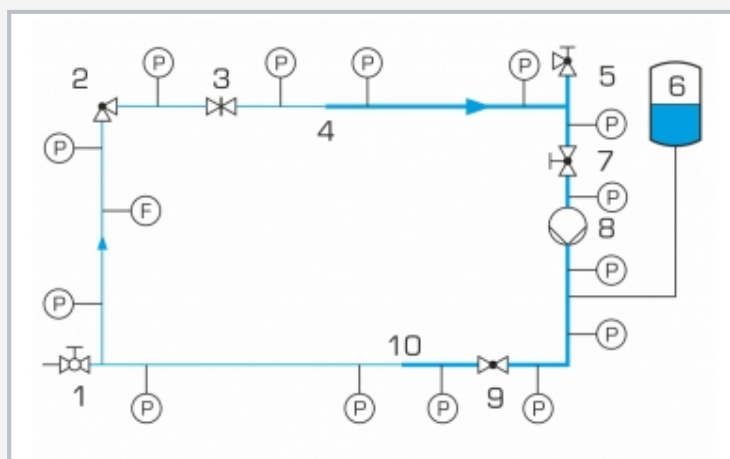
The respective pressures can be read via the tube manometer with reference to the height of the liquid column. The flow rate is measured by and read from a rotameter.

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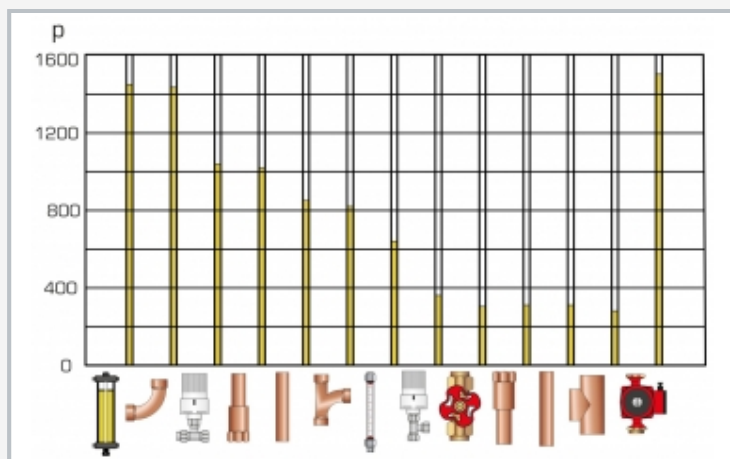
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1 tube manometer panel, 2 pressure measuring point, 3 heater angle valve, 4 gate valve, 5 flow meter, 6 water drain, 7 heater valve, 8 pump, 9 angle seat valve, 10 bleed valve in the water circuit, 11 expansion tank



Process schematic with position of the measuring points: 1 water drain, 2 heater angle valve, 3 gate valve, 4 enlargement, 5 bleed valve, 6 expansion tank, 7 angle seat valve, 8 pump, 9 heater valve, 10 contraction; P pressure, F flow rate



Schematic representation of the pressure loss in the pipe system: p pressure in mmWC

Specification

- [1] investigation of the pressure losses at contractions, pipe angles, pipe bends, valves and fittings and pipe elements of different diameter
- [2] pipe elements are commercially standard components in heating and sanitary engineering
- [3] clear panel mounted on a sturdy, movable frame
- [4] closed water circuit with pump and tank
- [5] integrated bleed valve on manometer and in the pipe section
- [6] flow measurement using rotameter
- [7] measurement of the pressure distribution at 14 pressure measuring points, display with 14 tube manometers

Technical data

Pump

- 3 stages
- max. flow rate: 4,5m³/h
- max. head: 6m

Tank: approx. 5L

Measuring ranges

- flow rate: 100...1000L/h
- pressure: 1600mmWC

230V, 50Hz, 1 phase
LxWxH: 1900x700x2020mm
Weight: approx. 140kg

Scope of delivery

- 1 trainer
- 1 set of instructional material