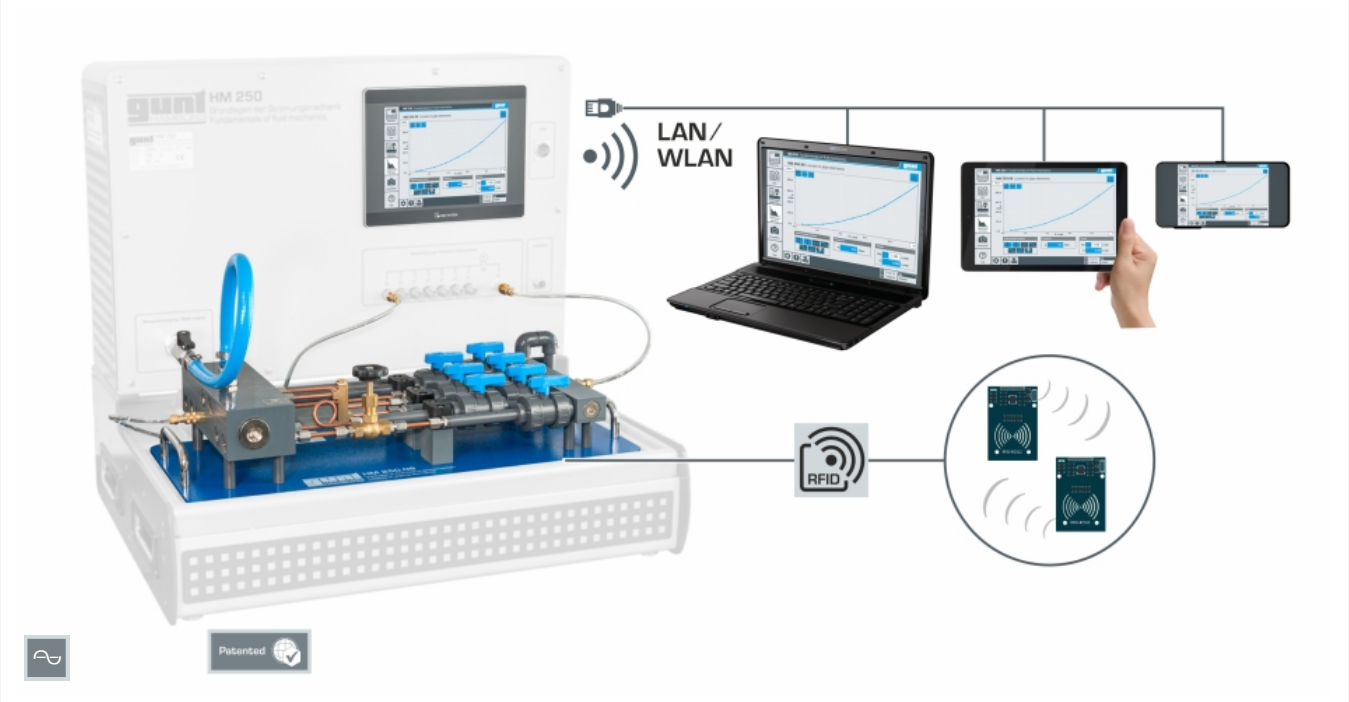
HM 250.08
Losses in pipe elements



Complete experimental setup with the HM 250 base module, screen mirroring is possible on up to 10 end devices

Description

- **determination and comparison of the pressure losses in different pipe sections**
- **intuitive experiment execution via touch screen (HMI)**
- **integrated router for operation and control via an end device and for screen mirroring on up to 10 end devices: PC, tablet, smartphone**
- **network capability: access to ongoing experiments from external workstations via the local network**
- **automatic identification of accessories via RFID technology**

Pressure losses in pipe sections can have various causes, such as acceleration, deceleration, deflection or friction. Pressure loss is often caused by a combination of several factors. This must be taken into account when designing piping systems.

The HM 250.08 unit is used to investigate pressure losses in various pipe sections and pipe elements. The experimental unit contains seven different pipe sections chosen for their didactic qualities (e.g. straight pipe, pipe with needle valve or pipe with S-bend). Each pipe section can be shut off separately by a ball valve.

In experiments, the pressure loss coefficient is determined individually in each pipe section. This means that the increase in pressure loss can be precisely attributed. By comparing the pipe sections, the change in pressure loss is specifically elaborated. The opening characteristics of the ball valve and needle valve shut-off devices are also recorded. The losses in the connecting pipes are negligible and are assumed to be the same in all sections.

The accessory HM 250.08 is easily and securely positioned on the worktop of the HM 250 base module. Via RFID technology the accessories are automatically identified, the appropriate GUNT software is loaded and an automatic system configuration is performed. The intuitive user interface guides through the experiments and displays the measured values graphically. For tracking and evaluation of the experiments, up to 10 external workstations can be used simultaneously using the local network via LAN connection. The base module supplies the water and is used to adjust the flow rate. The base module is also used to measure the flow rates and the pressures.

Learning objectives/experiments

- pressure losses in pipes, pipe fittings and pipe elements
- how flow velocity affects pressure loss
- application of Bernoulli's equation
- determine resistance coefficients
- opening characteristics of valve and ball valve
- how acceleration, pipe friction and deflection affect pressure loss
- GUNT software specifically adapted to the accessories used
  - learning module with theoretical fundamentals
  - device description
  - guided experiment preparation
  - execution of the experiment
  - graphical representation of pressure curves
  - data transfer via USB for versatile external use of measured values and screenshots e.g. evaluation in Excel
  - different user levels available

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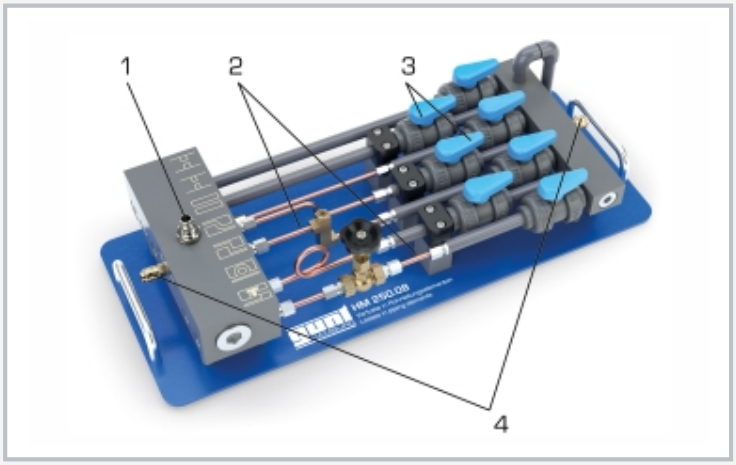
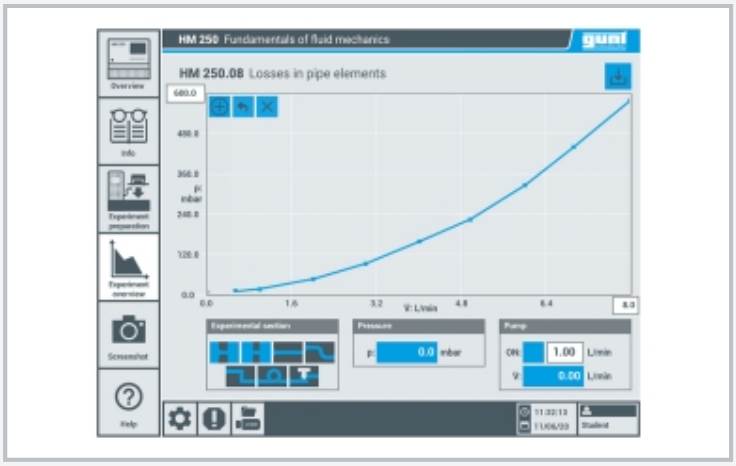
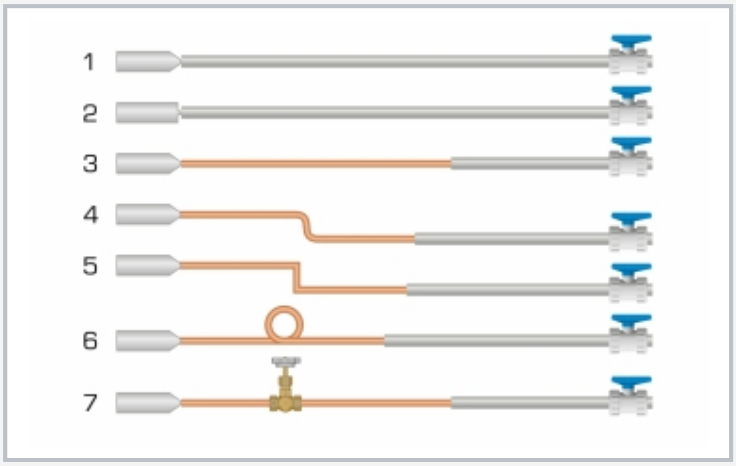


1 water supply, 2 pipe sections, 3 ball valves as shut-off devices, 4 pressure connections



Intuitive user interface in the HM 250 touch screen: pressure measuring at pipe section (straight pipe with nozzle) and graphic display of the measured values, pressure curve in the pipe section



Different pipe sections, each pipe section can be individually shut off with ball valve
1 pipe section with nozzle, 2 pipe section with orifice, 3 straight pipe with nozzle, 4 pipe with nozzle and S-bend, 5 pipe with nozzle and sharp S-bend, 6 pipe with pipe bend, 7 straight pipe with nozzle and needle valve

Specification

[1] investigate pressure losses at valves and pipe fittings
[2] 7 individually closable pipe sections with various pipe elements: nozzle, orifice, bends, valve, ball valve
[3] comparison of ball valve and needle valve
[4] flow rate in the pipe section can be adjusted via HM 250 base module
[5] automatic identification of accessories via RFID technology and use of the corresponding GUNT software
[6] experiment execution and display of the measured values via touch screen (HMI)
[7] network capability: access to ongoing experiments and their results from up to 10 external workstations simultaneously via the local network
[8] water supplied via HM 250 base module

Technical data

1. pipe section with nozzle
- PVC pipe: Ø inner 12,4mm
- nozzle inlet angle: 60°

2. pipe section with orifice
- PVC pipe: Ø inner 12,4mm
- orifice: Ø inner 4mm

3. pipe section: straight pipe with nozzle
- PVC pipe: Ø inner 12,4mm
- copper pipe: Ø inner 4mm, length: 200mm
- nozzle inlet angle: 60°

4. pipe section: pipe with nozzle and S-bend
- PVC pipe: Ø inner 12,4mm
- copper pipe: Ø inner 4mm, length: 200mm
- nozzle inlet angle: 60°

5. pipe section: pipe with nozzle and sharp S-bend
- PVC pipe: Ø inner 12,4mm
- copper pipe: Ø inner 4mm, length: 200mm
- nozzle inlet angle: 60°

6. pipe section: pipe with pipe bend
- PVC pipe: Ø inner 12,4mm
- copper pipe: Ø inner 4mm, length: 200mm
- nozzle inlet angle: 60°

7. pipe section: straight pipe with nozzle and needle valve
- PVC pipe: Ø inner 12,4mm
- copper pipe: Ø inner 4mm, length: 200mm
- nozzle inlet angle: 60°

Measuring ranges
- indicated measuring range pressure: 0...1bar
- indicated measuring range flow rate: 0...6,5L/min

LxWxH: 650x260x170mm
Weight: approx. 7,5kg

Scope of delivery

experimental unit, 1 set of instructional material

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Required accessories

HM 250	Fundamentals of fluid mechanics

Optional accessories

HM 250.90	Laboratory shelf