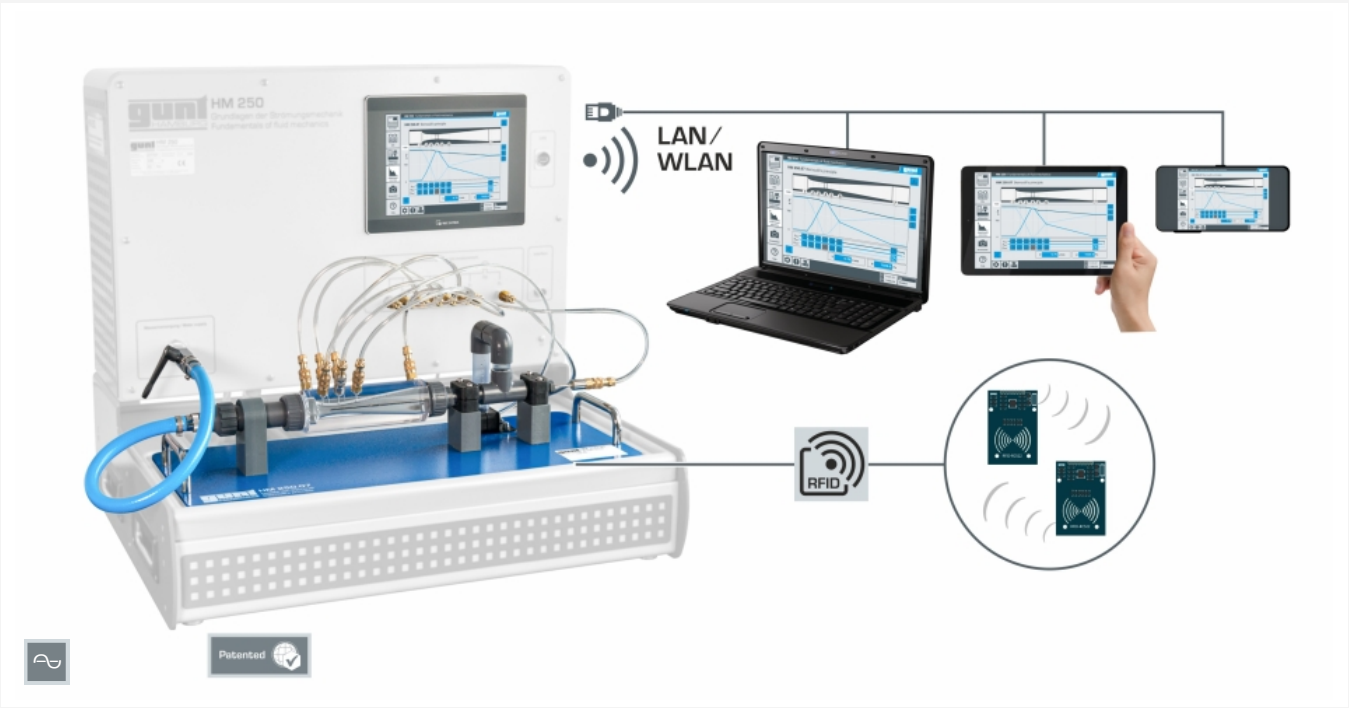
HM 250.07
Bernoulli's principle



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

Description

- **investigation of static, dynamic and total pressure along the Venturi nozzle**
- **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**

The HM 250.07 accessory is used to investigate the relationship between the flow velocity of a fluid and the different pressures in a Venturi nozzle. If the flow velocity of a fluid increases, e.g. when passing through a nozzle, the static pressure will drop. If the velocity decreases, the static pressure increases. The total pressure remains constant during the velocity change.

The Venturi nozzle is made of transparent material and is equipped with pressure connections for measuring the static pressure. The relative pressure increase compared to the narrowest cross-section is measured. The total pressure is measured with a Pitot tube which is moved in the nozzle along the flow. The dynamic pressure is determined from the static pressure and the total pressure.

The position of the Pitot tube in the nozzle can be observed. By turning the nozzle, the direction of flow is changed and the nozzle can be used as a diffuser. This allows the comparison of flow losses between a nozzle and a diffuser.

The accessory HM 250.07 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 measure the flow rate and pressure. The flow and pressure measurements are also measured via the base module.

Learning objectives/experiments

- energy conversion in divergent/convergent flow
- record the pressure curve in the Venturi nozzle
- determine the velocity curve in the Venturi nozzle
- qualitative evaluation of pressure losses
- identify influences of nozzle and diffuser on 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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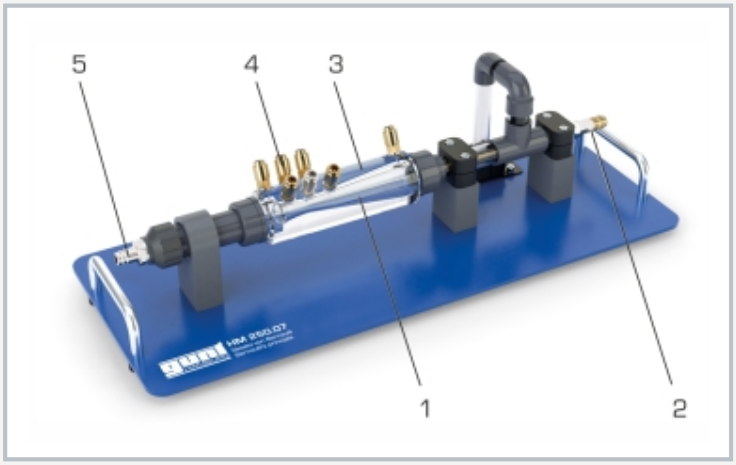
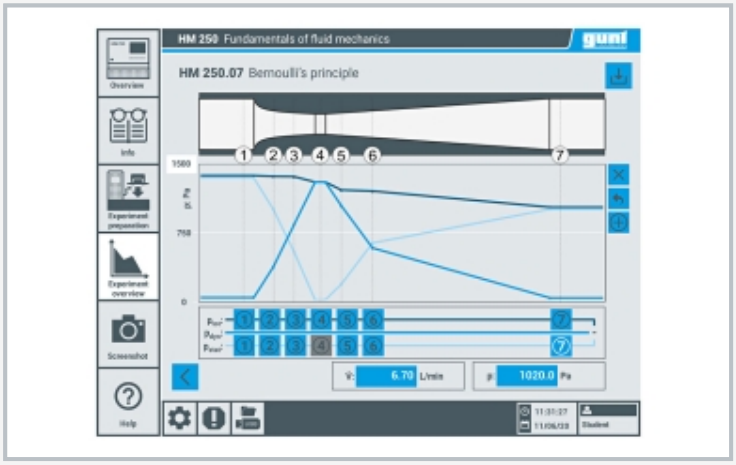
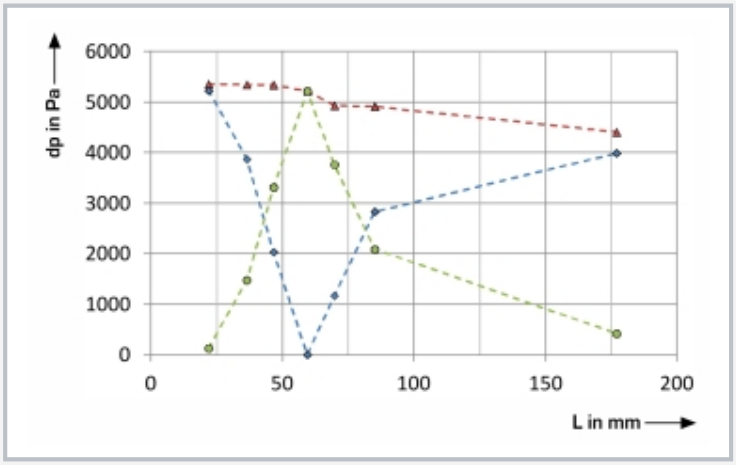


1 Pitot tube, 2 Pitot tube connection, 3 Venturi nozzle, 4 pressure connections for measuring points, 5 water supply



Intuitive user interface in the HM 250 touch screen: pressure measuring at 7 measuring points (1x reference pressure) and graphic display of the measured values, pressure curve in the Venturi nozzle



Pressure curve along the Venturi nozzle
blue: static pressure, green: dynamic pressure, red: total pressure

Specification

[1] familiarisation with Bernoulli's law
[2] transparent Venturi nozzle with measuring points for measuring static pressures
[3] comparison of static pressures upstream and downstream of the constriction by measuring at cross-sectional areas of equal size
[4] axially moveable Pitot tube for determining the total pressure at various points in the Venturi nozzle
[5] inlet contour with linear pressure increase over length
[6] automatic identification of accessories via RFID technology and use of the corresponding GUNT software
[7] experiment execution and display of the measured values via touch screen (HMI)
[8] network capability: access to ongoing experiments and their results from up to 10 external workstations simultaneously via the local network
[9] water supplied via HM 250 base module

Technical data

Venturi nozzle, transparent
- cross section: 79...491mm^2
- opening angle: 8°
- inlet contour with linear pressure increase over length

Pressure connections at the Venturi nozzle
- measuring point at Ø 25mm
- measuring point at Ø 13,2mm
- measuring point at Ø 11,1mm
- measuring point at Ø 10mm (reference pressure)
- measuring point at Ø 11,1mm
- measuring point at Ø 13,2mm
- measuring point at Ø 25mm

Pitot tube
- movable area: 155mm
- Ø inner: 1,1mm
- Ø outer: 2mm

Measuring ranges
- indicated measuring range pressure: 0...5500Pa
- indicated measuring range flow rate: 0...13,5L/min

LxWxH: 650x260x180mm
Weight: approx. 4,5kg

Scope of delivery

1 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