

# HM 150.13

## Methods of flow measurement



### Description

- **different methods of flow rate measurement**
- **visualisation of the pressure distribution in Venturi nozzle or measuring orifice/measuring nozzle**

Measuring the flow rate is an important aspect in measurement technology. There are several ways to measure the flow of fluids in pipes.

With HM 150.13 students can familiarise themselves with various methods for measuring flow in the pipe system and apply them in practice.

The experimental unit contains different measuring instruments to determine the flow rate. These instruments are designed with transparent cases in order to visualise how they operate and function. The methods include, for example, rotameters, a Venturi nozzle or orifice plate flow meter and measuring nozzle.

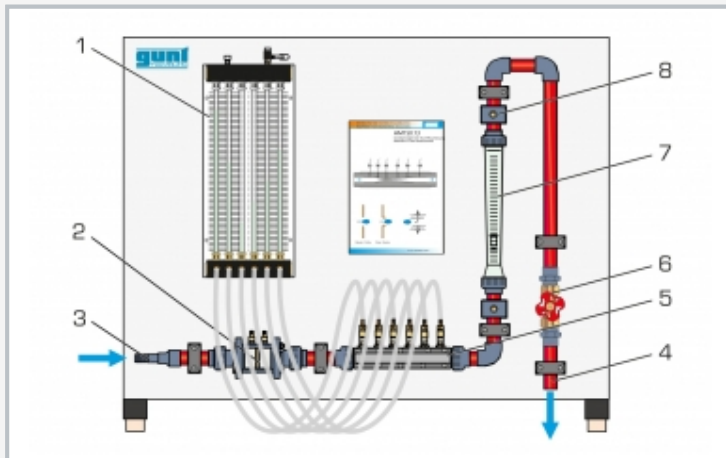
Six tube manometers is used in order to determine the pressure distribution in the Venturi nozzle or the orifice plate flow meter and measuring nozzle. The total pressure is measured by a Pitot tube. The experimental unit is positioned easily and securely on the work surface of the HM 150 base module. The water is supplied and the flow rate measured by HM 150. Alternatively, the experimental unit can be operated by the laboratory supply.

### Learning objectives/experiments

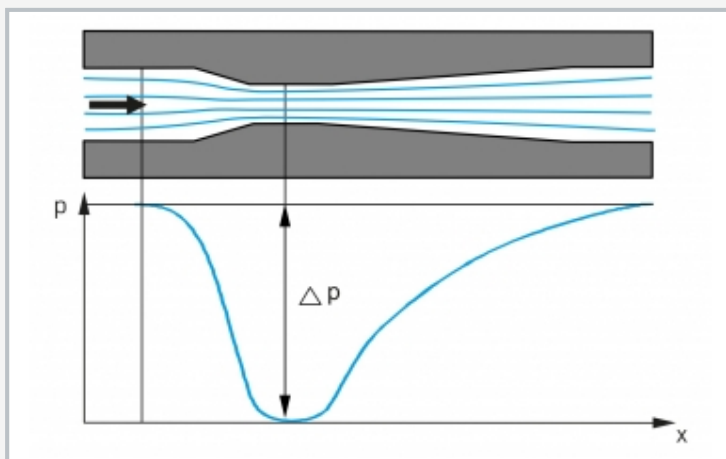
- flow measurement with
  - ▶ orifice plate flow meter and measuring nozzle
  - ▶ Venturi nozzle
  - ▶ rotameter
- pressure measurement with Pitot tube
- comparison of different instruments for flow measurement
- determining the corresponding flow coefficients
- calibrating measuring instruments

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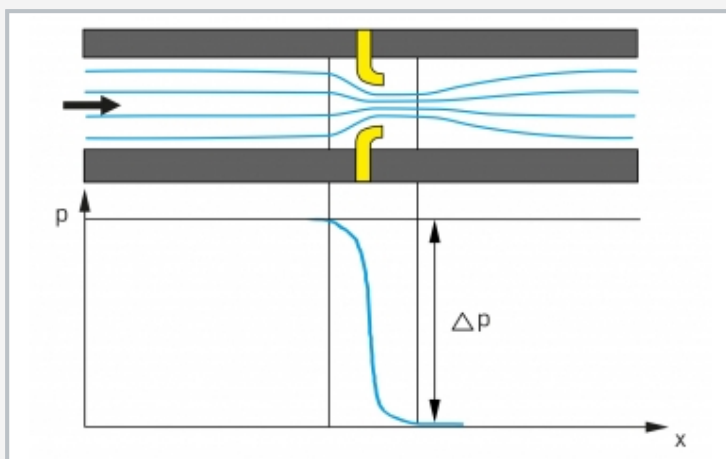
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1 6 tube manometers, 2 orifice plate flow meter and measuring nozzle, 3 water supply, 4 water drain, 5 Venturi nozzle, 6 valve for adjusting the flow rate, 7 rotameter, 8 measuring point



Pressure curve in a Venturi nozzle: p pressure, x section



Pressure curve in an orifice plate flow meter: p pressure, x section

### Specification

- [1] different methods of flow rate measurement
- [2] measuring instruments: orifice plate flow meter/measuring nozzle, Venturi nozzle and rotameter
- [3] 6 tube manometers to determine the pressure distribution in Venturi nozzle, orifice plate flow meter and measuring nozzle
- [4] measurement of the total pressure with Pitot tube
- [5] flow rate determined by HM 150 base module
- [6] water supply via HM 150 or via laboratory supply

### Technical data

Venturi nozzle:  $A=84...338\text{mm}^2$

■ angle at the inlet:  $10,5^\circ$

■ angle at the outlet:  $4^\circ$

Orifice plate flow meter:  $\varnothing 14\text{mm}$

Measuring nozzle:  $\varnothing 18,5\text{mm}$

Rotameter: max.  $1700\text{L/h}$

Measuring ranges

■ pressure:  $6x 0...390\text{mmWC}$

LxWxH:  $1100x672x900\text{mm}$

Weight: approx.  $30\text{kg}$

### Required for operation

HM 150 (closed water circuit) or water connection, drain

### Scope of delivery

- 1 experimental unit
- 1 set of measuring instruments
- 1 set of hoses
- 1 set of tools
- 1 set of instructional material

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Optional accessories

070.15000      HM 150      Base module for experiments in fluid mechanics