HM 150.07

Bernoulli's principle

Description

- **investigation and verification of Bernoulli's principle**
- **static pressures and total pressure distribution along the Venturi nozzle**
- **determination of the flow coefficient at different flow rates**

Bernoulli's principle describes the relationship between the flow velocity of a fluid and its pressure. An increase in velocity leads to a reduction in pressure in a flowing fluid, and vice versa. The total pressure of the fluid remains constant. Bernoulli's equation is also known as the principle of conservation of energy of the flow.

The HM 150.07 experimental unit is used to demonstrate Bernoulli's principle by determining the pressures in a Venturi nozzle.

The experimental unit includes a pipe section with a transparent Venturi nozzle and a movable Pitot tube for measuring the total pressure. The Pitot tube is located within the Venturi nozzle, where it is displaced axially. The position of the Pitot tube can be observed through the Venturi nozzle's transparent front panel.

The Venturi nozzle is equipped with pressure measuring points to determine the static pressures. The pressures are displayed on the six tube manometers. The total pressure is measured by the Pitot tube and displayed on another single tube manometer.

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

- energy conversion in divergent/convergent pipe flow
- recording the pressure curve in a Venturi nozzle
- recording the velocity curve in a Venturi nozzle
- determining the flow coefficient
- recognising friction effects

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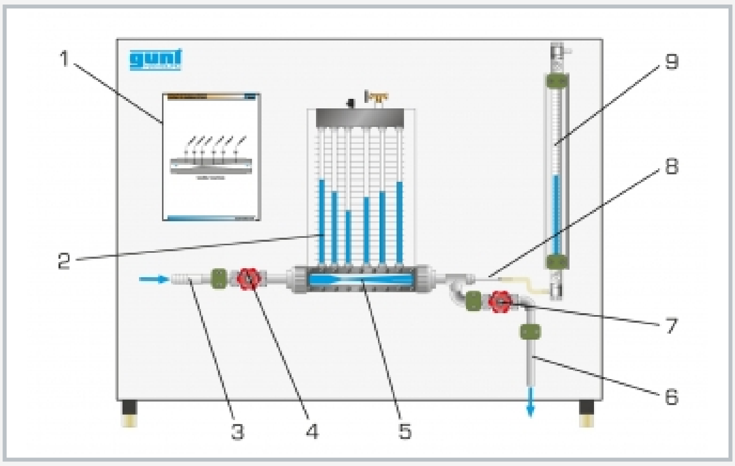
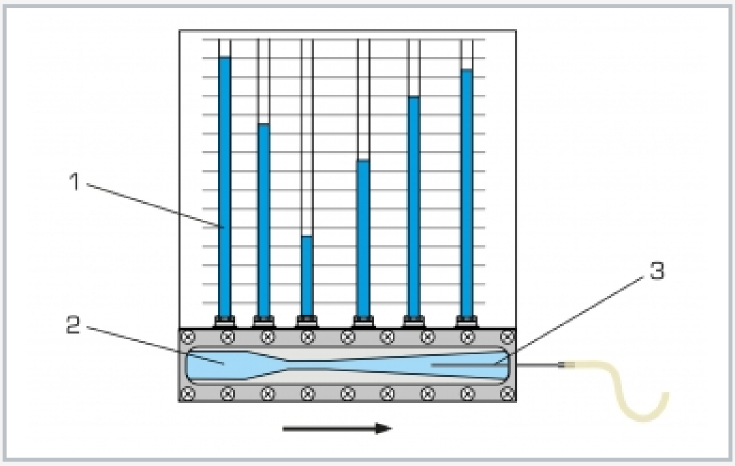
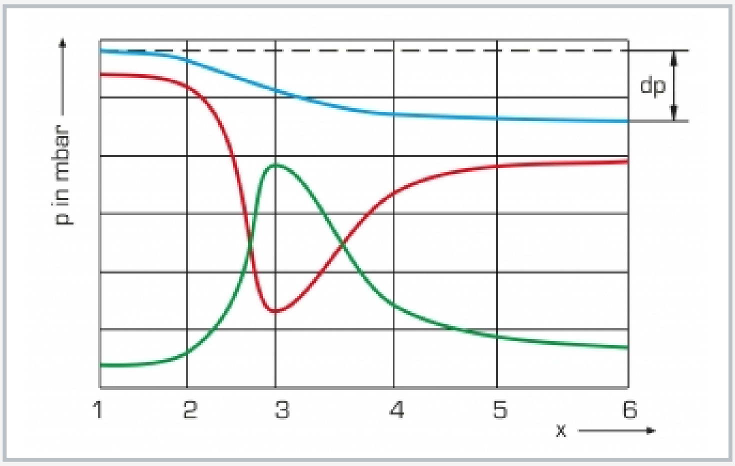


1 diagram, 2 tube manometers (static pressures), 3 water supply, 4 valve, 5 Venturi nozzle, 6 water outlet, 7 valve for water outlet, 8 Pitot tube, 9 single tube manometer (total pressure)



Measuring the pressures in a Venturi nozzle
1 tube manometers for displaying the static pressures, 2 Venturi nozzle with measuring points, 3 Pitot tube for measuring the total pressure, axially movable



Pressure curve in the Venturi nozzle: blue: total pressure, red: static pressure, green: dynamic pressure; x pressure measuring points, p pressure

Specification

[1] familiarisation with Bernoulli's principle
[2] Venturi nozzle with transparent front panel and measuring points for measuring the static pressures
[3] axially movable Pitot tube for determining the total pressure at various points within the Venturi nozzle
[4] 6 tube manometers for displaying the static pressures
[5] single tube manometer for displaying the total pressure
[6] flow rate determined by HM 150 base module
[7] water supply using HM 150 base module or via laboratory supply

Technical data

Venturi nozzle
- A: 84...338mm^2
- angle at the inlet: 10,5°
- angle at the outlet: 4°

Pitot tube
- movable range: 0...200mm
- diameter: 4mm

Pipes and pipe connectors: PVC

Measuring ranges
- pressure:
  - 0...290mmWC (static pressure)
  - 0...370mmWC (total pressure)

LxWxH: 1100x680x900mm
Weight: approx. 28kg

Required for operation

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

Scope of delivery

1 experimental unit
1 set of instructional material

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Optional accessories

070.15000	HM 150	Base Module for Experiments in Fluid Mechanics