HM 150.09
Horizontal flow from a tank

Description

- **visualisation of the trajectory of the outlet jet**
- **study of openings with different diameters and contours**
- **determination of the discharge coefficient**

Hydrodynamics considers the relationship between the trajectory, the outlet contour and the outlet velocity during flow from tanks. These considerations have practical applications in hydraulic engineering or in the design of bottom outlets in dams, for example.

HM 150.09 allows a user to study and visualise the profile of a water jet. Additionally, the discharge coefficient can be determined as a characteristic for different contours.

The experimental unit includes a transparent tank and a point gauge with scale for visualising the jet paths. An interchangeable insert is installed in the tank's water outlet to facilitate the investigation of various openings. Four inserts with different diameters and contours are provided along with the unit.

To visualise the trajectory, the issued water jet is measured via a point gauge that consists of movable rods. The rods are positioned depending on the profile of the water jet. By means of the scale, the trajectory can be determined.

The tank contains an adjustable overflow and a scale. In this way, a precise adjustment and accurate reading of the fill level are possible. 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

- Torricelli's law
- determine the level as a function of time
- determine evacuation times
- determine the trajectory of the water jet for
  - different outlet velocities
  - different openings
- determine loss coefficients
  - discharge coefficient
  - velocity coefficient
  - contraction coefficient

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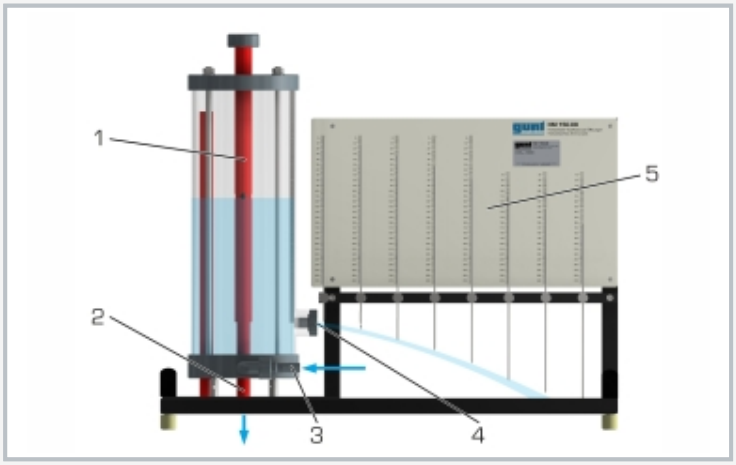
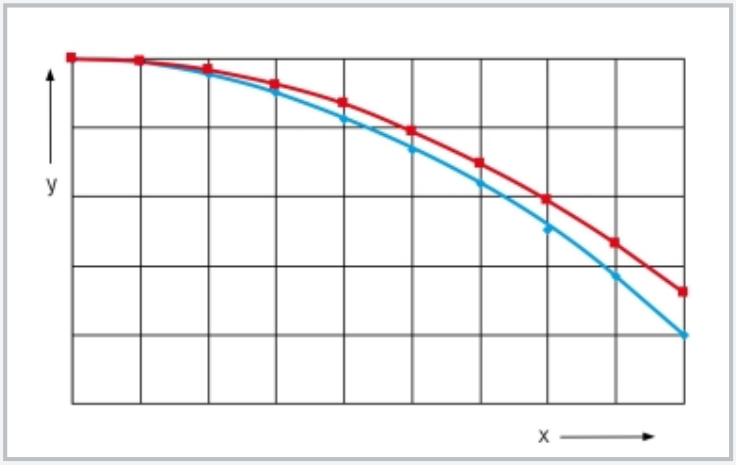
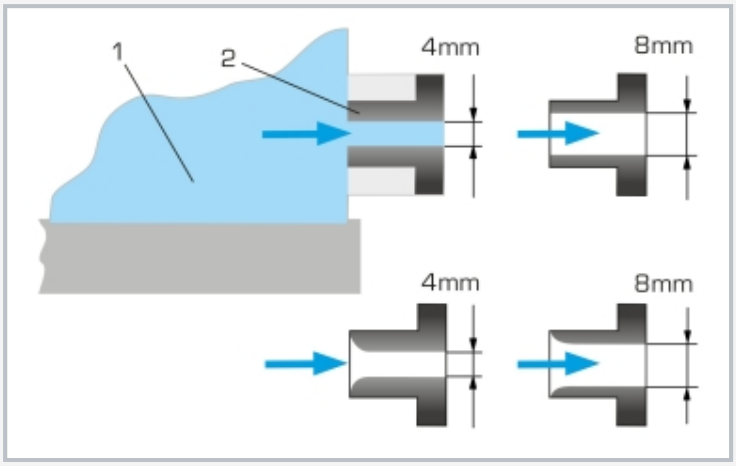


1 tank with adjustable overflow, 2 water overflow, 3 water supply, 4 water outlet, 5 point gauge for the water jet



Measured and calculated (theoretical) trajectory of the outlet jet;
red: theoretical, blue: measured



Interchangeable inserts to study different openings
1 tank, 2 insert; top: outlet from the tank through square contour, bottom: outlet from the tank through rounded contour

Specification

[1] study of horizontal flows from tanks
[2] determining the discharge coefficient for different outlet contours and diameters
[3] tank with adjustable overflow and scale
[4] four interchangeable inserts with different diameters and contours
[5] point gauge with scale and eight movable rods for determining the jet path
[6] flow rate determined by HM 150 base module
[7] water supply using HM 150 base module or via laboratory supply

Technical data

Tank
- height: 510mm
- Ø 190mm
- contents: approx. 13,5L

Inserts with rounded contour
- 1x Ø 4mm
- 1x Ø 8mm

Inserts with square contour
- 1x Ø 4mm
- 1x Ø 8mm

Point gauge, 8 movable rods
- length: 350mm

LxWxH: 870x640x700mm
Weight: approx. 26kg

Required for operation

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

Scope of delivery

1 experimental unit
4 inserts
1 set of instructional material

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Optional accessories

HM 150	Base module for experiments in fluid mechanics