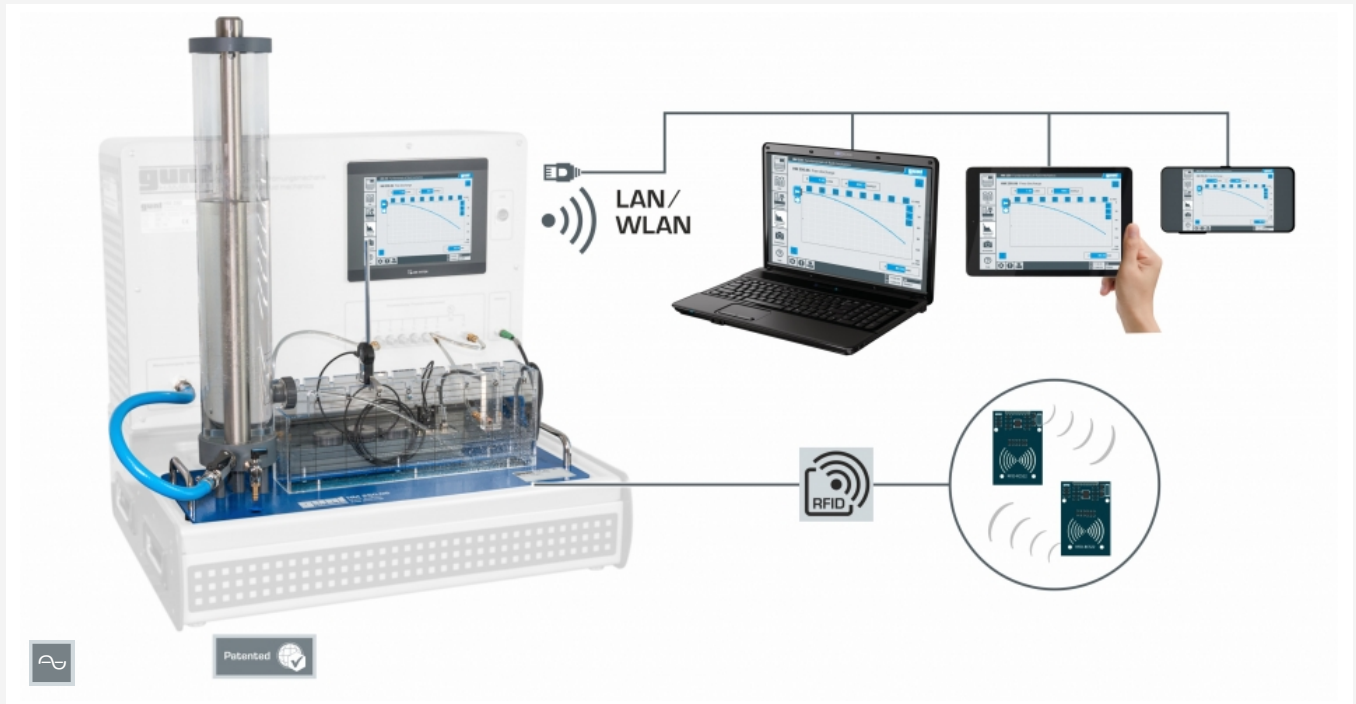# HM 250.06
Free discharge

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

Description

- **investigation of the trajectory in function of the level in the tank and the shape of the outlet**
- **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**

For horizontal discharge from a tank, the shape of the outlet and the outlet velocity affect the trajectory of the water jet. In hydrodynamics the interaction between the trajectory, the shape of the outlet and the outlet velocity during discharge from tanks are described and are essential, for example, in hydraulic engineering for the design of dams.

HM 250.06 includes a transparent tank with a horizontal outlet in which various inserts can be installed. The resulting trajectory of the water jet is digitally recorded in the following transparent experimental section. A depth slide gauge is used to measure the trajectory of the water jet in 8 predefined positions.

The measured values are transferred to the HM 250 base module and displayed as a curve on the touch screen. The level in the tank is set and automatically controlled via the base module.

Four outlet inserts with different diameters and inlet contours are provided along with the unit. The pressure loss coefficient can be determined as a characteristic for different inserts. Thus, the influence of the level in the tank and the pressure loss coefficient on the trajectory can be investigated.
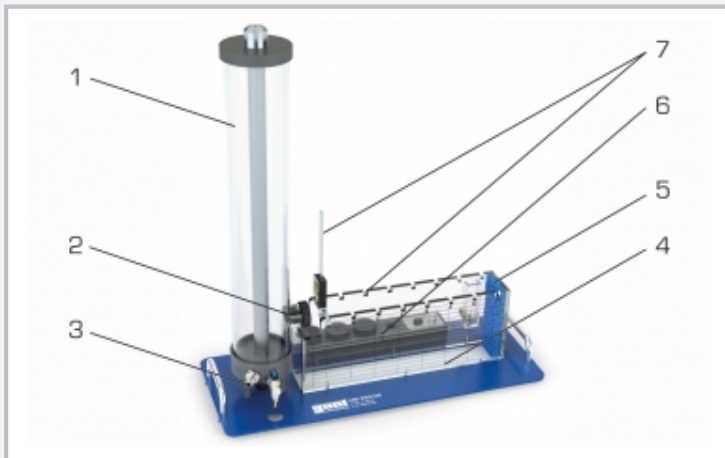
The accessory HM 250.06 is easily and securely positioned on the worktop of the HM 250 base module. Via RFID technology the accessories are automatically identified, the appropriate GUNT software is loaded and an automatic system configuration is performed. The intuitive user interface guides through 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. HM 250 supplies the water and is used to measure the flow rate and the pressure.

Learning objectives/experiments

- investigate how the level in the tank affects the outlet velocity
- apply Bernoulli's equation
- compare determined and theoretical outlet velocity
- investigate outlet inserts with different diameters and inlet contours, determine pressure loss coefficients
- investigate how the outlet velocity and the pressure loss coefficient affect the trajectory of the water jet
- application of the motion equations to determine the theoretical trajectory

- 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 the trajectory
  - data transfer via USB for versatile external use of measured values and screenshots e.g. evaluation in Excel
  - different user levels available

G.U.N.T. Gerätebau GmbH, Hanskampring 15-17, D-22885 Barsbüttel, Telefon (040) 67 08 54-0, Fax (040) 67 08 54-42, Email sales@gunt.de, Web www.gunt.de
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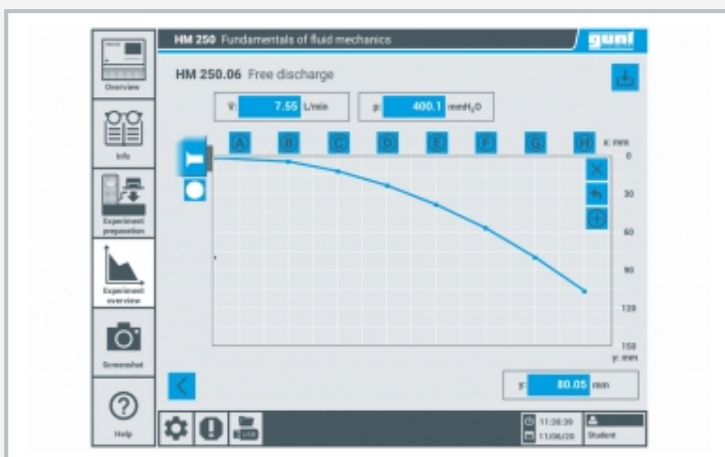Page 1/3 - 03.2021

HM 250.06
Free discharge

1 tank, 2 outlet with interchangeable insert, 3 water supply, 4 transparent experimental section with scale, 5 foam insert as splash guard, 6 storage tray for outlet inserts, 7 depth slide gauge positioned in notches of experimental section
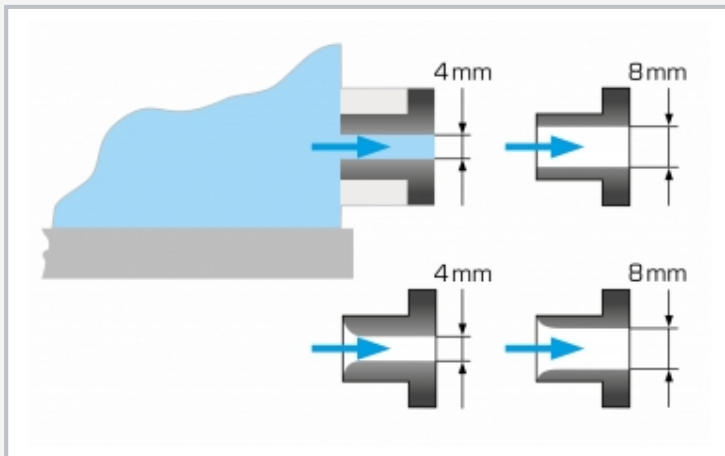
Interchangeable outlet inserts with different diameters and inlet contours

User interface in the touch screen: graphic display of the measured values as trajectory with level in the tank 400mm and rounded insert Ø 8mm

Specification

- [1] investigation of horizontal discharge from a tank
- [2] 4 interchangeable outlet insets with different diameters and inlet contours
- [3] determine pressure loss coefficients for the inserts
- [4] determine the trajectory of the water jet with digital depth slide gauge in the experimental section
- [5] 8 predefined positions in the transparent experimental section for recording trajectory
- [6] level in the tank controlled via HM 250
- [7] automatic identification of accessories via RFID technology and use of the corresponding GUNT software
- [8] experiment execution and display of the measured values via touch screen (HMI)
- [9] network capability: access to ongoing experiments and their results from up to 10 external workstations simultaneously via the local network
- [10] water supplied via HM 250 base module

Technical data

Tank
- material: PMMA, PVC, stainless steel
- height: 590mm
- Ø inner: 100mm
- content: max. 4,6L

Outlet inserts
- rounded contour
  ▶ 1x Ø 4mm
  ▶ 1x Ø 8mm
- sharp-edged contour
  ▶ 1x Ø 4mm
  ▶ 1x Ø 8mm

Experimental section to record the trajectory
- material: PMMA
- 8 positions for depth slide gauge
  ▶ distance between water outlet and 1st position: 25mm
  ▶ distance between 2nd position and 8th position: each 50mm

Digital depth slide gauge
- resolution: 0,01mm
- display (LCD)
- data output: RS 232

Measuring ranges
- depth slide gauge: 0...150mm
- indicated measuring range flow rate: 0...15L/min
- indicated measuring range pressure: 0...500mmWC

LxWxH: 650x260x725mm
Weight: approx. 8,2kg

Scope of delivery

1	experimental unit
4	outlet inserts
1	set of instructional material

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HM 250.06
Free discharge

Required accessories

070.25000	HM 250	Fundamentals of fluid mechanics

Optional accessories

070.25090	HM 250.90	Laboratory shelf

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