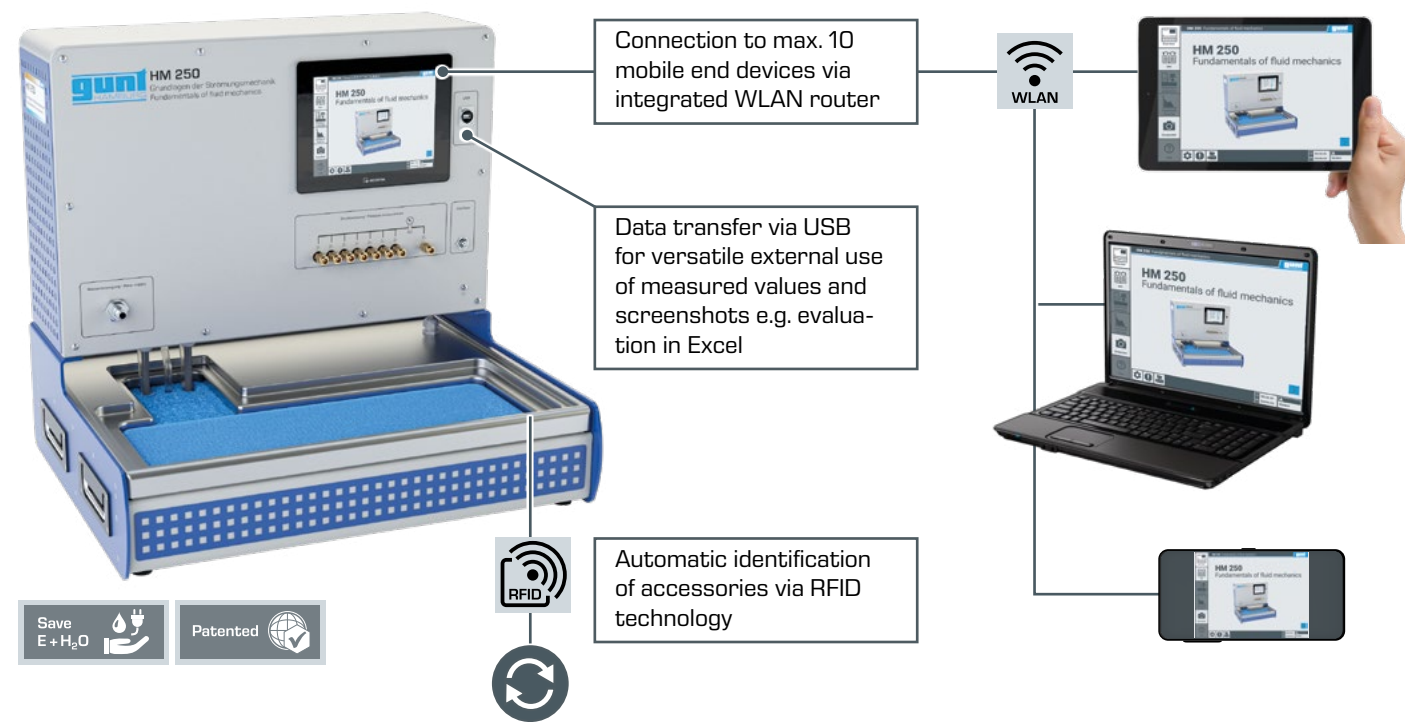


GUNT-Fluid Line: Laboratory experiments – remote and digital

The digital teaching-learning concept offers an interaction between real experiments and digital teaching with experiment preparation, execution and evaluation. The HM 250 base module provides the basic supply in each case. Measurement, control and communication systems are also provided by the base module.

An extensive selection of optionally available accessories enables a complete training course in the fundamentals of fluid mechanics.

HM 250 Base module



Real experiments – digital media



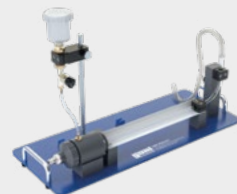
Due to screen mirroring, students can follow the preparation and execution of experiments on end devices and keep sufficient distance from each other.

The laboratory shelf HM 250.90 can be used for space-saving and practical storage of accessories.

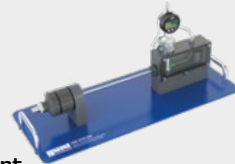
- intuitive experiment execution via touch screen (HMI)
- device control with PLC, operation via touch screen or an end device
- integrated WLAN router for operation and control via an end device and for screen mirroring on up to 10 end devices: PC, tablet, smartphone
- automatic identification of accessories via RFID technology
- automatic system configuration including bleeding of the experimental sections
- energy and water saving technics, space-saving setup

Flow in pipes

- laminar / turbulent flow
- effect of the Reynolds number on the flow profile
- visualisation of streamlines using electrolytically generated hydrogen bubbles



HM 250.01
Visualisation of pipe flow



HM 250.02
Measurement of flow profile



HM 250.03
Visualisation of streamlines

Laws of hydrodynamics

- continuity equation and its influencing variables
- principle of linear momentum: experiments on jet forces
- trajectory: examination the trajectory
- Bernoulli's principle: relation between the flow velocity and the different pressures



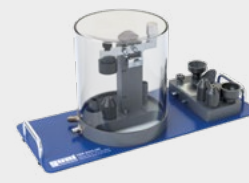
HM 250.04
Continuity equation



HM 250.05
Measurement of jet forces



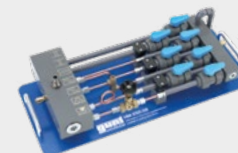
HM 250.06
Free discharge



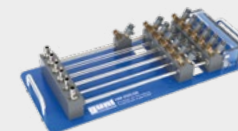
HM 250.07
Bernoulli's principle

Friction losses in pipe flow

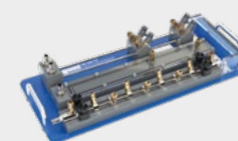
- resistance coefficients in different pipe elements
- relationship between Reynolds number and pipe friction coefficient
- using the Moody chart
- formation of the flow along the inlet section



HM 250.08
Losses in pipe elements



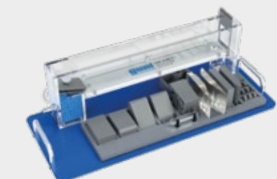
HM 250.09
Fundamentals of pipe friction



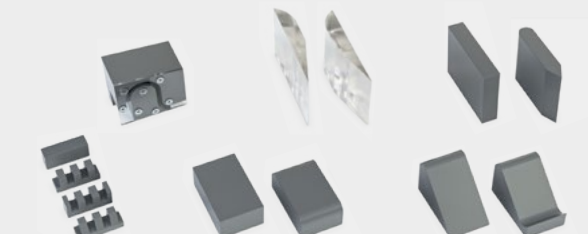
HM 250.10
Pressure curve along the inlet section

Flow in open channels

- energy levels of the water
- hydraulic jump
- energy dissipation in the flume



HM 250.11
Open channel



Different magnetic obstacles for demonstration of the flow