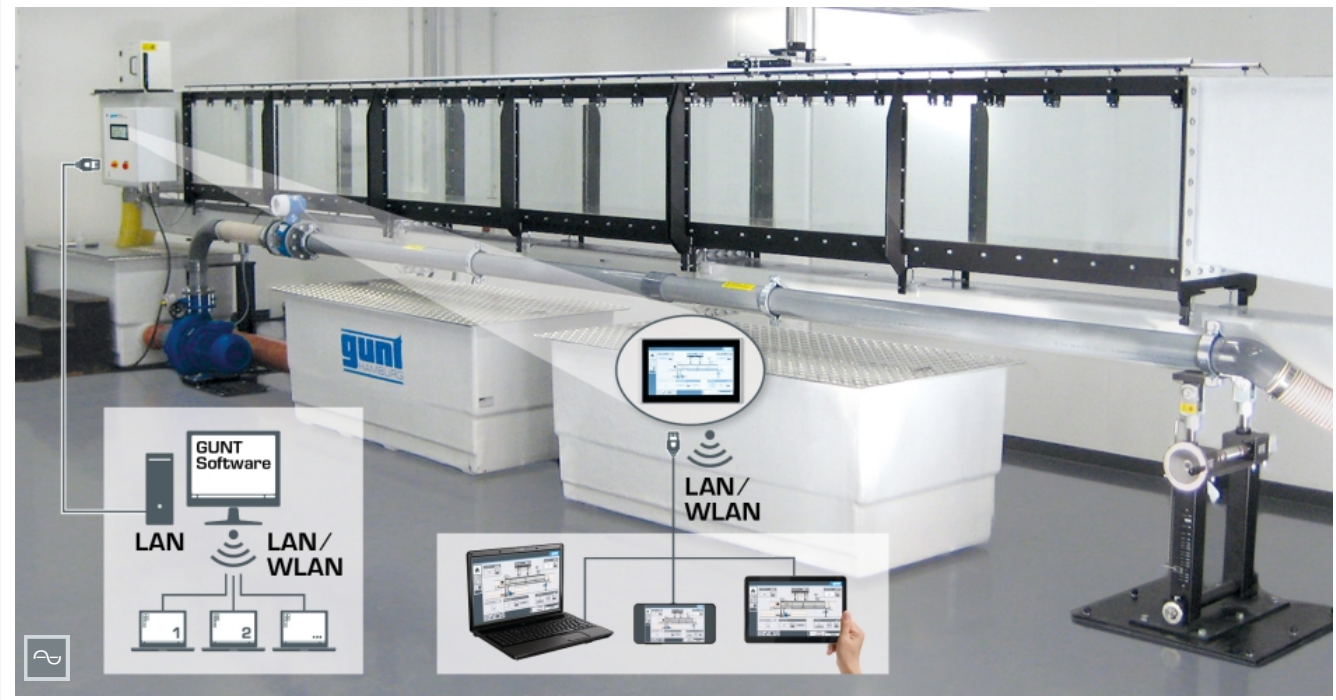
HM 163
Experimental flume 409x500mm



HM 163 (experimental section 7,5m) with the wave generator HM 163.41 and the level gauge HM 163.52, screen mirroring is possible on different end devices

Description

- **experiments ranging from fundamental principles to research projects, experimental section of 5m, 7,5m, 10m and 12,5m available**
- **plant control using an integrated PLC**
- **integrated router for operation and control via an end device and for screen mirroring on additional end devices: PC, tablet, smartphone**
- **models from all fields of hydraulic engineering available as accessories**

Experimental flumes are used in teaching and research to demonstrate and study the main phenomena of open-channel flow at the laboratory scale. For example, control structures for flow regulation and various methods of flow measurement are demonstrated.

The experimental flume HM 163 has a closed water circuit and an extendable experimental section. The side walls of the experimental section are made of tempered glass, which allows excellent observation of the experiments. All components that come into contact with water are made of corrosion-resistant materials.

The inlet element is designed so that the flow enters the experimental section with very little turbulence.

The inclination of the experimental flume can be finely adjusted to allow simulation of slope and to create a uniform flow at a constant discharge depth.

A wide selection of models, such as weirs, piers, flow-measuring flumes or a wave generator are available as accessories and ensure a comprehensive programme of experiments. Most models are quickly and safely bolted to the bottom of the experimental section.

The flume is controlled by the PLC via touch screen. By means of an integrated router, the flume can alternatively be operated and controlled via an end device. The user interface can also be displayed on additional end devices (screen mirroring). Via the PLC, the measured values can be stored internally. Access to stored measured values is possible from end devices via WLAN with integrated router/LAN connection to the customer's own network. Via direct LAN connection the measured values can also be transmitted to a PC where they can be analysed using the GUNT software. For experiment observation in remote learning, the use of a camera is necessary.

Learning objectives/experiments

- together with optionally available models
  - uniform and non-uniform discharge
  - flow formulae
  - flow transition (hydraulic jump)
  - energy dissipation (hydraulic jump, stilling basin)
  - flow over control structures: weirs (sharp-crested, broad-crested, ogee-crested)
  - flow over control structures: discharge under gates
  - flow-measuring flumes
  - local losses due to obstacles
  - transient flow: waves
  - vibrating piles
  - sediment transport
- screen mirroring: mirroring of the user interface on end devices
  - menu navigation independent of the user interface shown on the touch screen
  - different user levels available on the end device: for observing the experiments or for operation and control

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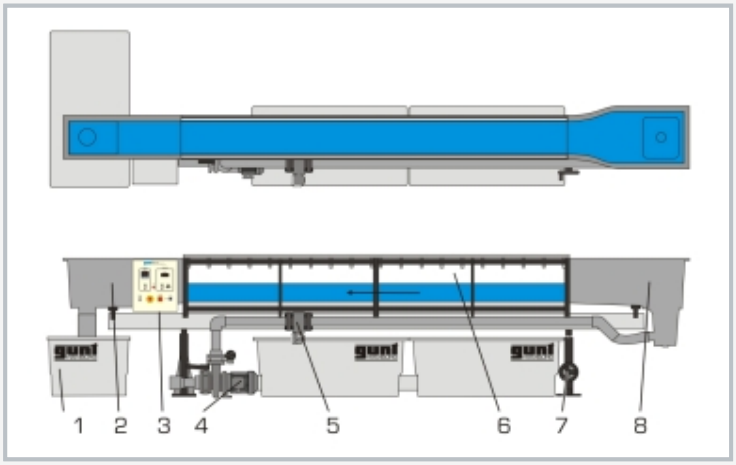
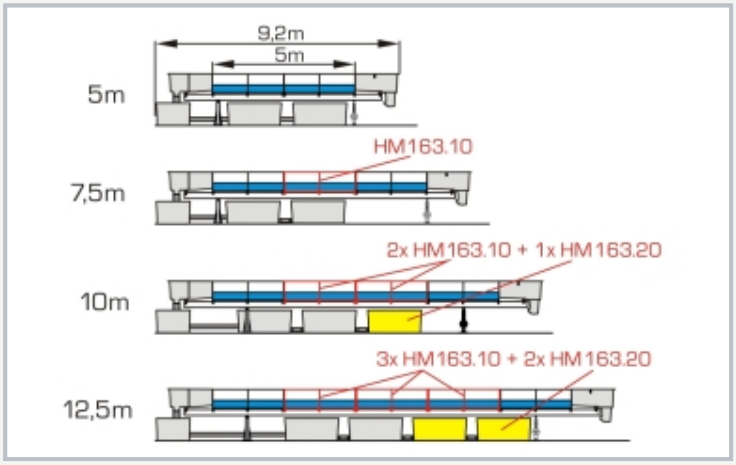
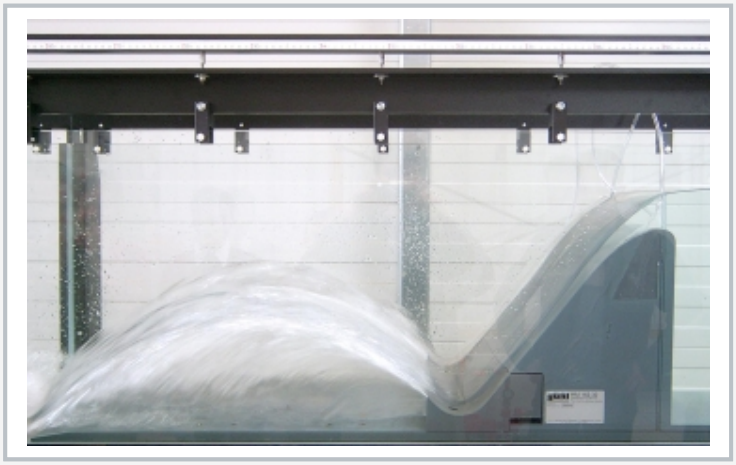


1 water tank, 2 outlet element, 3 switch box, 4 pump, 5 flow rate sensor, 6 experimental section, 7 inclination adjustment, 8 inlet element



HM 163 with experimental sections of different lenghts (5...12,5m). Depending on the desired length, additional extension elements HM 163.10 and water tanks HM 163.20 are required.



Overfall at the ogee-crested weir with ski-jump weir outlet HM 163.32.

Specification

[1] basic principles of open-channel flow
[2] experimental flume with experimental section, inlet and outlet element and closed water circuit
[3] length of the experimental section 5m, up to 12,5m possible with additional extension elements HM 163.10
[4] smoothly adjustable inclination of the experimental section
[5] experimental section with 20 evenly spaced threaded holes on the bottom for installing models or for water level measurement using pressure
[6] side walls of the experimental section are made of tempered glass for excellent observation of the experiments
[7] experimental section with guide rails for the optionally available instrument carrier HM 163.59
[8] all surfaces in contact with water are made of corrosion-resis tant materials: stainless steel, glass reinforced plastic
[9] flow-optimised inlet element for low-turbulence entry into the experimental section
[10] closed water circuit with 2 water tanks, pump, electromagnetic flow sensor and flow control
[11] models from all fields of hydraulic engineering available as accessories
[12] flume control with PLC via touch screen
[13] integrated router for operation and control via an end device and for screen mirroring: mirroring of the user interface on up to 5 end devices
[14] data acquisition via PLC on internal memory, access to stored measured values via WLAN with integrated router/ LAN connection to customer's own network
[15] GUNT software for data acquisition via LAN under Windows 10

Technical data

Experimental section
- possible length: 5m-7,5m-10m-12,5m
- flow cross-section BxH: 409x500mm
- inclination adjustment: -0,5...+2,5%

3 tanks, made of GRP, 1100L each
Pump
- power consumption: 7,5kW
- max. flow rate: 130m^3/h
- max. head: 30m
- speed: 2800min^{-1}

Measuring ranges
- flow rate: 5,4...130m^3/h

400V, 50Hz, 3 phases, 400V, 60Hz, 3 phases
230V, 60Hz, 3 phases, UL/CSA optional
LxWxH: 8570x2000x2200mm (experim. section 5m)
Empty weight: approx. 2100kg

Required for operation

PC with Windows

Scope of delivery

experimental flume, set of tools, set of instructional material

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Optional accessories

Control structures		
070.16329	HM 163.29	Sluice gate
070.16340	HM 163.40	Radial gate
070.16330	HM 163.30	Set of plate weirs, four types
070.16331	HM 163.31	Broad-crested weir
070.16333	HM 163.33	Crump weir
070.16336	HM 163.36	Siphon weir
070.16338	HM 163.38	Rake
070.16334	HM 163.34	Ogee-crested weir with pressure measurement
070.16332	HM 163.32	Ogee-crested weir with two weir outlets
070.16335	HM 163.35	Elements for energy dissipation
Change in cross-section		
070.16344	HM 163.44	Sill
070.16345	HM 163.45	Culvert
070.16346	HM 163.46	Set of piers, seven profiles
070.16377	HM 163.77	Flume bottom with pebble stones
Flow-measuring flumes		
070.16351	HM 163.51	Venturi flume
070.16355	HM 163.55	Parshall flume
070.16363	HM 163.63	Trapezoidal flume
Other experiments		
070.16361	HM 163.61	Vibrating piles
070.16371	HM 163.71	Closed sediment circuit
070.16372	HM 163.72	Sediment trap
070.16373	HM 163.73	Sediment feeder
070.16341	HM 163.41	Wave generator
070.16380	HM 163.80	Set of beaches
Measuring instruments		
070.16352	HM 163.52	Level gauge
070.16391	HM 163.91	Digital level gauge
070.16364	HM 163.64	Velocity meter
070.16350	HM 163.50	Pitotstatic tube
070.16353	HM 163.53	Ten tube manometers
070.16213	HM 162.13	Electronic pressure measurement
070.16359	HM 163.59	Instrument carrier
070.16381	HM 163.81	PIV-System
070.16382	HM 163.82	Instrument carrier for PIV system
070.16383	HM 163.83	Glass cut-out for PIV system
Other accessories		
070.16257	HM 162.57	Electrical inclination adjustment
070.16310	HM 163.10	Extension element of the experimental flume
070.16320	HM 163.20	Water tank
070.16314	HM 163.14	Gallery
070.16315	HM 163.15	Extension element of the gallery