

**HM 143**

***Transient Drainage Processes in Storage Reservoirs***



**Technical Description**

Transient drainage processes are taken into consideration when deciding on the dimensions of storage reservoirs. The processes occur for example, in rainwater retention basins and dams.

The main purpose of the rainwater retention basin is to delay the drainage process by temporary intermediate storage. Dams are used as permanent storage reservoirs in the water supply, in energy conversion, or in flood protection. The water rises before it is fed over an overflow.

The drainage processes from reservoirs is realised by pipelines, tunnels or other means. A surge chamber prevents water hammers in pipes and fittings in the event of rapid changes in flow.

HM 143 is used to demonstrate transient drainage processes from storage reservoirs and how a surge chamber works. The trainer includes a basin with adjustable weir and a second, deeper-lying basin with overflow and drainage line. A surge chamber is installed in the drainage line.

In the "rainwater retention basin" experiment basin A simulates a drainage channel with gate. In basin B, the retention basin, the discharge is adjusted by using valves in the drainage line. This illustrates typical delayed drainage processes.

In the second experiment, the transient drainage processes are shown in two storage reservoirs, one behind the other. In this experiment the weir is used as a free overfall weir.

In the "surge chamber" experiment a water hammer is produced by rapidly closing a gate in the drainage line. The vibration can be seen as oscillation of the water level in the surge chamber.

The pressure fluctuations in the basins and at the surge chamber are detected by pressure sensors and displayed using the GUNT software.

The well-structured instructional material sets out the fundamentals and provides a step-by-step guide through the experiments.

- \* Investigation of transient drainage processes in storage reservoirs
- \* Simulation of rainwater retention basin
- \* Transparent surge chamber for observing vibrations
- \* Software for displaying the pressure curves and course of the water levels

**Learning Objectives / Experiments**

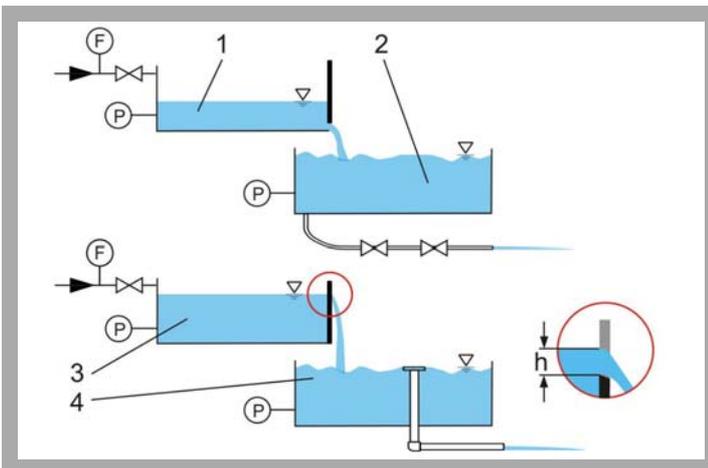
- demonstrating transient drainage processes in a rainwater retention basin
- demonstrating transient drainage processes in two water reservoirs located one behind the other and determining the discharge
- recording vibrations of the surge chamber and measure natural frequency
- recording and displaying pressure fluctuations

## HM 143

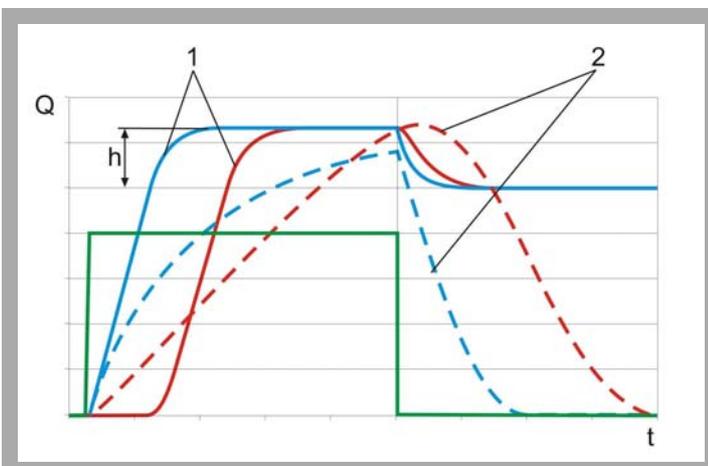
## Transient Drainage Processes in Storage Reservoirs



1 basin A with adjustable weir, 2 flow meter, 3 water connection, 4 drainage line, 5 gate, 6 valve, 7 surge chamber, 8 overflow pipe, 9 basin B with overflow



Top: "rainwater retention basin": 1 basin A as drainage channel with gate, 2 basin B as rainwater retention basin; bottom: "consecutive storage reservoirs"; 3 basin A as storage reservoir with free overflow weir, 4 basin B as storage reservoir with overflow; F flow rate, P pressure, h head



Transient drainage processes; blue: basin A, red: basin B; Q discharge, t time, green: water supply; 1: "consecutive storage reservoirs", h head; 2: "rainwater retention basin" with delayed drainage process

### Specification

- [1] transient drainage processes in storage reservoirs
- [2] functioning of a surge chamber
- [3] "rainwater retention basin" experiment: basin A as drainage channel, basin B as rainwater retention basin, rectangular weir as gate
- [4] "consecutive storage reservoirs" experiment: basin A and basin B are used as storage reservoirs, rectangular weir as overflow weir
- [5] "surge chamber" experiment: transparent pipe as surge chamber in drainage line of basin B
- [6] gate in the drainage line for generating water hammers
- [7] pressure sensors at both basins and the surge chamber capture the pressure fluctuations
- [8] representation of the pressure curves and course of the water levels with GUNT software
- [9] GUNT software for data acquisition via USB under Windows Vista or Windows 7

### Technical Data

- Basin A: LxWxH: 900x900x300mm
- material: stainless steel
- rectangular weir according to Rehbock, adjustable as gate, gate opening: 1,5mm as overflow weir, weir height: 215mm, overflowed width: 60mm
- Basin B: LxWxH: 900x900x300mm
- material: stainless steel
- overflow: 250mm
- Surge chamber
- material: PMMA
- di: 62mm
- height: 1800mm

### Measuring ranges

- pressure: 2x 0...100mbar, 1x 0...200mbar
- flow rate: 300...3.300L/h

### Dimensions and Weight

- LxWxH: 1.300x1.200x2.100mm
- Weight: approx. 140kg

### Required for Operation

- 230V, 50/60Hz, 1 phase or 120V, 60Hz/CSA, 1 phase
- Water connection, drain

### Scope of Delivery

- 1 trainer
- 1 CD with GUNT software
- 1 set of instructional material

### Order Details

070.14300 HM 143 Transient Drainage Processes in Storage Reservoirs