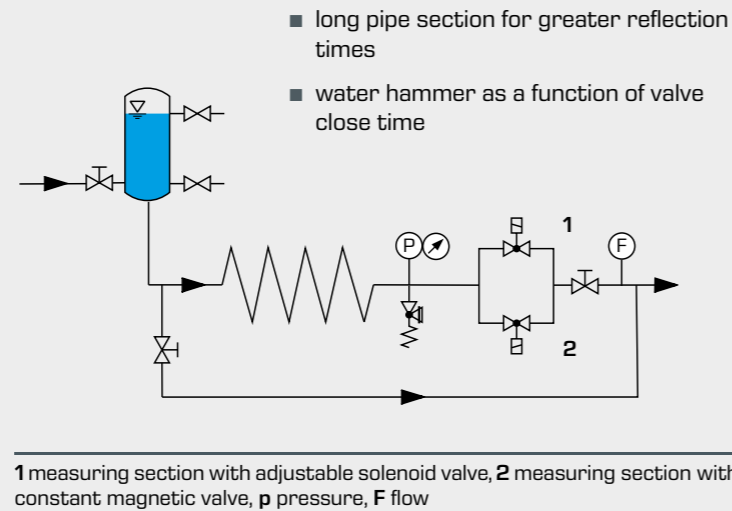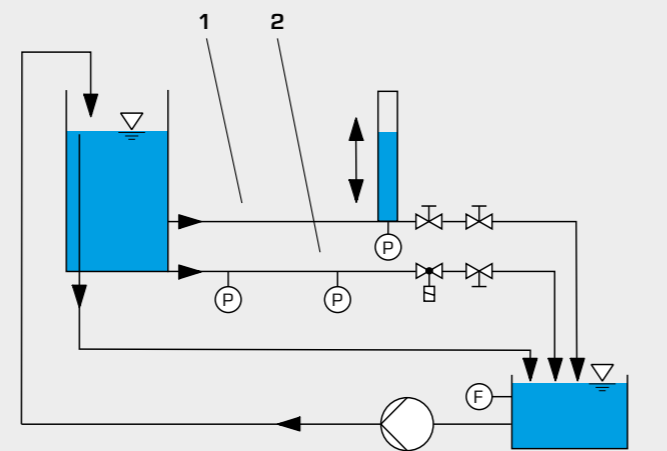# Devices for experiments in the field of transient flow

Transient flow in pipes

Demonstrate water hammer and pressure waves in pipes: HM 155 Water hammer in pipes

- long pipe section for greater reflection times
- water hammer as a function of valve close time

1 measuring section with adjustable solenoid valve, **2** measuring section with constant magnetic valve, **p** pressure, **F** flow

Using surge chambers to reduce water hammer: HM 156 Water hammer and surge chamber

1 pipe section with ball valve and surge chamber for visualisation of oscillations, **2** pipe section with solenoid valve for measuring water hammer
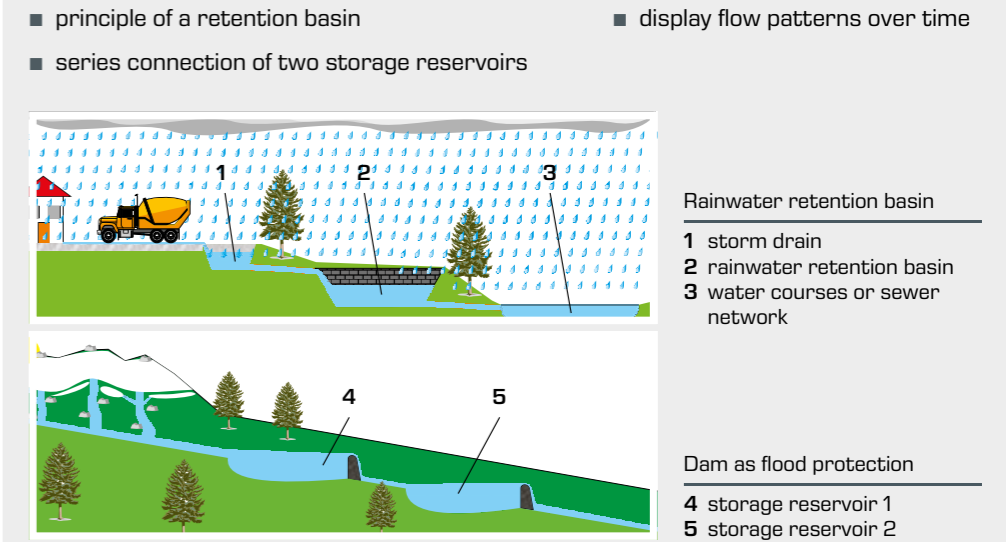
- operation of a surge chamber
- visualisation of water hammer in transparent surge chambers
- determine natural frequency of the oscillations in the surge chamber
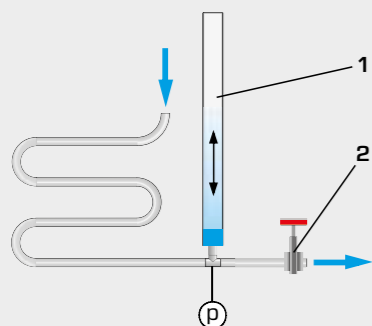
Function of a surge chamber (HM 143)

1 surge chamber, **2** gate valve, **p** pressure

Simulating transient drainage processes between storage reservoirs

HM 143 Transient drainage processes in storage reservoirs

- principle of a retention basin
- series connection of two storage reservoirs
- display flow patterns over time

Rainwater retention basin

1 storm drain
2 rainwater retention basin
3 water courses or sewer network

Dam as flood protection

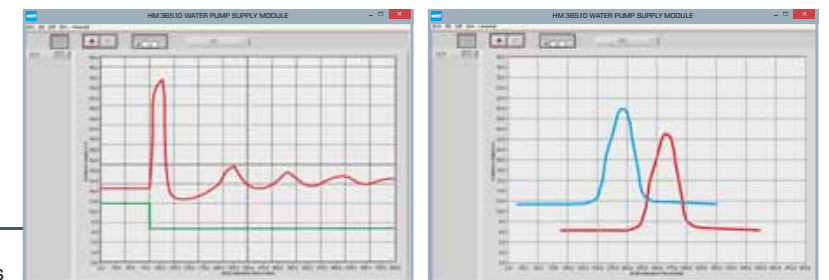**4** storage reservoir 1
5 storage reservoir 2

Data acquisition software for HM 155, HM 156 and HM 143

GUNT software for optimum support of the learning process

Graphical representation of

- reflection time and water hammer (HM 155)
- oscillation behaviour (HM 156)
- flow courses (HM 143)

Software screenshots

Technical use of water hammer

Demonstrating how a hydraulic ram works: HM 150.15 Hydraulic ram – pumping using water hammer

- use of water hammer to pump water
- function of an air vessel
- optimal observation of the functions through transparent elements

Pumping water

1 waste valve,
2 water inlet,
3 check valve,
4 air vessel,
5 rising pipe