

## CE 588

### Demonstration of dissolved air flotation



#### Learning objectives/experiments

- how dissolved air flotation works
- dissolving gases in liquids
- determining rate of ascent of air bubbles

#### Description

- **mechanical water treatment**
- **transparent tank for observing the processes**

Flotation processes are used to separate solids from a liquid (e.g. water). The flotation process most commonly used in water treatment is dissolved air flotation.

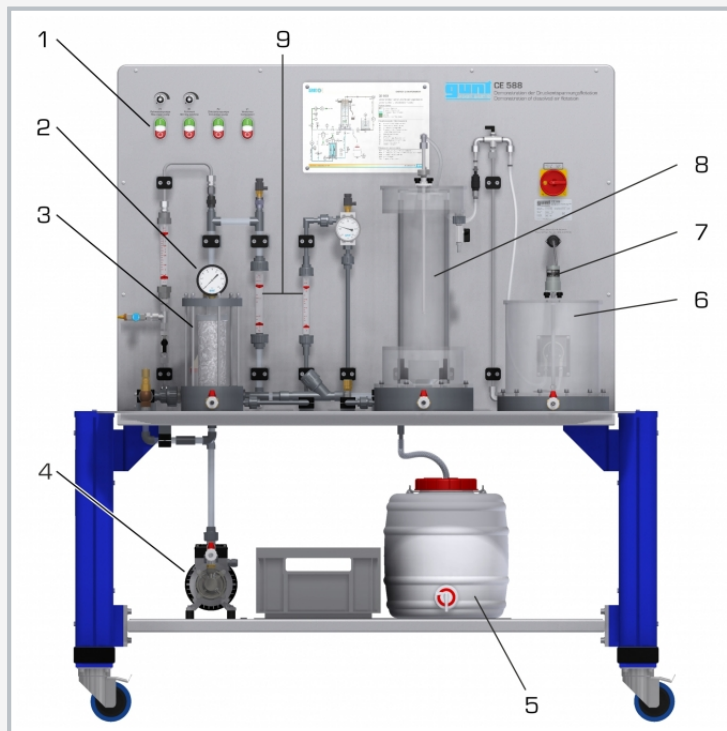
The suspension to be treated (raw water) is placed in a tank. Flocculation chemicals can be added to the raw water in order to improve the flotation of the contaminants. The diatomite provided is suitable as a contaminant. A pump transports the raw water, which enters the flotation column via a vertical pipe. The height of the supply line can be adjusted.

A water circuit with pump is connected to the flotation column. Two compressors supply air to the water circuit on the suction side of the pump. The air dissolves in the water under pressure. Part of the water flows back to the pump via a bypass. The other part of the water enters a pressure vessel filled with Pall rings. The pressure vessel ensures a sufficiently long dwell time to dissolve the air and to separate undissolved air. The water then enters the flotation column from below via a valve. This causes a sudden drop in pressure to almost atmospheric pressure. Since the solubility of air increases with increasing pressure, the excess air forms small bubbles. The air bubbles accumulate on the contaminants.

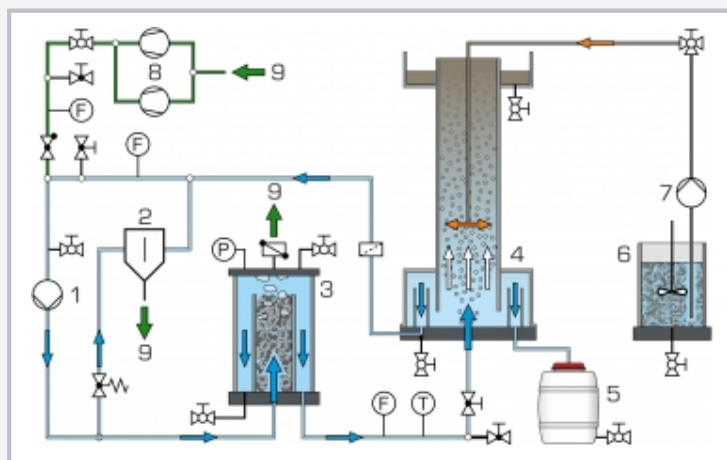
The contaminants rise up in the column together with the air bubbles. At the upper end of the flotation column, the contaminants enter a circulating channel. The treated water is taken from the bottom of the flotation column and collected in a tank. All relevant flow rates, temperature and pressure in the water circuit are measured and displayed.

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## Demonstration of dissolved air flotation



1 control elements, 2 manometer, 3 pressure vessel, 4 circulation pump, 5 treated water tank, 6 raw water tank, 7 stirring machine, 8 flotation column, 9 flow meter



1 circulation pump, 2 air separator, 3 pressure vessel, 4 flotation column, 5 treated water tank, 6 raw water tank, 7 raw water pump, 8 compressor, 9 air; F flow rate, P pressure, T temperature

### Specification

- [1] flotation column made of plexiglass
- [2] raw water tank with stirring machine
- [3] peristaltic pump for pumping raw water
- [4] continuously adjustable speeds of peristaltic pump and stirring machine
- [5] height-adjustable inlet for raw water into the flotation column
- [6] water circuit with pump and bypass
- [7] 2 compressors for introducing the air into the water circuit
- [8] transparent pressure vessel with Pall rings
- [9] measurement of flow rate, pressure and temperature

### Technical data

#### Flotation column

- inner diameter: 115mm
- height: 480mm
- volume: approx. 5L

#### Tanks

- raw water: 8L
- treated water: 15L
- pressure vessel: 1,5L

#### Raw water pump (peristaltic pump)

- max. flow rate: 24L/h
- max. speed: 200min<sup>-1</sup>

#### Circulation pump (centrifugal pump)

- max. flow rate: 660L/h
- max. head: 65m

#### Compressor: max. 2x 320L/h

Stirring machine: max. 330min<sup>-1</sup>

#### Measuring ranges

- flow rate: 5...550L/h (Luft)
- flow rate: 5...60L/h (Zirkulation)
- flow rate: 30...320L/h (Zirkulation + Bypass)
- pressure: 0...10bar
- temperature: 0...60°C

230V, 50Hz, 1 phase

230V, 60Hz, 1 phase

120V, 60Hz, 1 phase

UL/CSA optional

LxWxH: 1410x790x1590mm

Weight: approx. 160kg

### Scope of delivery

- 1 trainer
- 2 measuring cup
- 1 diatomite (25kg)
- 1 iron(III) chloride (250g)
- 1 flocculant (50g)
- 1 storage box
- 1 set of instructional material