

CE 282

Disc centrifuge



Description

- continuous separation of emulsions
- maintenance and inspection exercises possible
- practical experiments on a laboratory scale

A disc centrifuge can be used to separate mixtures of immiscible liquids.

The emulsion to be separated is prepared in a stirred tank. Water/oil is recommended for use as the emulsion. A stirring machine with a speed control mixes the two liquid phases. In the course of the mixing process the oil droplets are distributed ever more finely in the water. When the droplet sizes are smaller the emulsion remains stable for longer.

A pump delivers the emulsion up into the centre of the rotating centrifuge. The emulsion is delivered by way of the distributor base via riser ducts into the disc intermediate chambers. The driving force of the separation process is centrifugal force. It ensures that the specifically heavier liquid droplets (water) are drawn more strongly towards the outside than the specifically lighter liquid droplets (oil).

The settling distance and time are shortened by the disc arrangement set at an oblique angle to the field of acceleration. On the underside of the rotating discs the specifically heavier portion of the emulsion moves downwards and outwards. The lighter portion flows inwards on the top side of the discs. The separated liquids exit the centrifuge by way of outlets and can be collected in tanks.

The rotation speed of the centrifuge can be adjusted by way of a potentiometer. A valve is used to adjust the flow rate of the emulsion due to be separated. Various types of stirrer are available to perform the stirring. A photometer is recommended for analysis of the separated fractions.

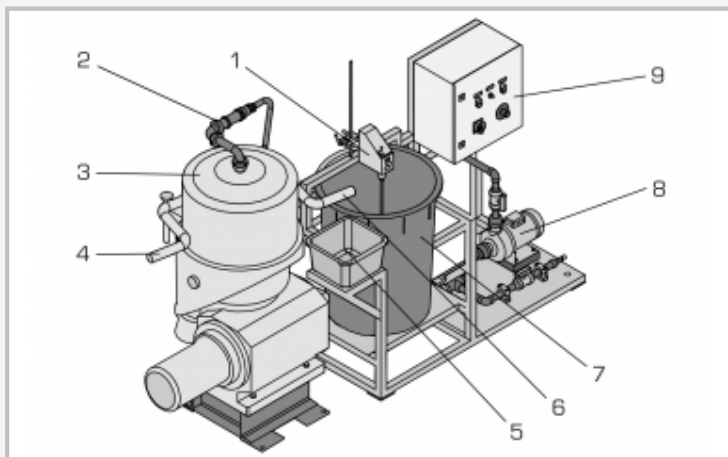
The operating and service instructions form the basis for learning how to perform an extensive range of maintenance and inspection operations on the centrifuge.

Learning objectives/experiments

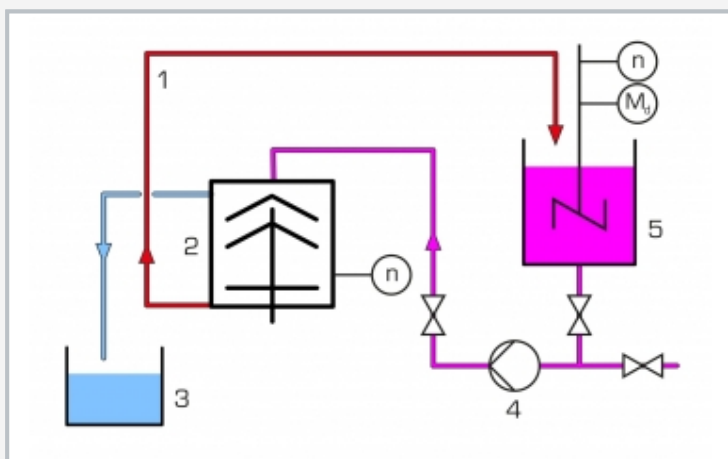
- production of stable emulsions with different types of stirrer
- learning the fundamental principle of disc centrifuges
- influence of rotation speed and feed flow rate on separation result
- characteristic of concentration of the light phase in the stirred tank over time (with photometer)
- startup/shutdown and operation of a disc centrifuge
- maintenance
- cleaning
- inspection

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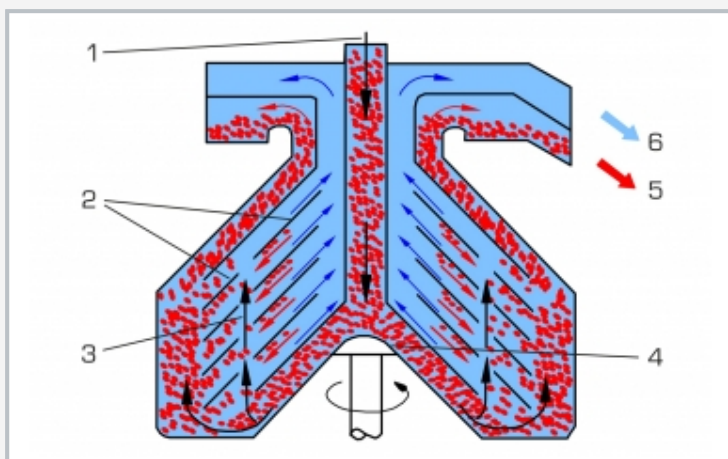
Disc centrifuge



1 stirring machine, 2 emulsion inlet, 3 centrifuge, 4 light phase outlet, 5 light phase collector tank, 6 heavy phase outlet, 7 stirred tank, 8 pump, 9 switch box with controls



1 heavy phase, 2 disc centrifuge, 3 light phase, 4 pump, 5 emulsion stirred tank; n speed, M_t torque



Fundamental principle of disc centrifuges: 1 emulsion inlet, 2 discs, 3 riser duct, 4 inlet base, 5 heavy phase outlet, 6 light phase outlet

Specification

- [1] continuous separation of emulsions with a disc centrifuge
- [2] HDPE tank with stirring machine to produce an emulsion
- [3] centrifugal pump to deliver the emulsion to the centrifuge
- [4] adjustment of emulsion flow rate by valve
- [5] centrifuge speed adjustable by potentiometer
- [6] speed-controlled stirring machine with digital torque indicator
- [7] 3 interchangeable stirrers
- [8] collector tank for separated phase

Technical data

Disc centrifuge

- power consumption: 7500W
- max. usable diameter: approx. 300mm
- max. speed: 6480rpm

Stirring machine

- power consumption: 140W
- speed: 30...1000rpm

Stirrer

- 2x paddle stirrers: 3/10 holes
- 1x stirrer with 3 blades

Centrifugal pump

- max. flow rate: 300L/min
- max. head: 9,5m

Tanks

- stirred tank: 200L
- collector tank: 14L

Measuring ranges

- speed:
 - ▶ 1x 0...8000min⁻¹
 - ▶ 1x 30...1000min⁻¹
- torque: 0...200Ncm

400V, 50Hz, 3 phases

400V, 60Hz, 3 phases; 230V, 60Hz, 3 phases

UL/CSA optional

LxWxH: 3000x1000x1800mm

Weight: approx. 1100kg

Required for operation

water connection: 200...300L/h, drain; special foundations and drainage required

Scope of delivery

- 1 trainer
- 1 set of accessories
- 1 set of instructional material