

CE 282

Disc centrifuge



Description

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

The disc centrifuge serves to separate an emulsion into several phases: lighter liquid like oil, heavier liquid like water and solids.

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.

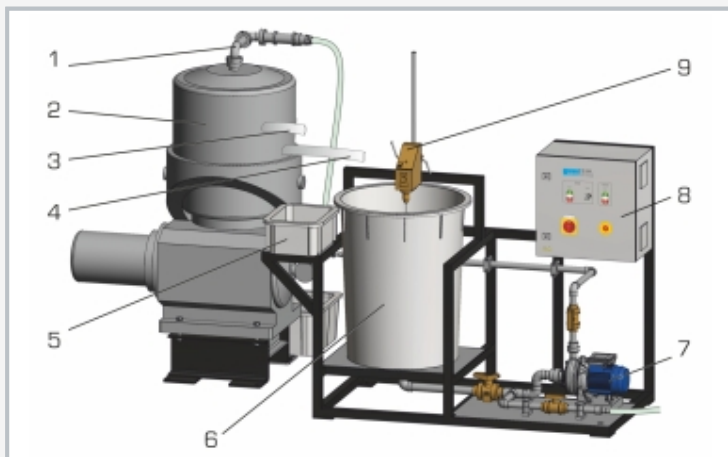
The operating and service instructions form the basis for learning how to perform an extensive range of maintenance and inspection operations on the centrifuge.

Learning objectives/experiments

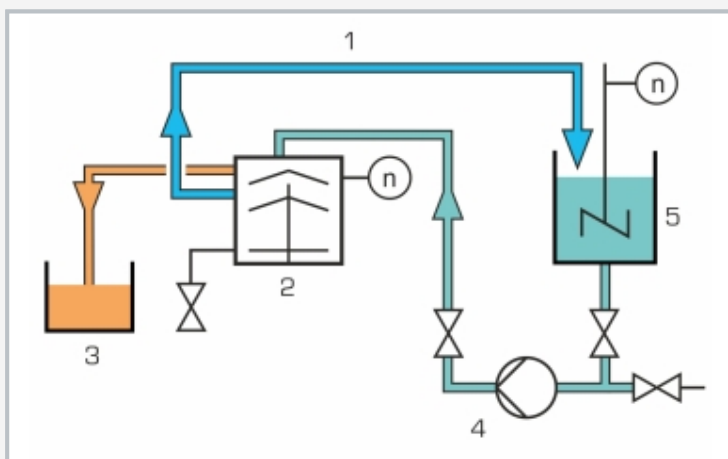
- production of stable emulsions with different types of stirrer
- learning the fundamental principle of disc centrifuges
- influence of rotation speed and feed flow rate on separation result
- characteristic of concentration of the light phase in the stirred tank over time (with photometer)
- startup/shutdown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

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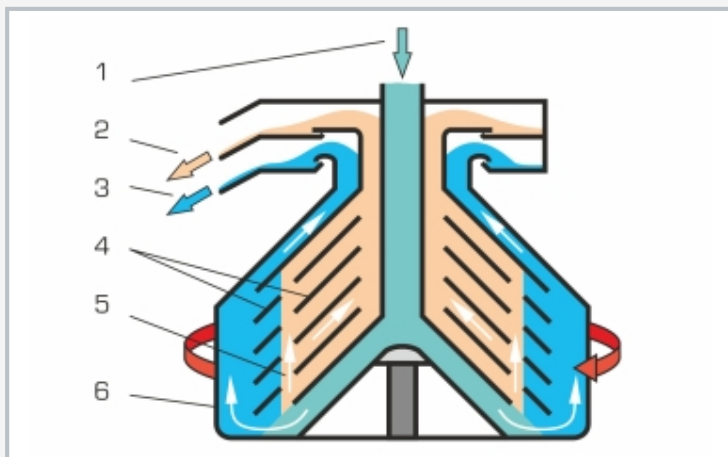
Disc centrifuge



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



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



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

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: 183L/min
- max. head: 11m

Tanks

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

Measuring ranges

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

400V, 50Hz, 3 phases

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

UL/CSA optional

LxWxH: 2800x1300x1800mm

Weight: approx. 1100kg

Required for operation

water connection: 200...300L/h, drain; 5L cooking oil, special foundations required

Scope of delivery

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