

## CE 320

### Stirring



#### Learning objectives/experiments

- flow fields of various stirrer types
- power demand, mixing time, mix quality dependent on
  - ▶ stirrer type
  - ▶ speed
  - ▶ materials used (density, viscosity)
  - ▶ insertion of flow impeders
- observation of the suspension state of suspended solids when using different stirrers and at different speeds
- observation of the droplet size of emulsions when using different stirrers and at different speeds

#### Description

- visualisation of flow fields when using various stirrer types
- high-performance stirring machine with speed control
- determination of mixing time of solutions
- mixing of emulsions and suspensions
- power demand during stirring

During stirring, the continuous phase is liquid. With CE 320, the production of solutions (solid dissolved in liquid), emulsions (mixture of immiscible liquids) and suspensions (insoluble solid in liquid) can be investigated.

Mixing takes place in a tank which is resistant to chemicals and heat-resistant. With the high-performance stirring machine even high-viscosity mixtures can be produced. The speed is adjustable. The torque is indicated on the unit's digital display. This enables the power demand to be determined.

Eleven different, easily interchangeable stirrers are provided. With plastic balls which are dispersed in the fluid it is possible to observe the characteristic flow fields of the different stirrer types.

Flow impeders can be inserted in the tank to investigate their influence on the mixing process. To determine the mixing time and mix quality of solutions, a conductivity meter is available. The device can also be used to measure temperatures.

A removable coiled tube serves as a heat transfer medium. It can be used for heating or cooling with water from the laboratory supply. A valve with precise adjustment is used to adjust the flow rate. This enables the influence of temperature changes on the mixing process to be investigated, e.g. due to fluid viscosity depending on temperature.

# CE 320

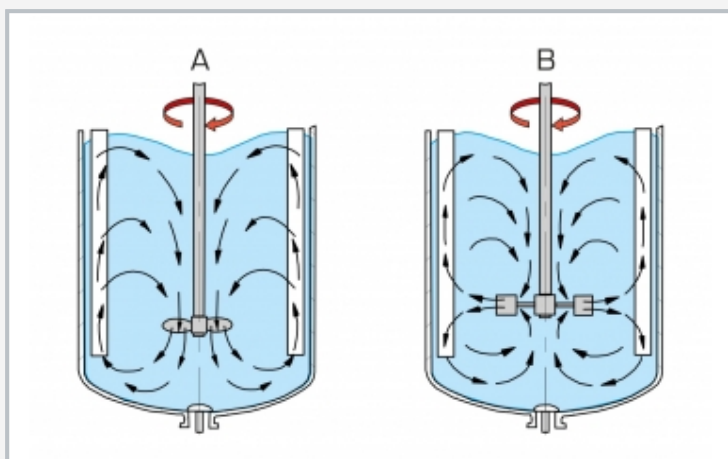
## Stirring



1 stirring machine with speed and torque indicator, 2 turbine stirrer and threaded shaft for stirring heads, 3 stirrer elements, 4 conductivity meter, 5 outlet, 6 flow impeder, 7 coiled tube, 8 shut-off valve for coiled tube



1 propeller stirrers, 2 blade stirrers, 3 threaded shaft for stirring heads, 4 turbine stirrer



Flow fields in the stirred tank with axial-conveying stirrer (A) and radial-conveying stirrer (B)

### Specification

- [1] investigation of mixing processes during stirring
- [2] transparent stirred tank with 4 removable flow impeders
- [3] speed-controlled stirring machine with digital torque indicator
- [4] 11 interchangeable stirrers: axial-, radial-, tangential-conveying
- [5] removable coiled tube for cooling or heating with external water supply
- [6] portable device for measuring conductivity and temperature

### Technical data

#### Stirred tank

- nominal capacity: approx. 15L
- material: DURAN glass and PVDF (base)

#### Stirrer elements

- 7 propeller stirrers
  - ▶ 2x 3 blades, Ø 70mm / 100mm
  - ▶ 1x 4 blades, Ø 70mm
  - ▶ 1x 2 blades, Ø 76mm, left
  - ▶ 1x 2 blades, Ø 76mm, right
  - ▶ 2x 2 blades (angled), Ø 70mm / 100mm
- 3 blade stirrers
  - ▶ 2x Ø 70mm with 3 / 6 holes
  - ▶ 1x Ø 100mm with 10 holes
- 1 turbine stirrer with shaft: Ø 50mm

#### Coiled tube

- diameter: approx. 140mm
- material: stainless steel

#### Measuring ranges

- conductivity: 0...200mS/cm
- temperature: -5...100°C
- speed: 50...2000min<sup>-1</sup>

230V, 50Hz, 1 phase  
 230V, 60Hz, 1 phase  
 120V, 60Hz, 1 phase  
 UL/CSA optional  
 LxWxH: 1150x825x1950mm  
 Weight: approx. 135kg

### Required for operation

water connection, drain

### Scope of delivery

- 1 trainer
- 11 different stirrer elements
- 1 set of accessories
- 1 conductivity meter
- 1 packing unit of plastic balls
- 1 set of instructional material