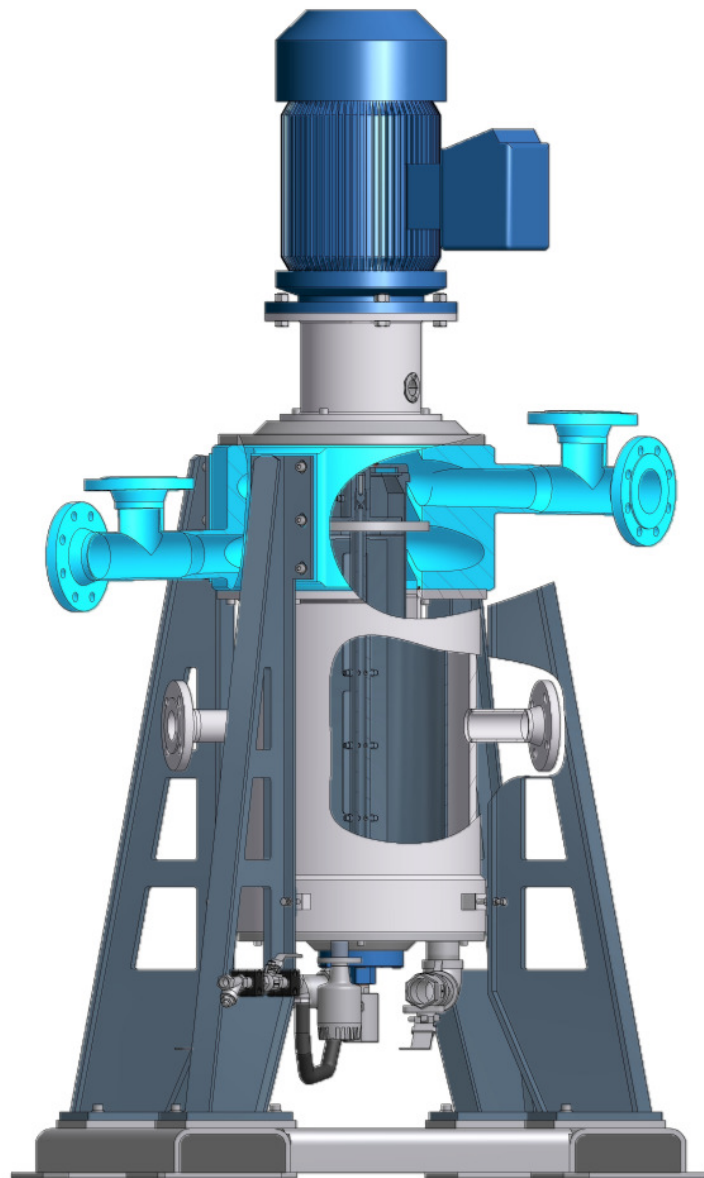


# EXTRACTION – WASHING - SEPARATION



**liquid – liquid solutions for continuous processes**



**Centrifuges at the centre of perfect processes**

# INTRODUCTION

## General Centrifuge

Clarification of process streams has been one of the niches in the process arena carved by liquid-liquid centrifuges, especially whenever emulsions or liquids close in density have been involved. Difficulties that often arise in separation of immiscible liquids include: poor or slow phase separation, emulsion or rag layer formation, and poor process control in batch systems. Centrifuges accelerate separation processes by enhancing the specific gravity differences. Liquid-liquid dispersions requiring hours to separate at 1G will proceed much faster at 1000 G, with greatly improved efficiency and outflow quality. The efficiency of the physical separation of two phases can be several percent higher using centrifuges versus decanting from tanks.

## Contactors as Extractors and Washers

Liquid-liquid centrifuges are valuable separation devices because of their small size and the rapid, yet efficient operation. However, they become even more valuable when employed as liquid-liquid contactors. The ability of a centrifuge to thoroughly mix two phases in the annular zone prior to separation in the rotor broadens its scope. Good mixing is very important to ensure optimal mass transfer and to minimize solvent or water usage. Chemical processes requiring extraction and washing (or neutralization) as well as separation can be performed in one step utilizing liquid-liquid centrifugal contactors. Better process control, less solvent required, low retained fluid volume during processing, and reduced plant space usage are realized when using these devices in place of traditional tanks, mixer settlers, and extraction columns.

CINC provides continuous liquid - liquid centrifugal extractors and separators which are very often the most cost effective solution for continuous extraction-, washing- or separation processes.

Our up scalable design enables pilot testing with our lab scale centrifuges at the customers site, the gained data will be guaranteed for the process size units.

Our simple design allows our customers to perform the required maintenance in min time.

The new patented technology enables our customer to use the centrifuge in different applications just with using different inlets for either extraction-, washing- or separation processes.

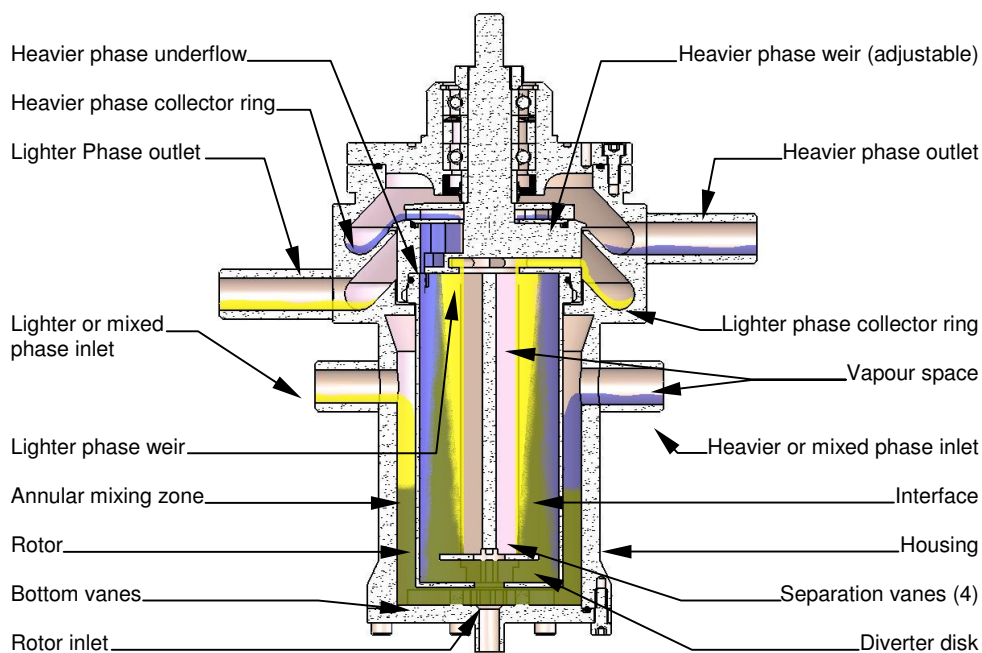


figure 1 Cutaway view

fantastic principle

# PRINCIPLE OF OPERATION

The annular centrifugal contactor operates as both separator and contactor which makes it a valuable tool in different applications. Its unique design provides mixing and separation in a single, compact unit. Figure 1. shows a cutaway view of the centrifuge housing and rotor and details the significant design features including the liquid flow path.

Two immiscible liquids of different densities are fed to the separate inlets and are rapidly mixed in the annular space between the spinning rotor and stationary housing. The liquids enter the central opening of the rotor bottom, the heavy phase is accelerated toward the wall, the light phase builds a layer on top of the heavy phase. The interface will be positioned half way between the lighter phase outlet and the heavier phase underflow at the top of the separating zone by an adjustable heavy phase weir.

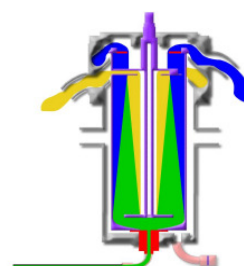
## Operation modes:

### Separation DF (direct feed):

Direct feed minimises the shear forces to the mixed fluid stream to enable an efficient separation.

The mixed fluid will be fed via the bottom inlet direct into the separation area inside the rotor.

Separation occurs continuously.



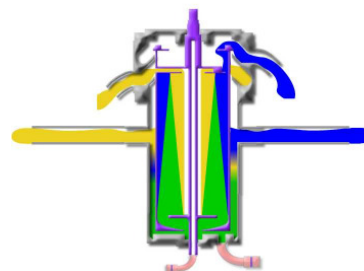
### Contactor Extraction / washing:

The mixing will be performed in the annular mixing zone between the spinning rotor and the housing wall.

Equilibrium will be reached after seconds

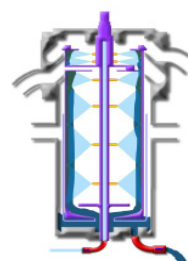
Special inserts optimise the mass transfer coefficient.

Inside the rotor separation occurs continuously.



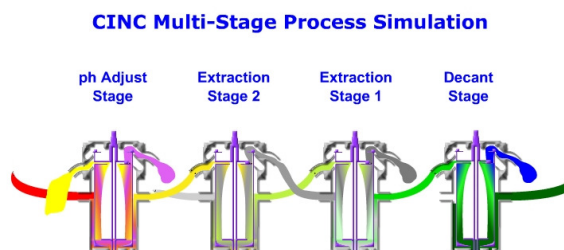
### Clean in place CIP / Steam in place SIP:

Cleaning of the centrifuge without taking the machine apart is provided by an integrated CIP / SIP system.



### Multi stage:

Each centrifuge represents one theoretical stage, processes requiring a multi stage counter current or cross current extraction are established with a series of centrifuges.



**easy to maintain**

# PILOTING / SCALE – UP / START - UP

## Piloting: (3 stage counter current extraction)

The lab scale model gains the physical characteristics of the liquids. The collected data will be used to up scale to process size. The reached results will be guaranteed for the process.

The lab scale centrifuges are available as rental units.



## Process: (5 stage counter current extraction)

The start up and the installation is simple. The connection to a common header provides inertisation for the xp environment.



## CINC centrifuges are available:

- in different materials from stainless steel to Hastelloy.
- according to the ATEX 100 regulation
- polished for the cGMP / FDA environment..
- different sizes for flow rates from 0 – 30000 l/h.
- as Rental units (xp) for flow rates up to 4000 l/h.
- with heat- and cool- able housings

## Please contact us for more information's:

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