Product brochure

Hybrid Centrifuge (HC) Separators
This brochure contains detailed information about our Hybrid Centrifugal (HC) Separators. These separators enable you to separate liquid from liquid or solid from liquid of industrial wastewater by using centrifugal forces. Beneficial effects of these separators are that they enable you to re-use materials, save energy, lower costs and hereby contribute to an environmentally sustainable future. The HC separators are vital in the applications/solutions we offer at CTST. These applications/solutions are completely customizable to your wishes. Please contact us if you have any question.

In this brochure you will find detailed information about how we developed, applicability, benefits and working principle of the Hybrid Centrifugal (HC) separators. As well you can find our contact information.

CTST is a Dutch based company. With over 20 year experience we are a renowned name in the customized separation and filtration industry worldwide. Over the years we enabled our customers to re-use materials, save energy and lower costs. We are determined to execute more tailor made projects for our customers and hereby achieve our mission statement: An environmentally sustainable future for the generations to come. We joined forces with a group of Dutch companies striving for the same ideas we have: NETG (Netherlands Environmental Technology Group) and the Water Alliance (institution for the development of sustainable water technology. Besides this we have close relationships with NGOs, local governments such as the Chinese and Dutch government.

We conducted projects in 5 continents and over 20 countries and are officially certified according to ISO, ASME, ATEX and PED certification.

The Hybrid centrifugal (HC) separator was developed in order to enable our customers to separate immiscible liquids in real-time. This product range is applicable to several industries: Chemistry, Pharmaceutical, food & Nutrition, Oil & Gas, Wastewater and Metals & Mining recovery.

Due to its diverse applicability, the HC separators play a vital role in our existence. We were able to develop this unique product range by joining forces with:

- Attended trade mission in China
- Well trained professionals
- Certified engineering
- Certified machining shop
The introduction briefly mentioned the working principle of the HC separator. This section will thoroughly discuss this. First the 4 functions of the HC centrifuge, the most vital part of the separator will be discussed:

1. **Liquid - liquid separations**
   Liquid - liquid separation is the real-time, continuous separation of liquids with a specific gravity difference. E.g. solvents, solids, oils and water.

2. **Extractions**
   Extractions use two immiscible phases to separate the substance from one phase into the other. Each centrifuge is a modular stage of mixing and separation. Each unit gravity feeds the next stage, allowing continuous real-time mixing and separation.

3. **Water washes**
   Water wash allows the contacting of contaminated solvents to remove impurities easily and conveniently.

4. **Reactions**
   Reaction is where two immiscible liquids are mixed, allowing them to react and separated in real-time. Often referred to as “contactors”.

The main benefits of the Hybrid Centrifuge (HC) Separator are enabling you to **re-use materials, save energy, lower costs** and most important of all: **Contribute to an environmentally sustainable future**, as mentioned in the introduction.

Besides this the use of centrifugal force as opposed to gravity offers you **real time separation**. As well the HC separator is suitable for high uninterrupted flows and large volumes, it can easily be disassembled and cleaned and offers you a significant cost reduction compared to alternative methods. The HC separator is also easy to install (low installation costs), has a small footprint, low weight, is durable and a robust machine. Last but not least the HC separators are **easy to maintain** and have a **low total cost of ownership**!

The great benefits of the HC separator resulted in a large customer base. We executed applications and solutions with HC separators worldwide. This means the HC separator is technologically proven in several conditions and circumstances. Examples of executed projects can be found on our YouTube page and previous customer can be found below.
HC separator was developed in order to enable our customers to separate immiscible liquids real-time, as mentioned in the introduction. But how does it actually work? This section will explain this thoroughly.

The HC centrifuge utilizes centrifugal force generated inside a spinning rotor about a central axis to separate liquids of a different specific gravity to vastly improve process conditions.

The image on the right shows the way of working in 14 steps. As you can see 2 immiscible liquids are pumped directly into the rotor and are subjected to centrifugal force. As the pump feeds the rotor, the heavy phase begins to locate equally to the rotors wall. Because of the specific gravity difference, separation takes place in real-time with the light phase now sitting on top of the heavy phase inside the rotor. As the two (now separated liquids) reach the top of the rotor, they are discharged from the machine’s heavy phase- and light phase outlets.

After a reaction, separation and washing often requires multi-stage separation. Usually this entails batch manual process. The centrifuge speeds in real-time such a function and is multi-stage continuous. The centrifuge can also be used as a contractor offering mixing of an organic/aqueous mix before separation. Again in real time, multi-stage function of the centrifuge is a major process development.

The Hybrid Centrifugal (HC) Separators are applicable to several industries worldwide, as mentioned in the introduction. The table below offers a detailed overview of the applicability:

<table>
<thead>
<tr>
<th>Chemical &amp; Pharmaceutical</th>
<th>Oil &amp; Gas</th>
<th>Food &amp; Nutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Extractions</td>
<td>- Water/oil &amp; Oil/water</td>
<td>- Flavoring separations</td>
</tr>
<tr>
<td>- Gas condensates</td>
<td>- Diesel watering</td>
<td>- Edible oils</td>
</tr>
<tr>
<td>- Washing of organics</td>
<td>- Wastewater separation</td>
<td>- Wastewater treatment</td>
</tr>
<tr>
<td>- Antibiotics production</td>
<td>- Produced water separation</td>
<td>- Oil wastewater</td>
</tr>
<tr>
<td>- Fine chemicals</td>
<td>- Wastewater treatment</td>
<td></td>
</tr>
<tr>
<td>- Solvent recovery</td>
<td>- Biodiesel</td>
<td></td>
</tr>
</tbody>
</table>

Please contact us when having a doubt about the applicability of the HC separator to your specific problem. We are motivated to help, engineer and find a solution for every customer.
The HC product range consists of multiple types of centrifuges, all with various sizes and capacities as you can see in the table below. We also offer complete system integration, which consists of feed pumps, valves et. Our skilled installation workers are also able to take care of on-site installation and your commissioning. We also are more than willing to offer additional components such as piping for supply and discharge.

<table>
<thead>
<tr>
<th>Type</th>
<th>Floor space:</th>
<th>Height:</th>
<th>Weight:</th>
<th>Rotor size:</th>
<th>Net capacity:</th>
<th>Power*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC 2</td>
<td>24 x 24 cm</td>
<td>75 cm</td>
<td>14 kg</td>
<td>5,2 cm</td>
<td>0,1 m³/hr</td>
<td>0,25</td>
</tr>
<tr>
<td>HC 5</td>
<td>42 x 42 cm</td>
<td>113 cm</td>
<td>73 kg</td>
<td>12,9 cm</td>
<td>1,17 m³/hr</td>
<td>1,5</td>
</tr>
<tr>
<td>HC 10</td>
<td>85 x 85 cm</td>
<td>170 cm</td>
<td>400 kg</td>
<td>25,5 cm</td>
<td>5,8 m³/hr</td>
<td>5,5</td>
</tr>
<tr>
<td>HC 20</td>
<td>142 x 142 cm</td>
<td>274 cm</td>
<td>2000 kg</td>
<td>52 cm</td>
<td>38,5 m³/hr</td>
<td>17</td>
</tr>
</tbody>
</table>

*Power consumption at nominal frequency (compensation friction losses and acceleration incoming liquid at 38,5 m³/hr)

We proudly consist of several official certifications: ISO, ASME, ATEX and PED. Besides this we have extensive contact with our partners. For instance NETG and Bouman. Our strengths combined result in synergetic outcomes

May you have any question about the specifications, please do not hesitate to ask. We are more than willing to inform you.

Contact information

We would like to thank you for reading this company. Please do contact us via the contact information below, if you have any question. We are more than willing to help.

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