Flottweg
Separation Technology

FLOTTWEG SEPARATION TECHNOLOGY FOR THE PRODUCTION OF BIODIESEL

ALTERNATIVE FUELS HAVE GOOD PROSPECTS
You too Can Benefit from Them!

Biodiesel is a fuel produced from natural fats and oils. Its raw materials are vegetable oils such as rapeseed oil, sunflower oil, palm oil, jatropha oil, etc. Also by-products such as animal fats, used cooking oil and oil from grease separators are increasingly converted into valuable biodiesel. In addition to an optimized CO_2 balance, this fuel can be refined with the help of the right separation technology making it compliant with the strictest quality standards.

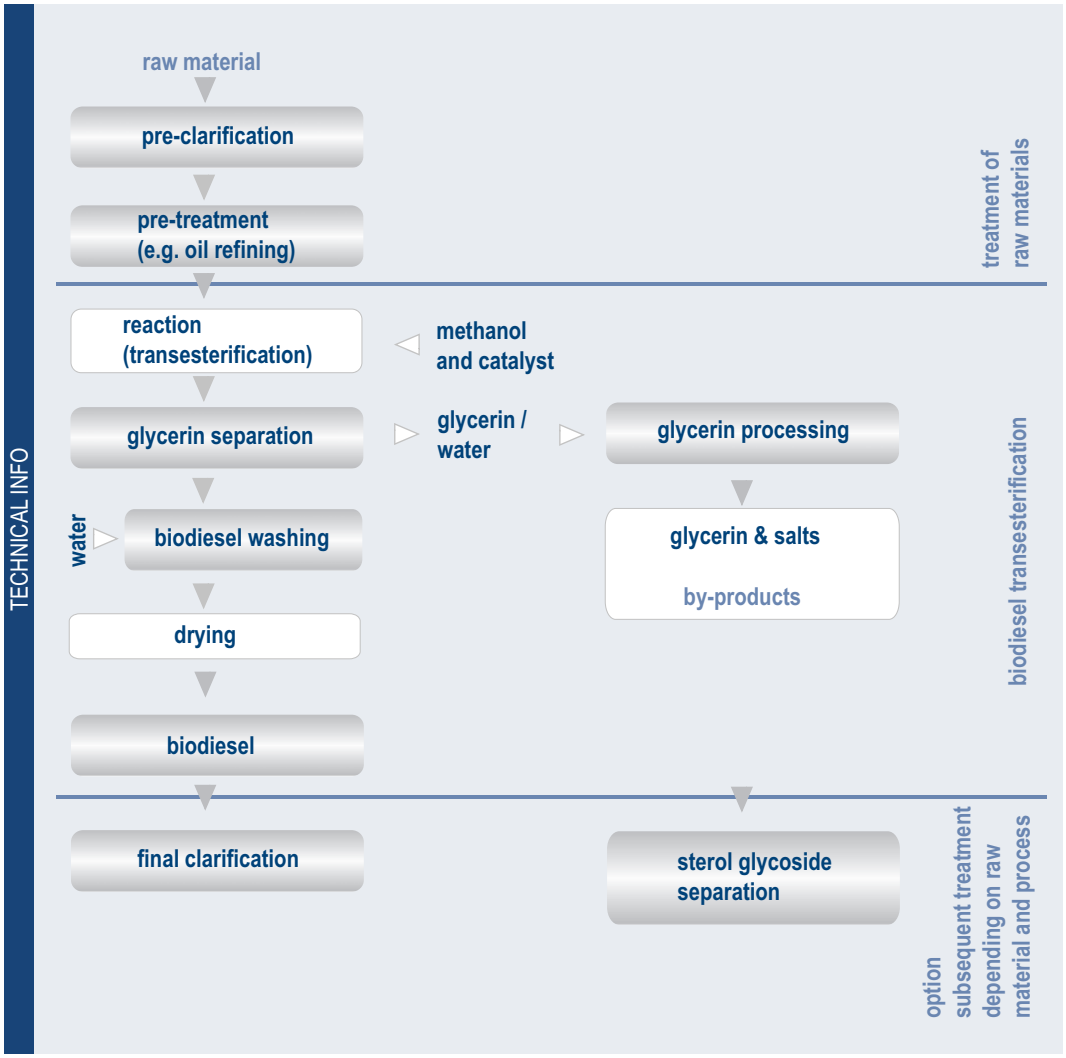
Biodiesel is used in place of conventional diesel fuel, which reduces our dependency on fossil fuels. Depending on the origin and quality of the raw material, there are different production processes. Biodiesel is produced when triglyceride, which is a major component of natural fats and oils, is converted into fatty acid ester. This transesterification reaction takes place through a catalyst and the addition of alcohol (mostly methanol). The products from the transesterification reaction, such as fatty acid ester (=biodiesel, generally methyl ester) and glycerin water, are put through various process stages to make them compliant with the required purity.

Our separation technology means your success

You can benefit from our long experience. We have been assisting customers since the beginning of the biodiesel industry. We offer:

- **Components to process raw materials with complex compositions such as animal fat, used cooking oil, etc.**
- **Components to process bypass streams in biodiesel processes (glycerin processing, salt recovery, distillation residuals treatment, etc.)**
- **Customized system solutions to increase yields, to optimize sub-processes, and to increase product quality**

EFFICIENCY IN ALL PROCESS STAGES



Process stages in biodiesel production

Optimize your process using state-of-the-art centrifuge technology

- Removal of impurities before transesterification for better biodiesel quality and by-products
- Optimized separation efficiency during glycerin clarification and biodiesel washing
- Efficient separation of sterol glycosides in order to avoid deposits and filter problems

Rapeseed under cultivation

MAXIMUM BENEFIT

The Purer the Raw Material, the Better the Final Product

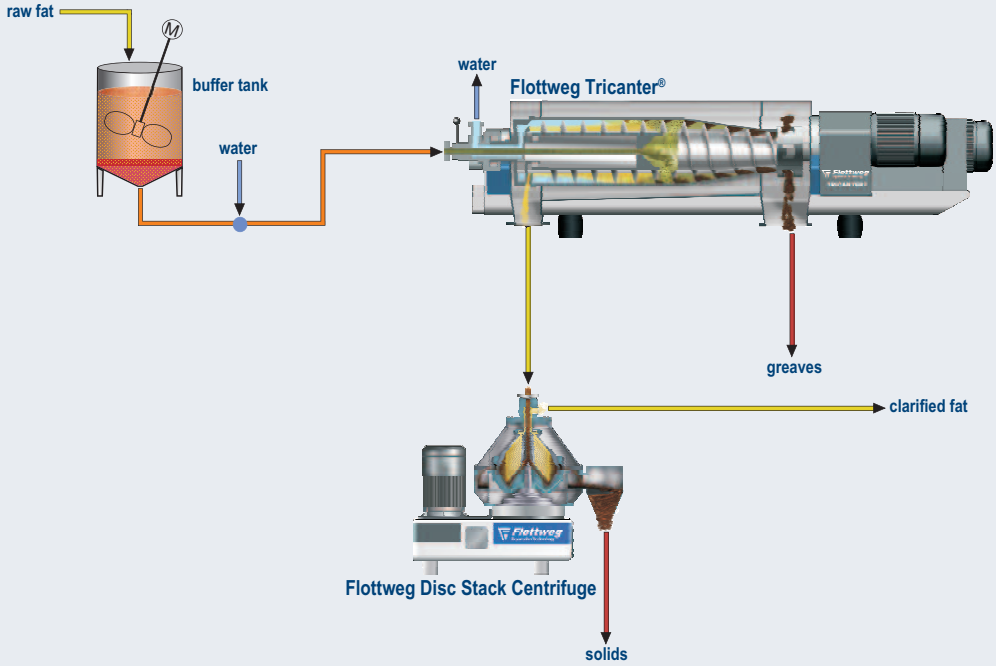
Raw materials from plants and animals contain varying quantities of undesired impurities depending on their origin, storage and processing. These impurities can cause problems during subsequent processing and can constrain the efficiency of your system.

The right separation technology ensures that the impurities are removed during pre-treatment before biodiesel transesterification so that your process runs optimally.

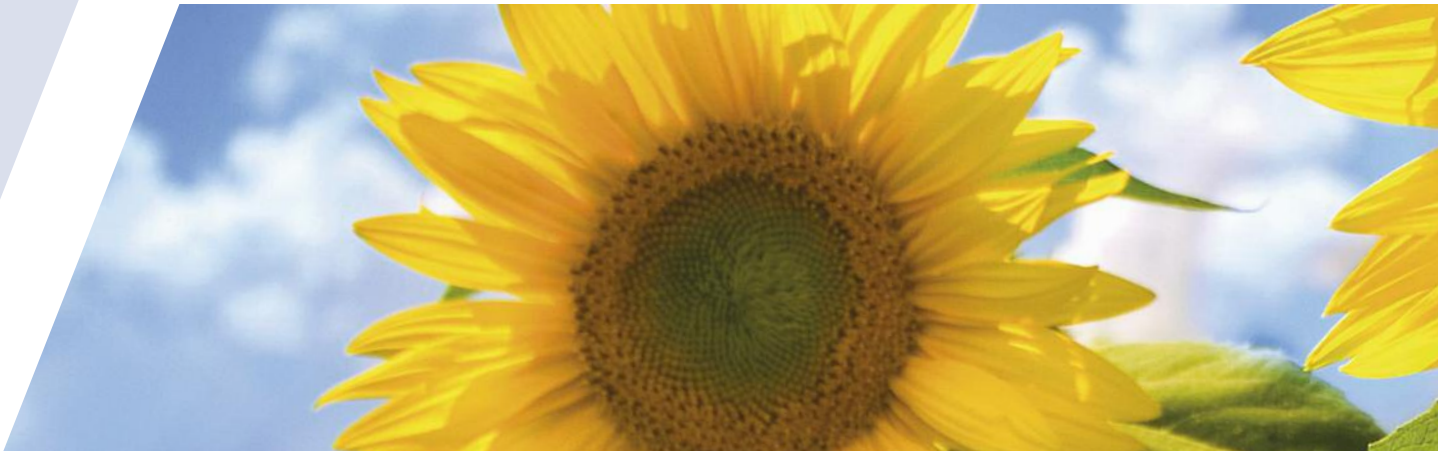
Your benefits

- Impurities are removed in order to improve the quality of biodiesel and its by-products
- Optimal fat removal from the solids
- Customized components are also available to upgrade existing processes

TECHNICAL INFO



Raw materials processing using cooking oil/animal fat

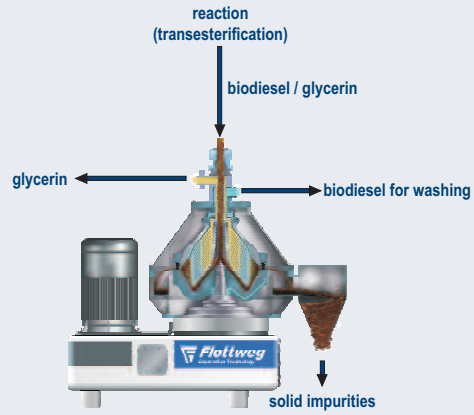


THE BIODIESEL REACTION PROCESS

BIODIESEL GLYCERIN SEPARATION

During the triglyceride transesterification, glycerin is split off. In order to achieve maximum transesterification efficiency, the glycerin generated should be removed as quickly and as completely as possible. Disc stack centrifuges have efficiently proved reliable for this task for decades. The separated glycerin water mixture can be processed as raw material in the pharmaceutical and cosmetic industries (see page 7).

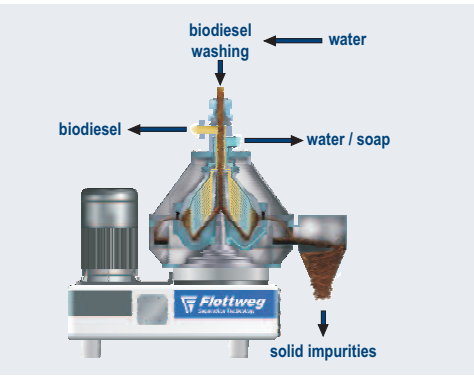
TECHNICAL INFO



BIODIESEL WASHING

Depending on the raw material and the catalyst used, biodiesel may still contain a considerable amount of impurities after transesterification. These can be washed out with water and subsequently removed using a disc stack centrifuge. This additional washing can increase product quality considerably.

TECHNICAL INFO



Your benefits

- Highly efficient separation using the Flottweg Disc Stack Centrifuge
- Minimum power consumption
- High purity and quality
- Explosion proof in accordance with ATEX directives 2014/34/EU
- All components have gas tight construction and are purged with nitrogen.

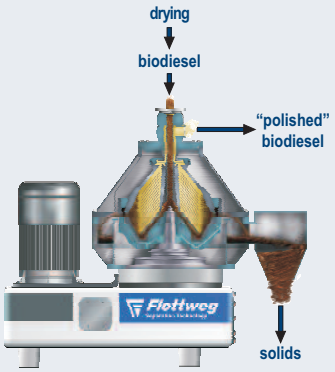
® = *registered trademark in various countries*

Sunflower, an important source of oil

THE BIODIESEL REACTION PROCESS

before and after fine clarification

TECHNICAL INFO



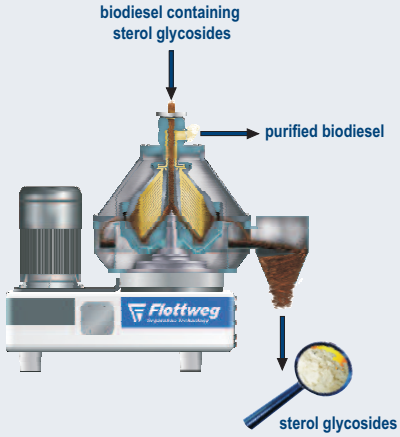
FINE CLARIFICATION OF BIODIESEL

After biodiesel washing, one of the last stages is to remove any remaining water by using, for example, vacuum dryers. Depending on the raw material and the process, the dried biodiesel might be further cleaned ("polished") using a disc stack centrifuge. This removes remaining impurities and increases product quality.

- "Polish" your final product
- Remove the last traces of solids
- Comply with strictest quality standards
- Also available as a skid mounted unit

before and after the separation of the precipitated sterol glycosides

TECHNICAL INFO



REMOVING STEROL GLYCOSIDES

Under certain conditions, especially if palm or soy oil is the raw material, sterol glycosides may be precipitated in the biodiesel. If these kinds of oils are processed, additional maintenance on the production system may be necessary. In the worst case, these sediments can lead to expensive breakdowns of the system. Disc stack centrifuges can provide a substantial improvement by efficiently removing such sediments.

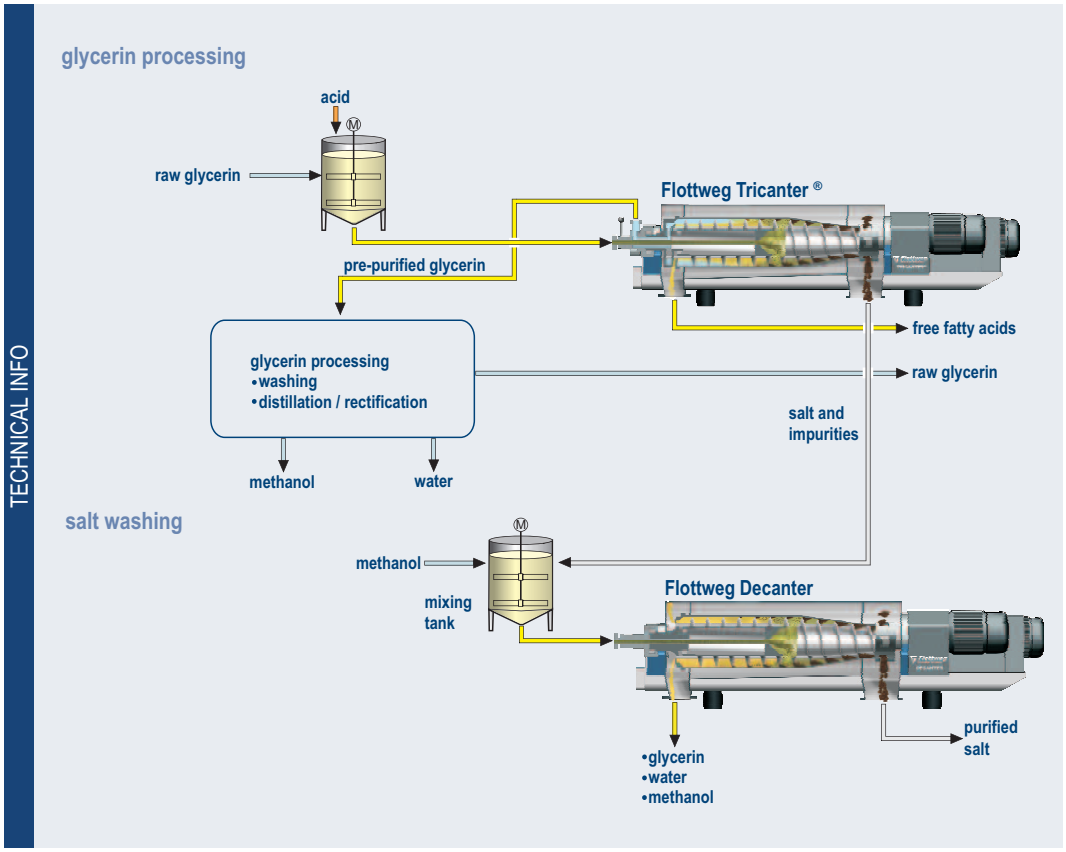
- Efficiently remove sterol glycosides using the Flottweg Disc Stack Centrifuge
- Highest product quality
- Certainty in meeting quality standards

TREATMENT OF BY-PRODUCTS
Glycerin Processing and Salt Washing

The reaction products and by-products from biodiesel production can also become resources if they are recovered and processed. Besides glycerin, it is also possible to recover the used salt in high purity. This valuable raw material may later be used as fertilizer. Methanol and water are separated thermally and can be re-introduced into the production process.

Features

- Efficient mechanical separation – high cake dryness in the recovered salt
- Protection of the drying systems – salt is efficiently removed
- Sturdy design, easy operation



Glycerin processing and salt washing

Feed

Solids from the Tricanter®

Solids from the Decanter

® = registered trademark in various countries

palm fruits

FLOTTWEG DECANTERS AND TRICANTERS®

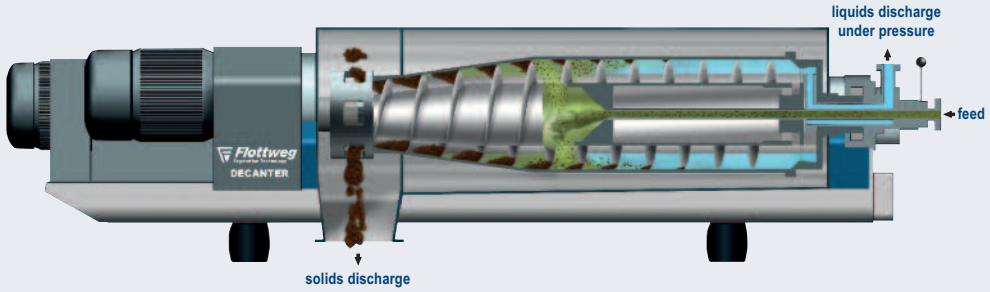
Technology That Creates Confidence

Features

- Flottweg's adjustable impeller – quick and fine adjustment to varying production conditions
- Flottweg's oil-air (oil mist) lubrification
  - Optimal quantity of fresh lubrication oil
  - Minimal bearing temperature and maximal lifetime
  - Minimal energy consumption
  - Simple and compact – nearly maintenance free
- Flottweg Simp Drive® – automatic adjustment for varying food conditions
- Minimal power consumption
- All parts in contact with product made in high quality stainless steel
- High-quality wear protection

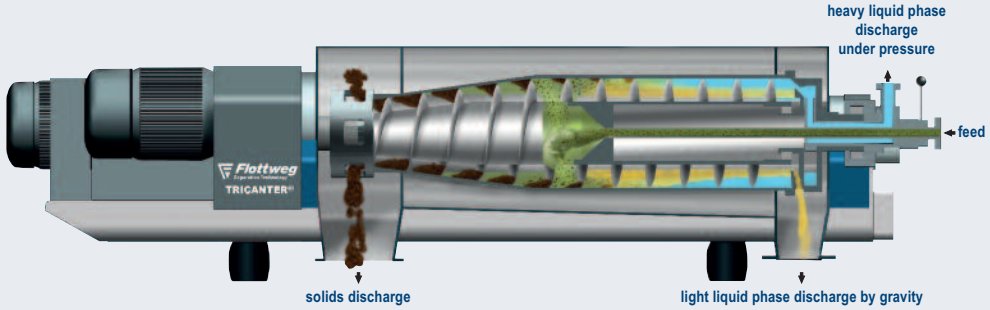
Benefit from our long experience in centrifuge manufacturing. Flottweg Centrifuges are well established among renowned biodiesel manufacturers and plant construction companies. Benefit from our reliable and innovative separation technology!

TECHNICAL INFO



Flottweg Decanter

TECHNICAL INFO



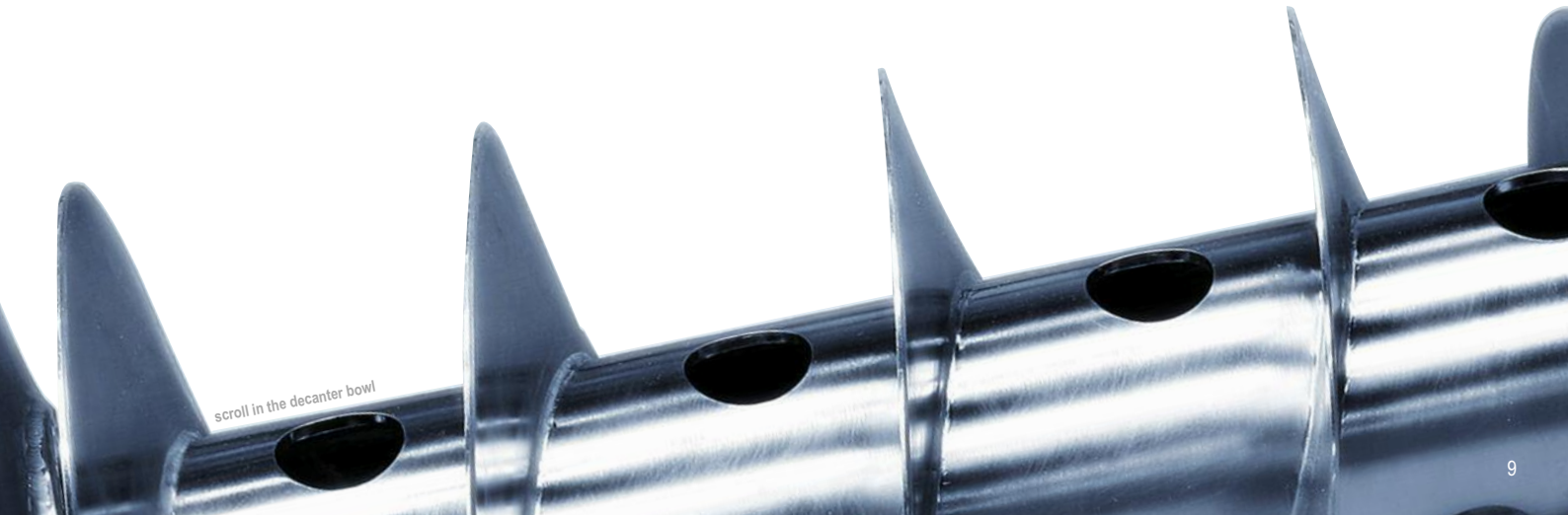
Flottweg Tricanter®

® = registered trademark in various countries

TECHNICAL DATA

TECHNICAL DATA OF FLOTTWEG DECANTERS AND TRICANTERS®					
Model	**Z3E**	**Z4E-3**	**Z4E-4**	**Z5E-4**	**Z6E-4**
Materials of construction	All parts in contact with product are made of high grade stainless steel such as 1.4463 (Duplex) and 1.4571 (AISI 316Ti).				
Dimensions* (L x W x H)	2950 x 840 x 800 mm	3224 x 1000 x 1200 mm	3736 x 1000x 1200 mm	4524 x 1564 x 1200	5147 x 1705 x 1500 mm
Total weight*	1760 kg	2600 kg	3000 kg	6200 kg	9230 kg
Motor for bowl drive	18.5 kW	22 kW	22 kW	55 kW	75 kW
Motor for scroll drive Flottweg Simp Drive®	7.5 kW	7.5 kW	7.5 kW	15 kW	18.5 kW
Capacity*	3.0 m³/h	5.0 m³/h	7.5 m³/h	15.0 m³/h	20.0 m³/h
Optional	Available also for installation in explosion hazard areas Class I, Division 2, Group D or ATEX directives 2014/34/EU Zone I with inert gas purging and Zone II				
The Flottweg Centrifuges mentioned here are available as decanters for two-phase separation and as Tricanters® for three-phase separation.					

** These figures are guidelines. Actual capacity depends on the characteristics of the product to be treated.*



scroll in the decanter bowl

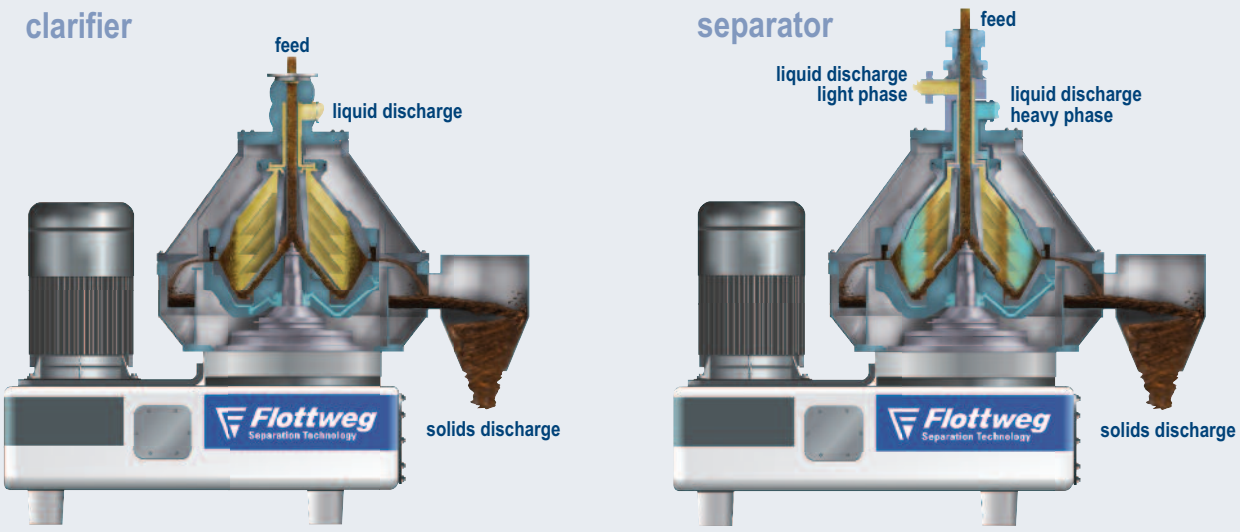
FLOTTWEG DISC STACK CENTRIFUGES

Efficient and Reliable

Features

- Self-cleaning bowl – no need for manual cleaning
- Flottweg SoftShot® – unique bowl discharge system
  - Precise partial discharges – minimum loss of liquids, high yield
  - No discharge bang – reduced bowl charge, reduced wear
- Modular, sturdy design – high availability, easy maintenance, reduced operating costs
- Minimum energy consumption
- Parts in contact with product made of stainless and acid-proof steel

TECHNICAL INFO



Flottweg Disc Stack Centrifuges as clarifiers for two-phase separation and as separators for three-phase separation

TECHNICAL DATA OF FLOTTEG DISC STACK CENTRIFUGES				
Model	**AC1000**	**AC1500**	**AC2000**	**AC2500**
Materials of construction	All parts in contact with product are made of high grade stainless and acid-proof steel such as 1.4418, 1.4501, 1.4571 (AISI 316TI) and 1.4404.			
Dimensions * (L x W x H)	900 x 500 x 1000 mm	1500 x 1000 x 1800 mm	1500 x 1000 x 1900 mm	2050 x 1260 x 1900 mm
Total weight*	415 kg	1750 kg	2410 kg	3450 kg
Motor for bowl drive	5.5 kW	18.5 kW	37 kW	55 kW
Capacity*	2000 l/h	8000 l/h	18000 l/h	32000 l/h
Optional	Available for installation in explosion hazard areas Class I, Division 2, Group D or ATEX directives 2014/34/EU Zone I with inert gas purging and Zone II			
The Flottweg Centrifuges mentioned here are available as decanters for two-phase separation and as Tricanters® for three-phase separation.				

** These figures are guidelines. Actual capacity depends on the characteristics of the product to be treated.*

PURGING WITH INERT GAS
Our Know-How for Optimal Safety

In process stages where methanol is present, explosion hazardous gas suspensions may develop. The explosion risk can be eliminated by replacing air with inert gas which is nitrogen in most cases. Centrifuges used in these applications have to be gas-tight in order to prevent vapor from exiting into the atmosphere or air from entering.

Flottweg Centrifuges comply with ATEX directives 2014/34/EU and IEC for Class I, Division 2 and Group D.

Flottweg Inert Gas Purge Unit

Advantages

- **Decanters, Tricanters® and disc stack centrifuges may also be used in explosion hazardous areas.**
- **Automatic centrifuge monitoring for safe operation**
- **Quality "Made in Germany" Flottweg premium products are and will continue to be designed and manufactured in Germany. All individual parts and components, as well as each complete centrifuge are subject to our strict test criteria.**
- **Flottweg is ISO 9001 certified and manufactures its products in compliance with all current technical standards.**

Flottweg Service Technicians are always available for you

FLOTTWEG AFTER-SALES SUPPORT

Even the best machinery needs to be maintained and serviced. Over many decades, Flottweg has established a worldwide service network consisting of representatives, branch offices and its own subsidiaries to provide our customers with localized service and spare parts. Our service engineers and technicians are qualified for any kind of installation, commissioning, repair and maintenance.

® = registered trademark in various countries

Flottweg Separation Technology – Engineered For Your Success

Flottweg
Separation Technology

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REPRESENTATIVE

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