



SEPARATION TECHNOLOGY FOR THE DAIRY INDUSTRY

Highest yield with best quality

 **Flottweg**

Engineered For Your Success



CONTENTS

Sustainability and additional earnings for milk processing	Page 02
More productivity thanks to Flottweg separation technology	Page 03
Flottweg products and processes for the dairy industry	Page 04
Recovering valuable ingredients from whey	Page 06
Producing alcohol from whey	Page 08
Recovering casein	Page 09
Extracting calcium phosphate	Page 10
Producing lactose	Page 12
Processing fermented dairy products	Page 14
Processing and recovering milk fat from process streams ...	Page 16
... Pasta filata steeping water	Page 17
... Recovering milk fat	Page 18
... Clarifying cheese wash water and brine	Page 19
Flottweg decanters and Sedicanter[®]	Page 20
Flottweg separators	Page 22
Flottweg quality and service	Page 24





QUALITY & EFFICIENCY FOR A DYNAMIC MARKET

The milk processing industry is facing significant challenges: Despite constant demand and rising prices, profitability and competitiveness are negatively affected by higher operating costs for feed and energy. In addition, geopolitical developments and climate change are causing unpredictable production conditions, while strict environmental regulations further complicate operations in many regions.

In this context, the pressure on the industry to implement more sustainable production methods is becoming increasingly apparent. These methods, in turn, require additional investment and adjustments.

In this dynamic environment, industrial centrifuges, in particular separators and decanters, provide a proven solution to the challenges specific to the dairy industry.

Systems from Flottweg, the world's leading manufacturer of industrial centrifuges, have played a crucial role in solid/liquid separation for many years. Advanced machines like the Flottweg Sedicanter® and decanters set the pace in industrial processes and offer numerous benefits in terms of efficiency and sustainability.



Flottweg ensures sustainable, economic processes in milk processing

- **Conservation of resources:** Recovering valuable ingredients from process streams, such as proteins and fats, not only supports the conservation of resources, but also provides an additional source of income. For example, there is a strong demand for whey proteins from cheese production as a basis for meal replacement drinks or food supplements.
- **Energy savings:** Efficient centrifugal separation processes can significantly reduce energy consumption, especially in combination with thermal processes.
- **Product quality:** Mechanical separation ensures the highest quality standards by effectively removing unwanted solids. This results in a more homogenous end product and greater customer satisfaction.
- **Cost efficiency:** By minimizing waste and recovering by-products, dairies can significantly reduce their operating costs and run their business more sustainably.

Flottweg is certified according to ISO 9001:2015 and builds its products according to the latest technical standards.

Flottweg separation technology is used in

- Dairies and cheese factories
- Processes to extract lactose, casein, or calcium phosphate
- Functional food production

The use of Flottweg separators and decanters in milk processing enables an improvement in productivity and allows you to take an essential step towards a more sustainable and economical future. Invest in the future of your processes and let us explain the benefits of the latest separation technology, “Engineered For Your Success”!

SUCCESS IS LEVERAGING NEW POTENTIAL

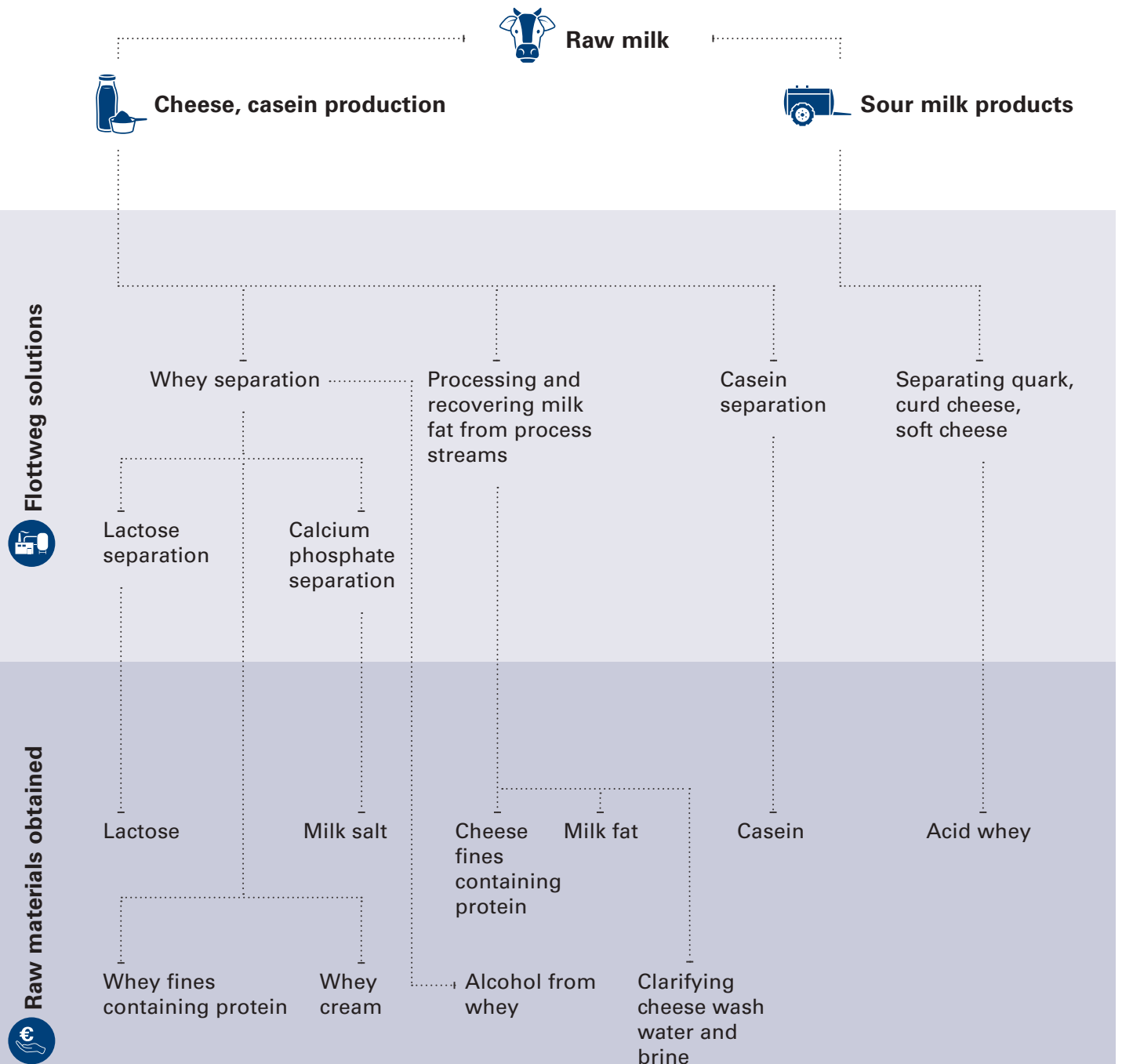
Flottweg separators and decanters have proven their worth in a variety of applications, especially in the production of raw materials or processing by-products, such as whey, which is one of the greatest sources of high-quality protein. Processing by-products also offers opportunities for the financially lucrative recovery of proteins, fats, or product water.

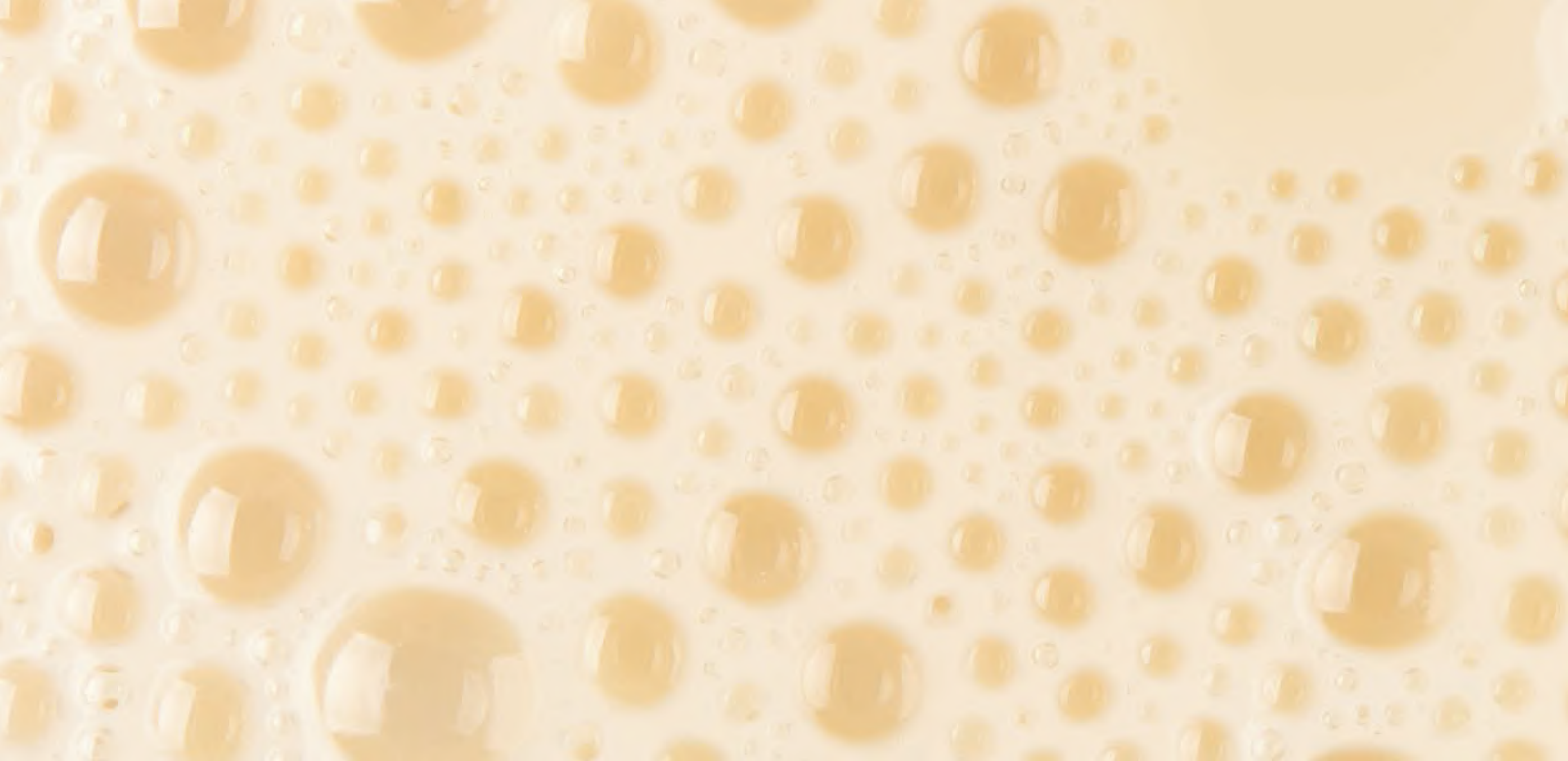
Flottweg separators and decanters are specially developed for the industrial processing of dairy products. These industrial centrifuges are easy to operate and are characterized by their high separation efficiency, robustness, and ease of maintenance. This reduces the amortization time and total cost of ownership.





Processing by-products with Flottweg separators and decanters





RECOVERING VALUABLE INGREDIENTS FROM WHEY

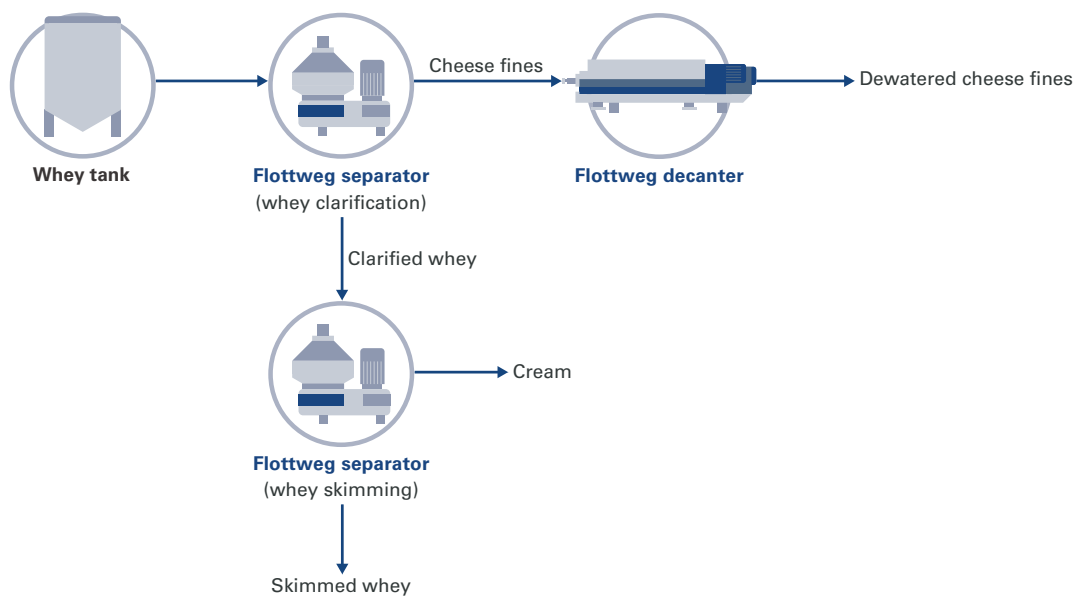
During cheese production, the largest amount of processed milk by far remains behind as whey. But this whey is more than just a by-product as it contains valuable ingredients, including:

- lactose
- whey protein
- minerals

The modern dairy industry processes the whey into valuable products – these range from whey drinks and baby food to additives for pharmaceuticals. Any remaining residue, such as broken cheese particles (cheese fines) and residual milk fat, can be separated and recovered from the pure whey before further processing. Both ingredients are important raw materials for dairy products.

The use of industrial centrifuges can maximize the yield and recovery of these valuable ingredients.

Hygiene standards play a crucial role in whey processing to ensure the highest product quality. Flottweg separators and decanters are specifically designed for use in the food industry and meet the highest quality standards. They are fully CIP (clean-in-place) capable, allowing for efficient cleaning. The seals and lubricants used are made of FDA-compliant material that fulfills food regulations and prevents any contamination.



Whole whey treatment process from the clarification to skimming the whey

Benefits

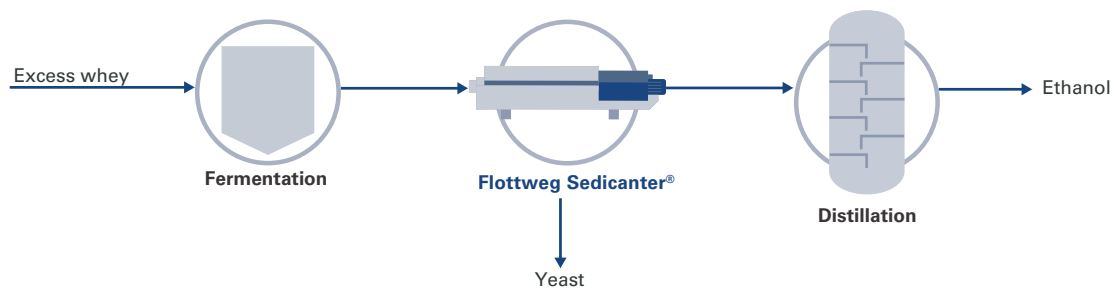
- The low residual fat content in the separated whey increases the product quality of the whey powder and protein concentrate
- The “complete” clarification of the whey optimizes the further processing of the separated whey (e.g. increasing the service life of UF plants or evaporator plants)
- Highest hygiene standards for separators and decanters for high product quality (e.g. FDA-compliant seals and lubricants)

ALCOHOL EXTRACTION FROM WHEY

Another way to create an additional valuable product is to make alcohol from excess cheese whey.

The permeate produced by the ultrafiltration of whey still has a significant lactose content. Instead of throwing this excess whey away, the lactose can be converted to alcohol and carbon dioxide through fermentation using yeasts. The fermentation product is often referred to as "beer". Subsequent distillation processes gradually increase the alcohol content.

The "whey beer" contains a high proportion of fine yeast cells. It is therefore advisable to separate the yeasts from the mash using a Sedicanter® before distillation. This prevents fouling processes in the distillation column, increases the column's operating life, and reduces the consumption of energy and CIP media.



Example of an ethanol production process

Benefits of alcohol production from excess whey

- Extraction of a high-priced product (ethanol)
- Reduction of disposal costs
- Financially interesting for smaller dairies, too

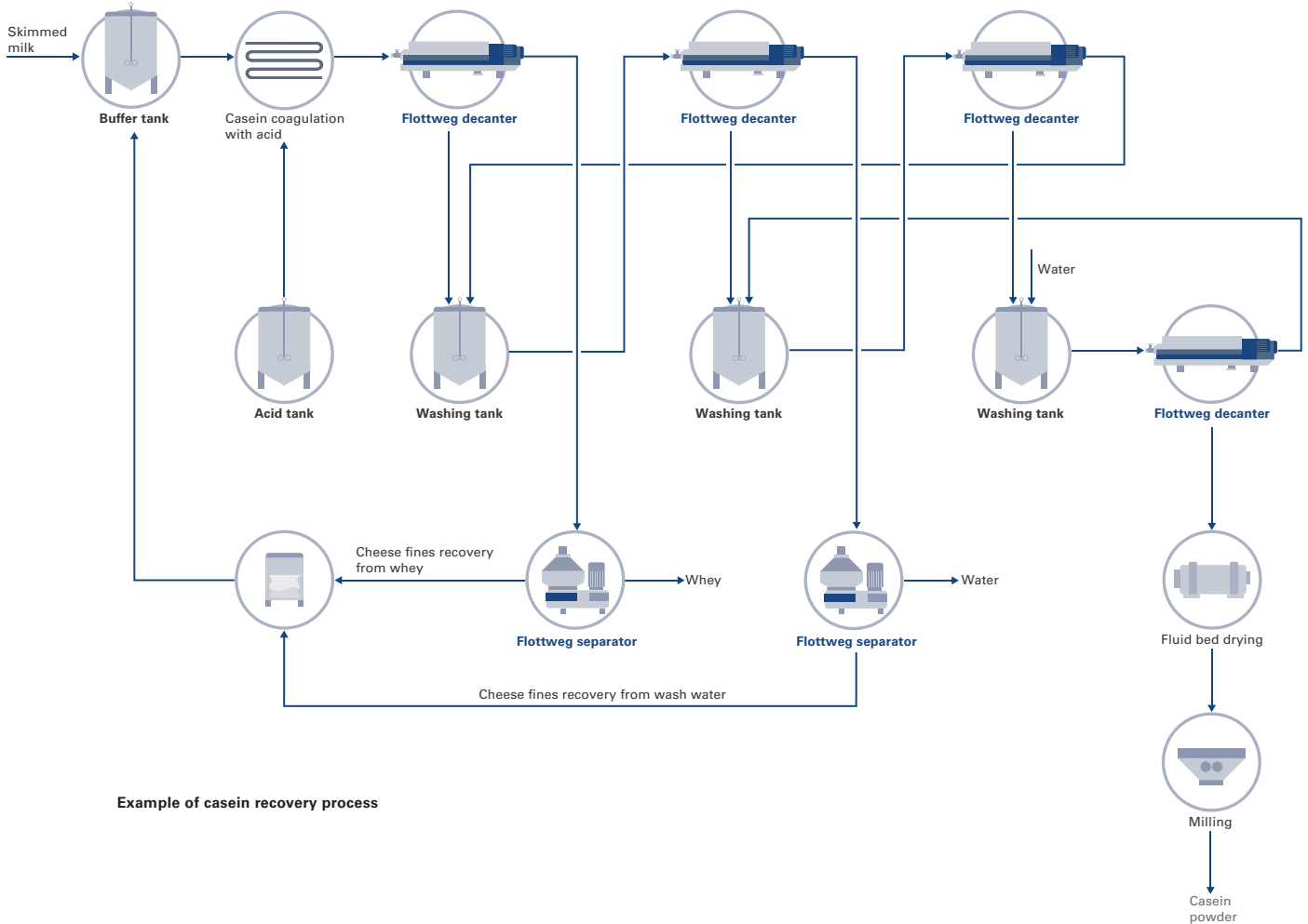
Benefits of the Flottweg Sedicanter®

- Extends the distillation column's operating life, fouling is reduced
- This saves energy and CIP media
- Proven separation process from the brewing and bioethanol industry

CASEIN RECOVERY

To recover casein, the skimmed milk is acidified to its isoelectric point. This can be done using both biological and mineral acids. Alternatively, casein is obtained by enzymatic precipitation (enzymes such as chymosin and rennet).

Acidification neutralizes the negatively charged casein micelles, resulting in precipitation of the casein. In a similar way to the rennet precipitation process, the casein is separated from the whey, followed by several washing stages in a decanter. Cheese fines are once again removed from both the whey and wash water via the integrated separators to ensure a maximum casein yield.



Example of casein recovery process

Benefits

- Efficient separation and dewatering, up to 50% w/w dry matter
- Impeller technology for product adaptation and efficient CIP
- Completely hygienic design
- Optional stainless steel rotor bed available
- Many years of experience in various casein and caseinate processes (acid and rennet precipitation, the Pillet process, ion exchange, etc.)



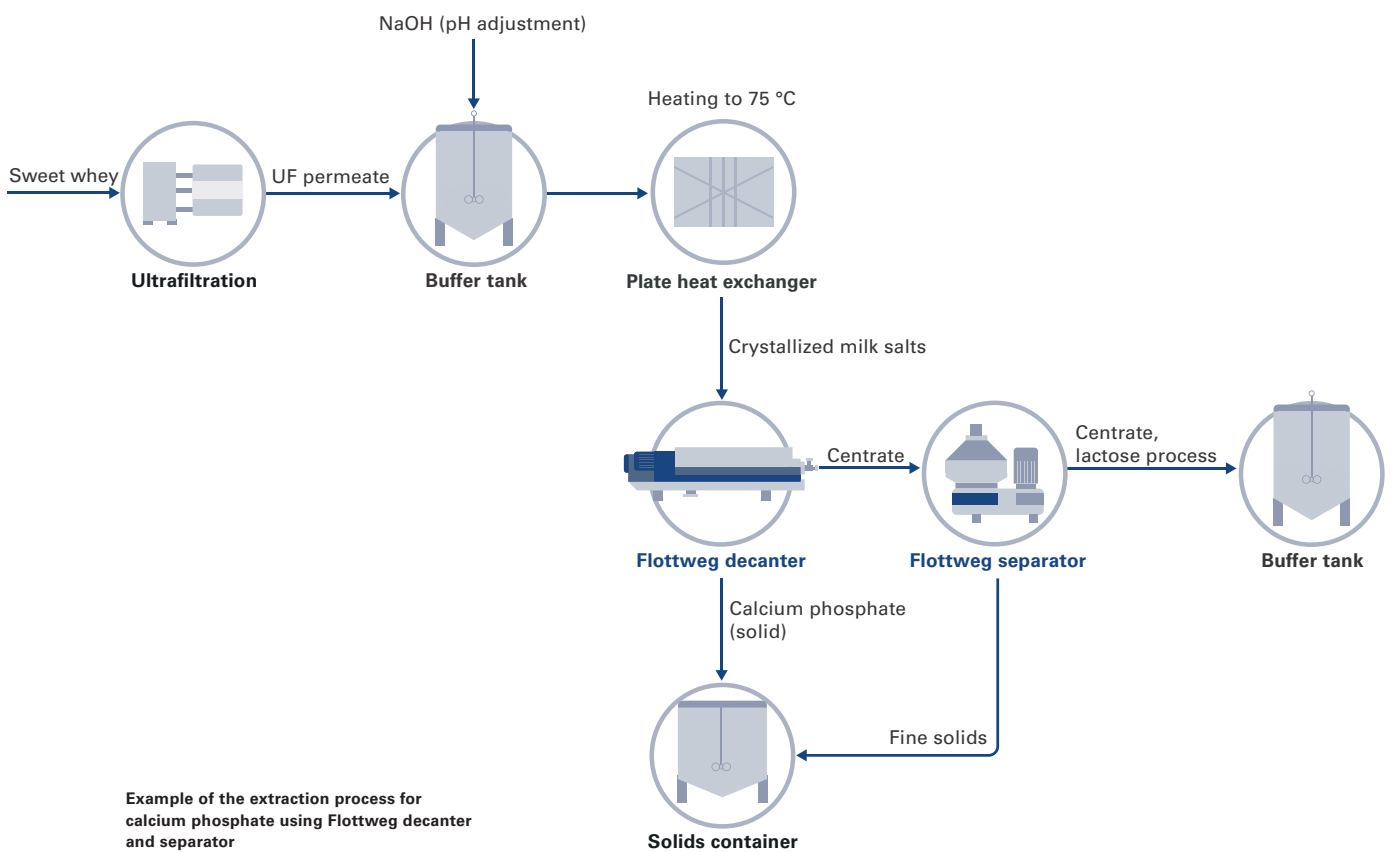
EXTRACTION OF CALCIUM PHOSPHATE

Calcium phosphate, also called milk salt, is a major part of the minerals contained in milk. The extraction of calcium phosphate (DCP process) from whey has become increasingly important in recent years. This is for two reasons:

- 01** Demineralization not only increases lactose purity but also prevents the formation of deposits downstream. This extends the service life and reduces the CIP cycles.
- 02** In addition, calcium phosphate is a valuable food supplement that has a wide range of applications in the beverage industry.

Calcium phosphate can be obtained from acid or sweet whey. To do this, the pH value and temperature are adjusted appropriately so that the lactic salts are no longer dissolved. However, excessive heating may damage the lactose.

Once the salts have crystallized, they can be separated from the solution using industrial centrifuges. Depending on the required level of purity of the calcium phosphate, several washing stages may be needed.



Benefits

- Efficient separation results
- High dry matter in solid
- Hygienic design for a safe end product
- Optional: Wear protection in hygienic design



PRODUCTION OF LACTOSE

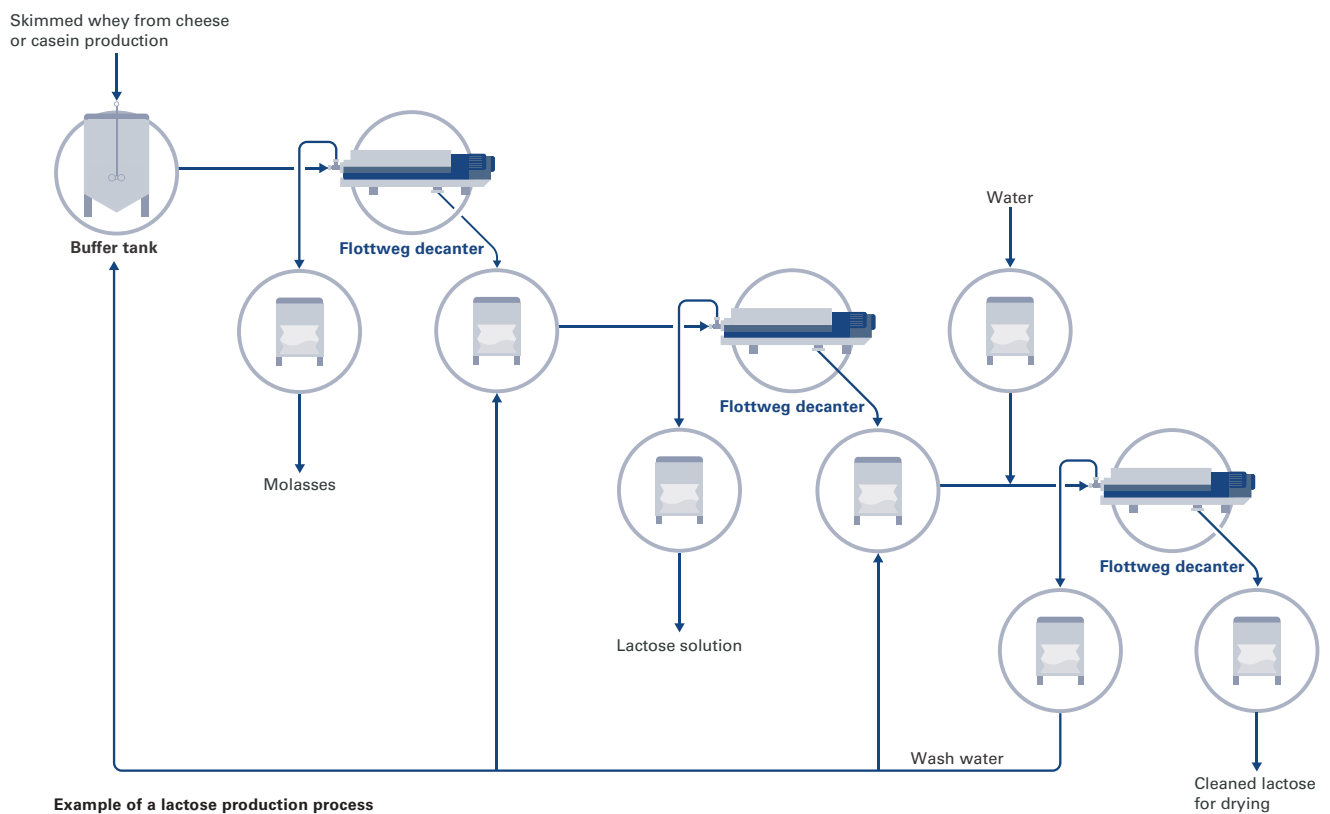
Lactose, also known as milk sugar, is a sugar that occurs naturally in milk and is a major constituent of whey. Lactose is often used as a sugar supplement in various foods because it is less sweet than normal sugar. It also plays an important role in pharmaceuticals as a binder or filler in tablets.

A by-product of the cheese and casein industry, lactose is a valuable product that can be profitably purified and dewatered using Flottweg industrial centrifuges. A hygienic decanter from Flottweg designed specifically for industrial lactose production can separate purified lactose as a 90% dry solid and feed it directly to the dryer.

Lactose is extracted from whey by crystallization, a process affected by several factors including pH, temperature, and composition. As in the production of casein, producing milk sugar involves several washing stages:

- 01** Loosening the crystallized lactose from the parent solution.
- 02** Removing impurities (e.g. protein, lactic acid, and minerals) by adding cold water.
- 03** Final wash with the requirement to obtain the purest possible end product.

The adapted design of the Flottweg decanter centrifuges meets both the requirements for hygiene and the highest possible dry solids content.



Benefits

- High differential speed of the scroll (variable 20-70 rpm) ensures a consistently high dry substance content (up to 90%) in the end product even under fluctuating process conditions
- Direct feed into the dryer possible
- Hygienically polished surfaces on the rotor, housing and components that come into contact with products
- FDA certified sealing material
- Wear protection with Stellite® coating on the scroll
- CIP nozzles at all critical points
- Washing the lactose using the counterflow principle saves water costs
- Multi-stage lactose washing process and long retention time in the decanter ensure the best possible separation of the milk sugar with a high degree of separation



PROCESSING FERMENTED DAIRY PRODUCTS

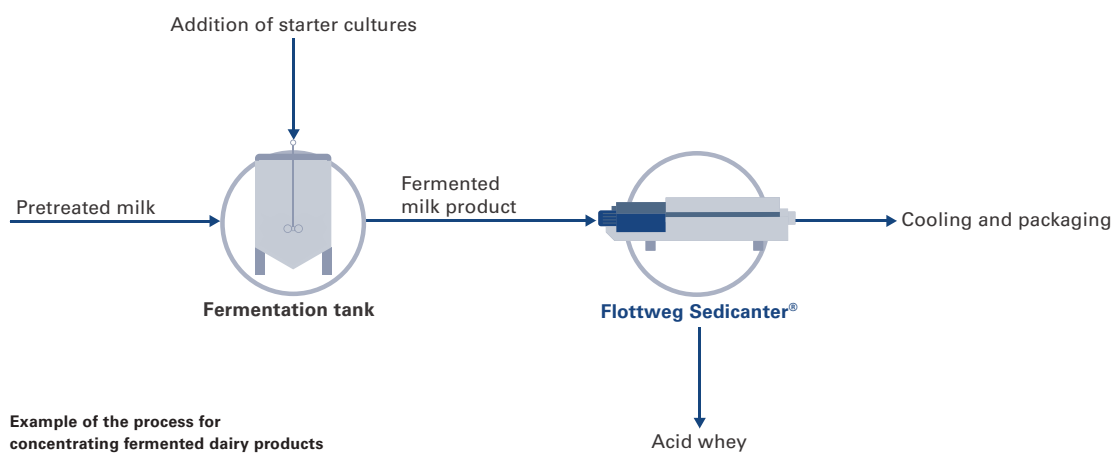
Quark, curd cheese, skyr, or Greek-style yogurt: The demand for fermented dairy products on the world market is increasing. The continuous development of new fermented dairy products also requires further re-thinking in production.

Quark (curd cheese) and other fermented milk products are precipitated from milk through the bacterial formation of lactic acid.

The coagulated milk components (precipitated milk protein) are separated from the acid whey. The quark is discharged as a soft to crumbly mass.

The acid whey can be further processed separately. It is becoming increasingly important as a raw material for biofermentation in the production of "green chemicals."

Fermented milk products, which are characterized by their fine-grained, creamy, and soft consistency, can be perfectly separated using the patented Flottweg Sedicanter[®]. The design of the Sedicanter[®] combines the features of both a decanter and separator: High solids contents in the feed are clarified and separated under centrifugal forces of 5,000 to 10,000 g at a constant flow rate.



Benefits

Optimum performance

- High solids loads in the feed
- Good compensation for fluctuating solids in the feed
- High separation rates and high clarifying effect

Hygiene

- Hygienic design
- CIP cleaning possible
- Use of high-grade stainless steel

Flexibility

- The adjustable impeller provides flexibility during operation when the composition of the feed product fluctuates
- Torque-dependent and infinitely variable control of the bowl and differential speed



PROCESSING AND RECOVERING MILK FAT FROM PROCESS STREAMS

A variety of fat-containing by-products are produced by milk and cheese dairies. In order to make production more efficient and sustainable, this milk fat can be processed and used or recycled.

Flottweg separators are used to separate the valuable milk fat from the water and to further process the recovered product. The baking industry, in particular, uses milk fat in the form of butter, clarified butter, and butter oil. Throughout the entire process, Flottweg technology ensures both hygienic and extremely efficient processing.

Flottweg separation technology can also optimize the process for the production of anhydrous milk fat.

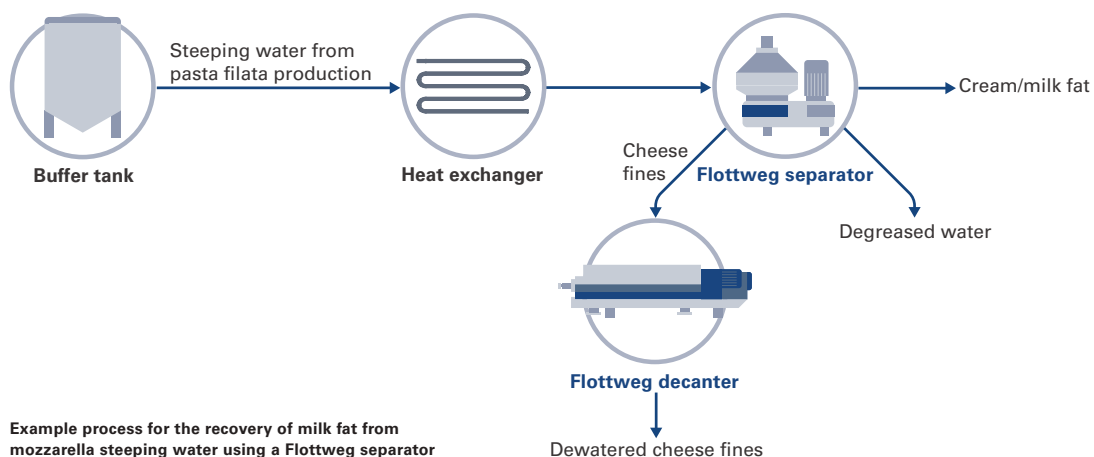
RECOVERING MILK FAT FROM PASTA FILATA STEEPING WATER

Mozzarella is probably the most well-known representative of pasta filata cheeses. The production process of this family of cheeses is characterized by the kneading and stretching of the cheese mass in hot water that is typical for the pasta filata production process. Due to the high temperature, milk fat is dissolved from the cheese mass and remains in the steeping water.

By using a Flottweg separator, this valuable milk fat can be recovered and recycled, while the water phase can be used again.

The resulting milk fat can then be further processed into various products, such as cream, with a fat content of 40% for the production of butter.

The extraction of milk fat from the mozzarella steeping water not only helps with the recovery of valuable products, but also to reduce wastewater.



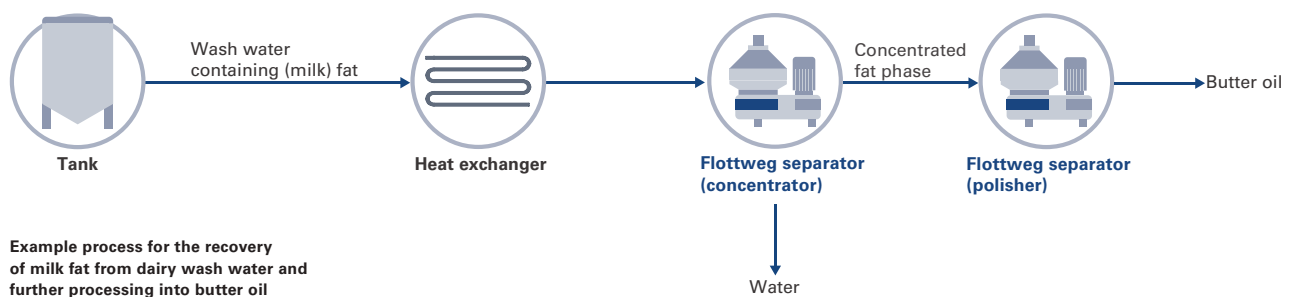
Benefits

- Efficient separation results and high yield
- High total dry solids in the discharged solid
- Fast and easy cream setting phase
- Consistently hygienic design
- High material quality to protect against corrosion

RECOVERING MILK FAT

Wash water containing a significant amount of milk fat is produced when rinsing dairy systems - for example, in butter production machines. Flottweg separators can extract this milk fat from the wash water. This recovery not only enables the valuable milk fat to be re-used, but also significantly reduces the wastewater treatment workload.

The recovered milk fat can be processed ("polished") in a second separator stage to form butter oil. The resulting product is the basis for clarified butter.



Benefits

- **Efficient separation results**
- **Maximum purity butter oil**
- **Minimal losses in the water phase**
- **Completely hygienic design**
- **High material quality of the components in contact with the product**



CLARIFYING CHEESE WASH WATER AND BRINE

Many cheese dairies wash their product in a final step before packaging to obtain a flawless and attractive product. This is particularly the case for red smear-ripened cheese. Solid particles and other constituents dissolve during the washing process. These wash and process waters are difficult and cost-intensive to dispose of due to the high organic suspended matter content.

Clarifying the washing solution using a Flottweg separator removes the solids almost completely so that the clarified water can be returned to the process. This significantly reduces the process water consumption and therefore the strain on the wastewater treatment plant or the disposal costs.

Many cheeses use brine in the maturation and rind formation process. The use of clarification separators also helps this process. During the production process, impurities such as cheese fine particles accumulate in the salt bath. Normally, the brine is treated by filtration and reused. Preclarifying the liquid using a Flottweg separator increases the filtration system's life and also supports the treatment process.

Benefits of clarifying the cheese wash water and process water

- Process water and CIP media savings
- Reduction in cleaning and wastewater costs by reducing the strain on relieving the filter
- Supports high cheese quality through constant conditions in the process water or brine

Benefits of the Flottweg clarification separator

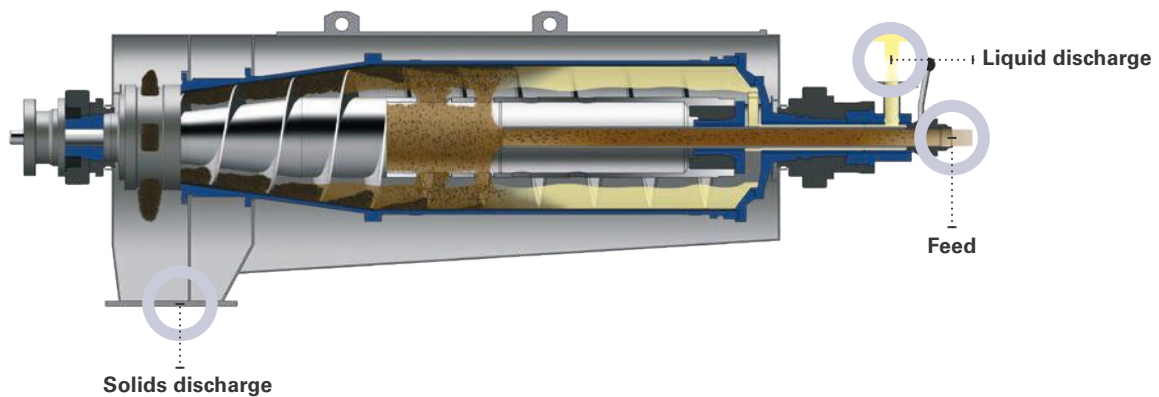
- Special materials for use with high salt content
- High surface quality of the components in contact with the product for safe production and efficient CIP cleaning
- Simple retrofitting of filtration systems through pre-assembled skid solutions ("plug & play") on request

SPECIAL FEATURES OF THE FLOTTWEG DECANTER AND SEDICANTER®

Flottweg decanter

Flottweg decanter centrifuges, which are used in dairies in the production of lactose and casein, are hygienically optimized in accordance with EHEDG guidelines and fully CIP-capable.

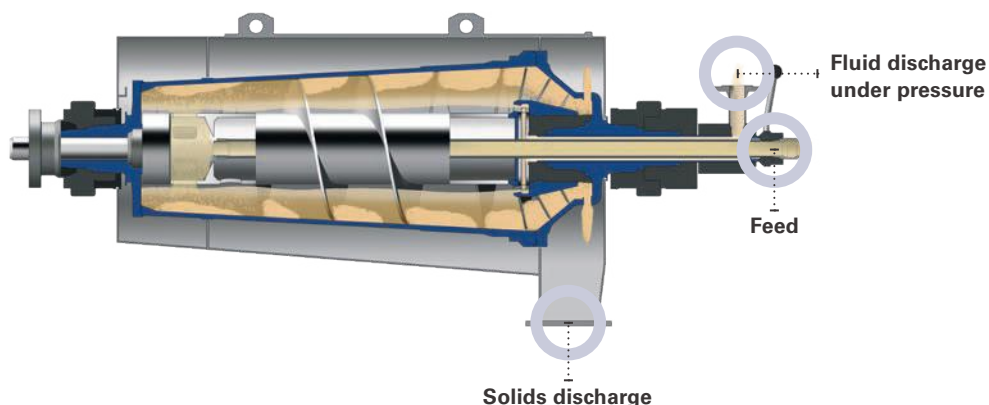
- Special CIP nozzles ensure effective cleaning of the critical areas.
- All parts in contact with the product are made of high-grade stainless steel with appropriate surface treatment.
- Seals are available in FDA approved material.
- The lubricants used comply with the NSF H1 standard for the food industry.
- The gearboxes are installed outside the product area.



Flottweg Sedicanter®

Soft, easy-flowing solids, such as proteins, are difficult to process with a standard decanter. The solids content is often too high for processing in a separator. Only the patented Flottweg Sedicanter® achieves an optimal separation result.

The Sedicanter® combines the advantages of disk stack centrifuges and decanter centrifuges. It clarifies the suspension in a similar way to a separator, i.e. it provides an optimally clarified centrate. At the same time, like the decanter, it takes large quantities of solids at the feed inlet and produces dry solids (sediment) in the discharge. Even with fluctuating feed volumes, it achieves the best possible separation resolution thanks to its adjustable impeller.





Flottweg Simp Drive®

The Flottweg Simp Drive® regulates the differential speed according to the scroll torque. The Flottweg decanter/Sedicanter® automatically adapts to different load conditions and drains/dewateres the product to the maximum total dry solids.

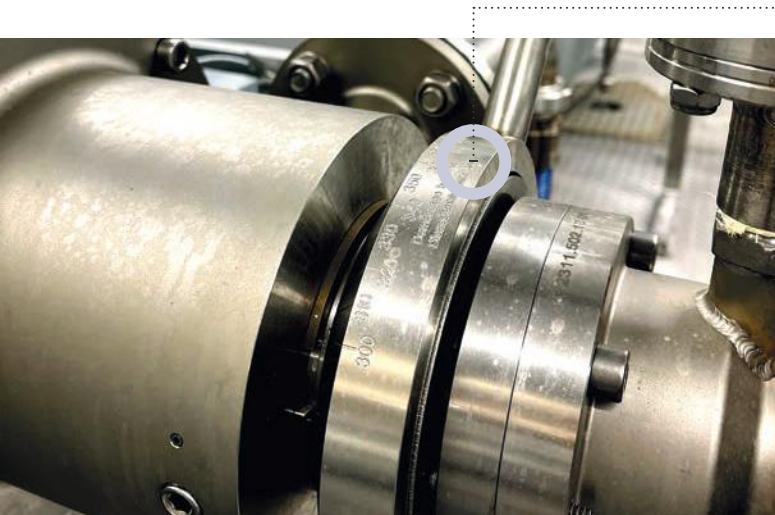
- Maximum energy efficiency
- In-house development based on 25 years of experience, resulting in high availability
- Constant torque, even at high differential speeds, guarantees high total dry solids in the separated solid
- 100% integrable into existing CIP processes



Material and hygienic design

Our machines are designed for the high requirements of the food industry and meet the high hygiene standards.

- FDA certified sealing material
- All components in contact with the product made of high-grade stainless steels
- CIP cleaning nozzles in all critical areas
- All components in contact with the product: Ra max. 0.8-1.6 µm
- Hygienically polished welded seams in the production space
- Hygienic wear protection (Stellite®)
- All lubricants are suitable for use in the food sector: NSF H1



Adjustable impeller

The adjustable impeller can vary the pond depth continuously during operation, allowing for quick and precise adaptation to changing feed concentrations. In addition, the impeller supports the CIP cleaning effect inside the machine.

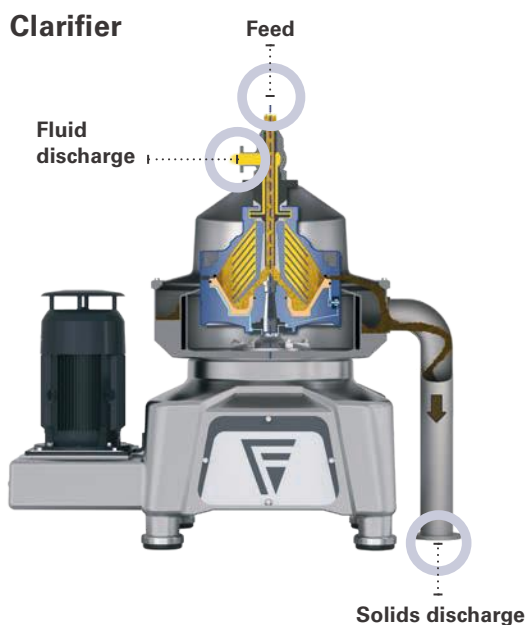
- Maximum yield even with product fluctuations
- Optimum cleaning effect
- Automated CIP cleaning
- Fluid discharge under pressure

Flottweg Decanter and Sedicanter® – applications in the dairy industry

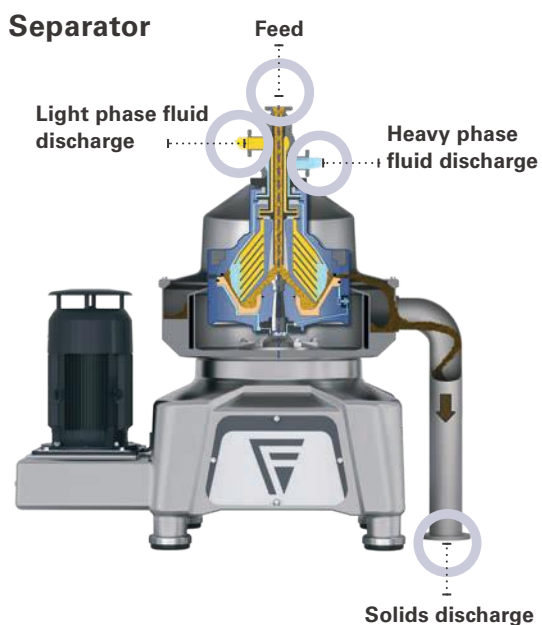
- Separating fermented milk products
- Rennet precipitation and acid precipitation for casein production
- Lactose production

SPECIAL FEATURES OF THE FLOTTWEG SEPARATORS

Flottweg separators are characterized by their compact, robust design, smooth running, and ease of maintenance. The number of wear parts and seals is reduced to a minimum, reducing downtime and operating costs. The disk pack and the distributor ensure optimum flow behavior in the bowl. They thus enable highly efficient solids separation and maximum separation resolution in the separation of liquid phases. The new Soft Shot® FLEX discharge system ensures a high dry substance content in the discharged solid.



Flottweg clarification separator for the separation of solids



Flottweg separator for separating two insoluble liquids while simultaneously separating solids

Applications in the dairy industry

- Dedusting and removing cheese fines and skimming whey
- Separating curdled milk constituents from acid whey
- Extracting milk fat from wash water





The Flottweg Soft Shot® FLEX system

Even faster, even more variable, but still quiet as always – Flottweg’s proven Soft Shot® discharge system has taken a new evolutionary step, the Soft Shot® FLEX discharge system.

- Maximum yield and high throughflow
- Silent solids discharge
- Minimized wear of highly stressed components
- Flexible and exact discharge times
- Maximum product yield due to flexible combination of partial and full discharges



Material and hygienic design

- High surface quality of components in contact with the product for efficient CIP cleaning
- Automatic rinsing programs for effective CIP cleaning
- Seals with FDA certificate or FDA conformity on request
- Optional: Super duplex stainless steels for higher resistance to chlorides



Drive concept

- Force transmission through a heavy-duty belt drive controlled by a variable frequency drive
- Simple, robust design for low-vibration and quiet operation
- Easy maintenance, low wear
- Flexible adaptation to product requirements through simple, variable speed control
- Reduced starting current, working speed reached rapidly
- Fast, smooth reacceleration after solids discharge

FLOTTWEG QUALITY AND SERVICE



Guaranteed Flottweg quality

Typical "Made in Germany": We have a clear understanding of what quality is and do not compromise on it. In the food industry, our products must comply with high standards of hygiene. Therefore, the Flottweg centrifuge components that come into direct contact with the medium to be processed (e.g. bowl, scroll, and feed) are made exclusively of high-grade, rust and acid resistant stainless steels. This also makes it possible to increase the strength and improve the resistance.

Our machines are equipped to meet your requirements permanently – in extreme cases 24 hours a day, 7 days a week. Our strict quality controls (ISO 9001:2015) and the traceability of all critical components ensure additional product safety.



Our service – always there for you!

Over 1,100 employees worldwide in a network of over 60 sales and service locations are on hand to assist you. We not only strive for first-class advice on the selection and design of our systems, but we are also there for you afterwards, whenever you need us – in more than 100 countries around the world.



Success can be planned. In just three steps.

Are you planning your own success story for your products?

Then get in touch with Flottweg and benefit from our 3-step roadmap:

01

We discuss your separation task and business goals with you.

02

In the pre-engineering stage, we analyze your raw materials in our laboratory and carry out customized tests at the Flottweg Technical Center or on site at your business premises. The first product samples can also be provided at this point.

03

After the design and detailed development process, you will receive a concrete offer including all relevant line figures for your individual Flottweg application.

Make Flottweg the engineer of your success:
Our sales partners are looking forward to hearing about your ideas and challenges!





Flottweg worldwide

To be able to serve our customers worldwide, we maintain an international sales and service network: We are represented in over 100 countries. All branches and representatives have specially trained service technicians, some of whom we train in our in-house Flottweg Academy.

11
international
subsidiaries

Projects in over
100
countries

Over
50
service centers

- – Headquarters
- – Subsidiary
- – Representative





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