



FLOTTWEG SEPARATORS

Separate and clarify liquids and solids
– efficiently and adapted to your processes



 **Flottweg**

Engineered For Your Success



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OVERVIEW

Flottweg separators – two series, one principle: optimal separation and clarification for your processes

Separators play a central role in the mechanical separation and clarification of liquid-solid mixtures in many industrial processes. Depending on the application and the nature of the product, different separator types are used. Flottweg offers two basic designs for this purpose, which have been specially developed to meet the process requirements of the respective industries.



AC series: self-cleaning disk stack separators for precise fine clarification or separation

Flottweg separators of the AC series have a bowl with a hydraulic ejection mechanism for the separated solids. This process is achieved automatically at regular intervals.

Areas of application (among others):

- Clarification of liquids
- Three-phase separation (liquid-liquid-solid)
- Extraction processes

Solids content:

Up to about 10% by volume in the feed.

Application focus:

Efficient separation/clarification with high product quality.



FDS series – nozzle separators: separators for clarification with high solids content

Flottweg nozzle separators of the FDS series continuously transport the solids out of the bowl via special nozzles.

Areas of application (among others):

- Clarification of liquids
- Classification of liquids
- Dewatering of pasty products

Solids content:

Up to 25 % of the total volume.

Application focus:

Continuous solids discharge at high throughflow rates.

How to find the right separator type

These factors play a role when selecting the appropriate assembly:

- Particle size and shape
- Density and consistency of solids
- Viscosity of the liquid

The specifications above serve as a rough guide. The optimum design of a centrifuge depends on numerous other process parameters – Flottweg draws on years of experience in a wide variety of industries and processes to come up with the best solution for the customer.

USES AND BENEFITS

Flottweg separators – for precise clarification and separation of a wide variety of materials

Separators are high-speed centrifuges for the mechanical separation and clarification of mixtures consisting of solids and liquids.

Due to their special design, separators operate at a very high rotational speed and therefore achieve a high centrifugal acceleration (g force). In addition, the integrated disks ensure a high clarification surface. As a result, even very fine solid particles can be separated out, and liquid mixtures can be separated efficiently.

Depending on the application, we offer two separator series:

The Flottweg AC series (Automatic Combination)

This series is characterized by the Soft Shot® FLEX ejection mechanism, which offers the following advantages and more:

- Almost silent and gentle solids discharge
- Hydraulic system with numerous adjustment options to optimally adapt the separator to your process
- Maximized product yield

The Flottweg FDS series (Flottweg nozzle separator)

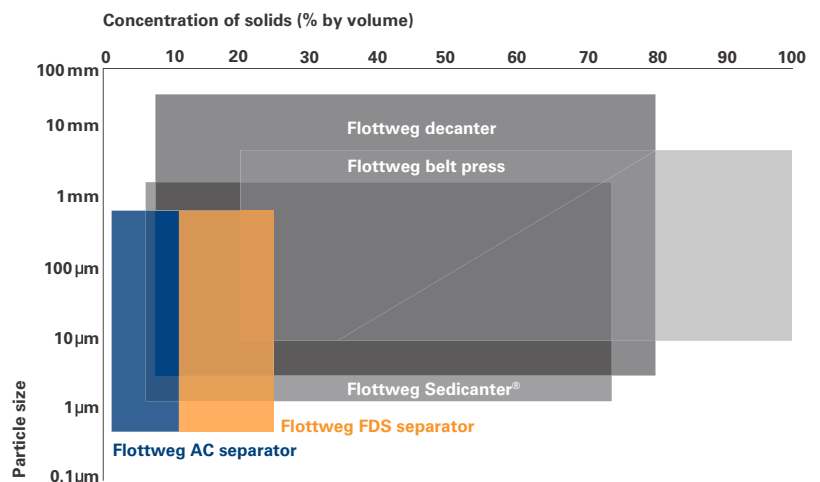
This series was developed together with our customers and was designed for their needs from the outset. A selection of its features:

- Optimized separation and high solids yield
- Large clarification surface and efficient design to clarify or separate suspensions with high solids content
- Maximum energy recovery

Complete machine portfolio for a wide range of industries and applications

All of our Flottweg separators are developed and built in Germany at the production site in Vilsbiburg. Customers all over the world are impressed by our separators' high quality, outstanding workmanship and ease of maintenance.

With our complete machine portfolio of separators, decanter centrifuges and belt presses, we offer the optimum separating unit for every customer process.



Applications for Flottweg separators



Beverage industry ●

- Beer clarification
- Processing citrus juice
- Processing fruit juice
- Processing tropical juice
- Processing vegetable juice
- Production of instant tea
- Wine clarification
- Cider clarification
- Processing instant coffee and byproducts (e.g. coffee oil)
- Cleaning of reservoir wastewater



Chemicals & industrials ●●

- Plastic production (materials)
- Chemical production ●●
- Processing of drilling slurry
- Waste oil recycling
- Slop oil processing
- Processing of tailings ●
- Processing of lubricating oil



Food & dairy products ●●

- Pectin production - hydrolysis
- Milk processing (e.g. milk, whey)
- Sugar production
- Protein extraction
- Starch extraction ●

- = AC separator
- = FDS separator



Life sciences & pharmaceuticals ●●

- Processing of algae
- Processing of fermentation broths ●●
- Biotechnology ●●
- Vegetable extraction
- Production of raw materials (e.g. vitamins, food supplements)



Fish processing ●

- Processing of fish byproducts
- Fish hydrolysis (proteins)
- Krill processing
- Surimi processing
- Production of gelatine
- Processing of fish meal



Meat processing & animal byproducts ●

- Meat hydrolysis (proteins)
- Processing of poultry byproducts
- Rendering
- Processing of slaughter byproducts



Vegetable oils & biofuels ●

- Palm oil processing
- Seed oil processing
- Olive oil production
- Biodiesel production

Why Flottweg

Flottweg separators are characterized by a compact and robust design. The bowl can be quickly and easily disassembled and reassembled for maintenance purposes. By avoiding wear parts and seals wherever possible, we ...

- reduce operating costs
- simplify maintenance
- increase machine availability

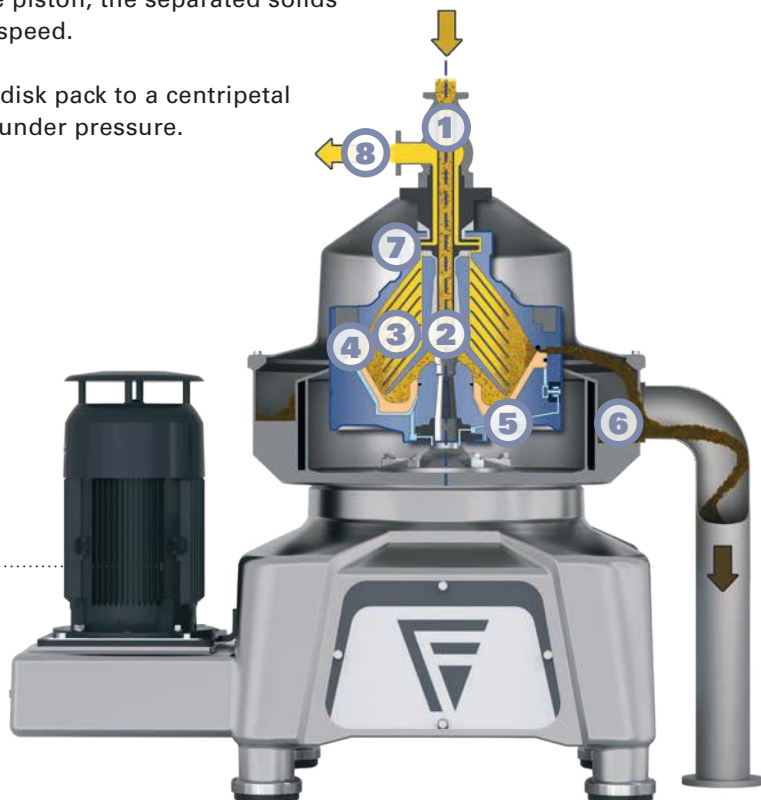
AC SERIES – PRINCIPLE OF OPERA- TION AND DESIGN

CLARIFIER

Clarification: two-phase separation (solid-liquid)

Flottweg clarifiers are used to separate solids from liquids and enable highly efficient clarification.

- 01** The product to be clarified runs through a stationary infeed pipe into the interior of the bowl and is gently accelerated to the bowl
- 02** speed by the distributor. Large solid particles are immediately deposited in the centrifugal field.
- 03** The disk pack in the bowl causes the product stream to split into many thin layers while creating a large clarification surface. Within the disk pack, the fine solid particles are separated from the liquid.
- 04** As a result of the high centrifugal force, the separated solids settle in the solids space of the bowl.
- 05** Through hydraulic actuation of the piston, the separated solids
- 06** are periodically discharged at full speed.
- 07** The clarified fluids flow out of the disk pack to a centripetal
- 08** pump, where they are discharged under pressure.

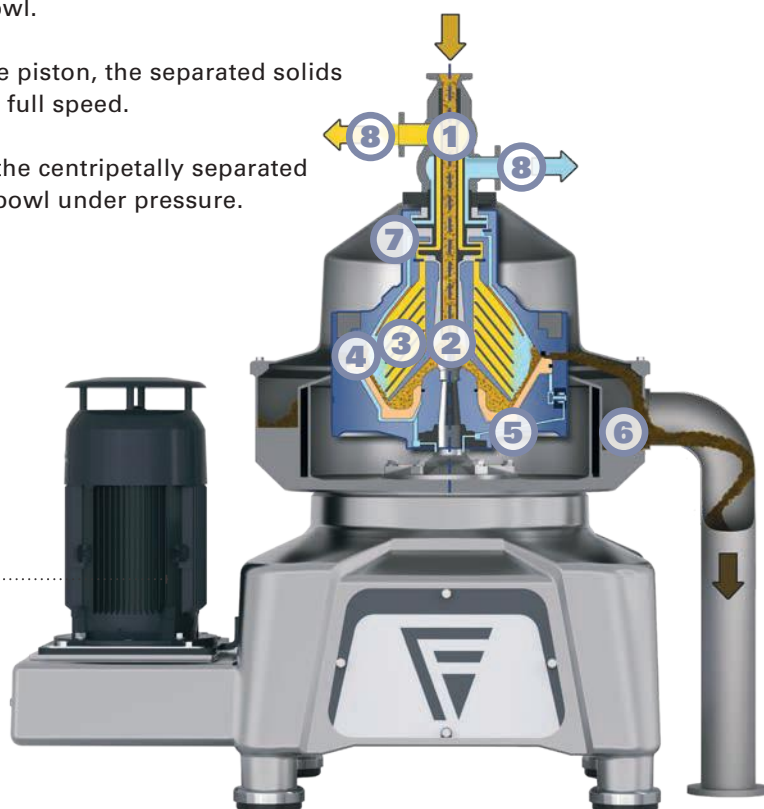


PURIFIER

Purification: three-phase separation (liquid-liquid-solid)

A purifier makes it possible to separate liquid mixtures with different densities while simultaneously separating out the solids.

- 01** In a purifier (three-phase separator), the product to be separated runs via a stationary infeed pipe into the
- 02** interior of the bowl and is gently accelerated by the distributor to the bowl speed.
- 03** Large solid particles are immediately deposited in the centrifugal field. The disk pack in the bowl causes the product stream to split into many thin layers and creates a large clarification surface. Within the disk pack, the liquid mixture separates into a light and a heavy liquid phase. The fine solid particles are deposited at the same time.
- 04** As a result of the high centrifugal force, the separated solids settle in the solids space of the bowl.
- 05** Through hydraulic actuation of the piston, the separated solids
- 06** are discharged periodically and at full speed.
- 07** The centripetal pumps discharge the centripetally separated
- 08** liquid phases from the separator bowl under pressure.



FEATURES AT A GLANCE

The heart of the centrifuge



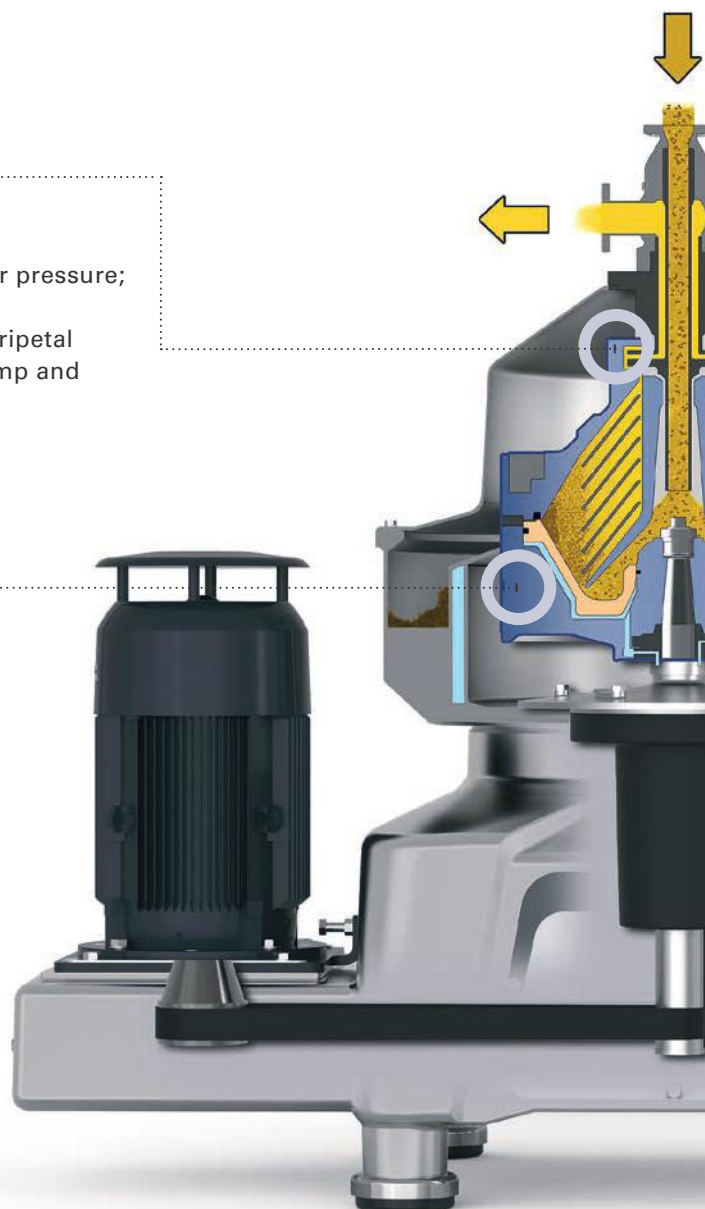
Discharge of the clarified liquid by centripetal pumps

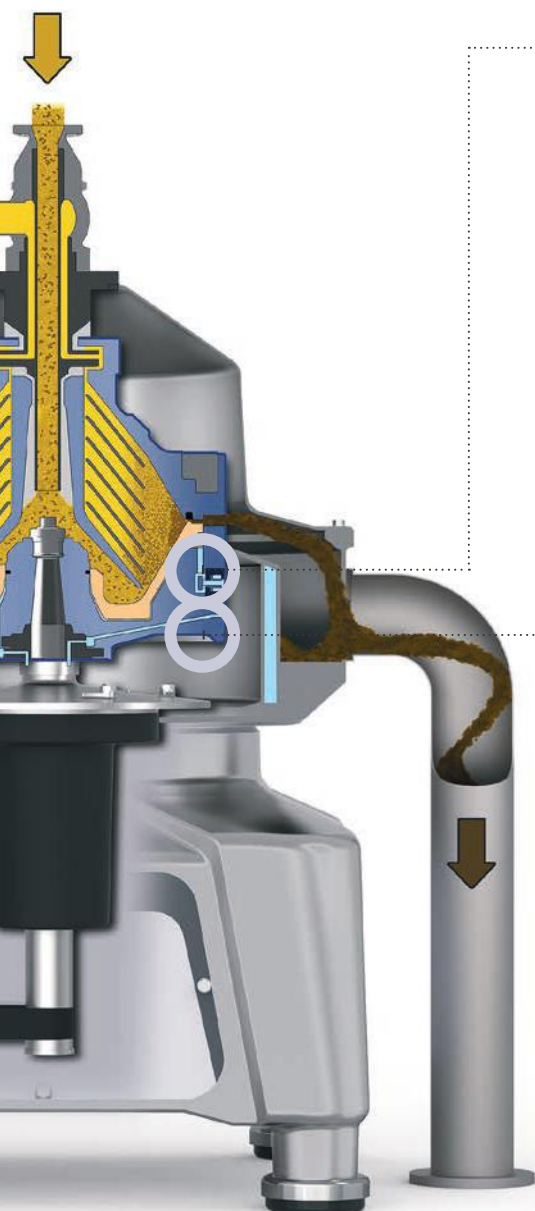
- **Clarifier version:** Discharge of the clarified liquid under pressure; prevention of foaming in the product
- **Purifier version:** Discharge of liquid phases using centripetal pumps; optional combination of single centripetal pump and free discharge



The bowl material

- All parts in contact with the product are CIP-compatible
- High surface quality of components in contact with the product enable efficient CIP cleaning
- Automatic flushing programs for effective CIP cleaning
- Seals with FDA certificate or conformity on request
- Optional: super duplex stainless steels for higher resistance to chlorides





The Flottweg Soft Shot® FLEX system

- Precise and flexible combination of partial or full discharge for highest product yields
- Speed-independent for low energy consumption
- Gentle and nearly silent solids discharge
- Discharge times can be precisely adjusted, resulting in the highest product yield



The separator bowl

- Maintenance-friendly thanks to compact and robust design
- Simple assembly and disassembly as a complete module
- Low operating costs due to a reduced number of components and seals
- "Made in Germany" quality
- Highly efficient solids separation and maximum separation resolution when separating two liquids due to optimized flow behavior inside the bowl

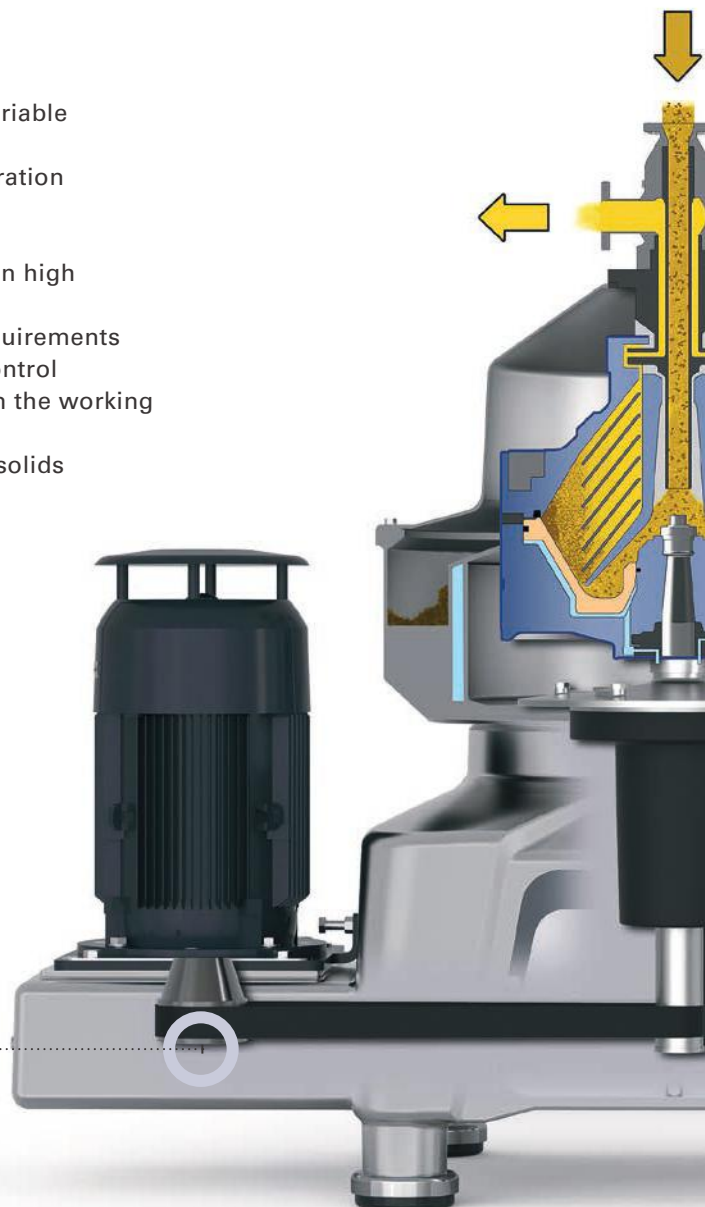
FEATURES AT A GLANCE

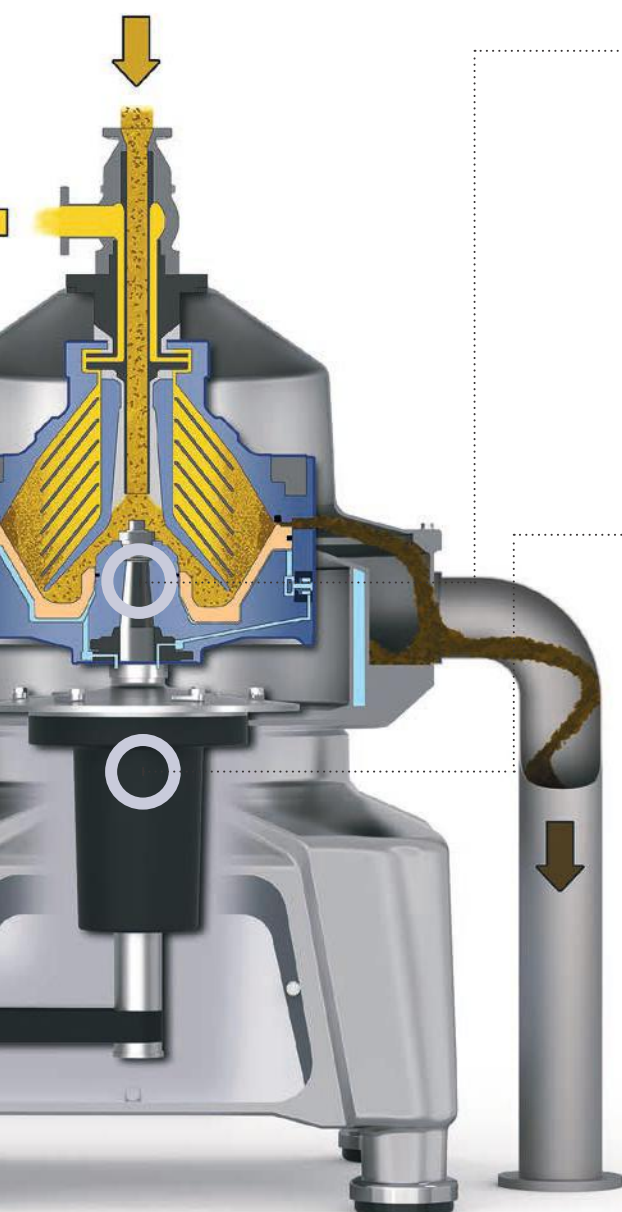
The drive system



The Flottweg belt drive

- Power is transmitted through a variable frequency belt drive
- Simple, robust design for low-vibration and quiet operation
- Easy maintenance, low wear
- Standard drive motors, resulting in high availability
- Flexible adaptation to product requirements through simple, variable speed control
- Reduced starting current results in the working speed being reached quickly
- Fast, smooth reacceleration after solids discharge





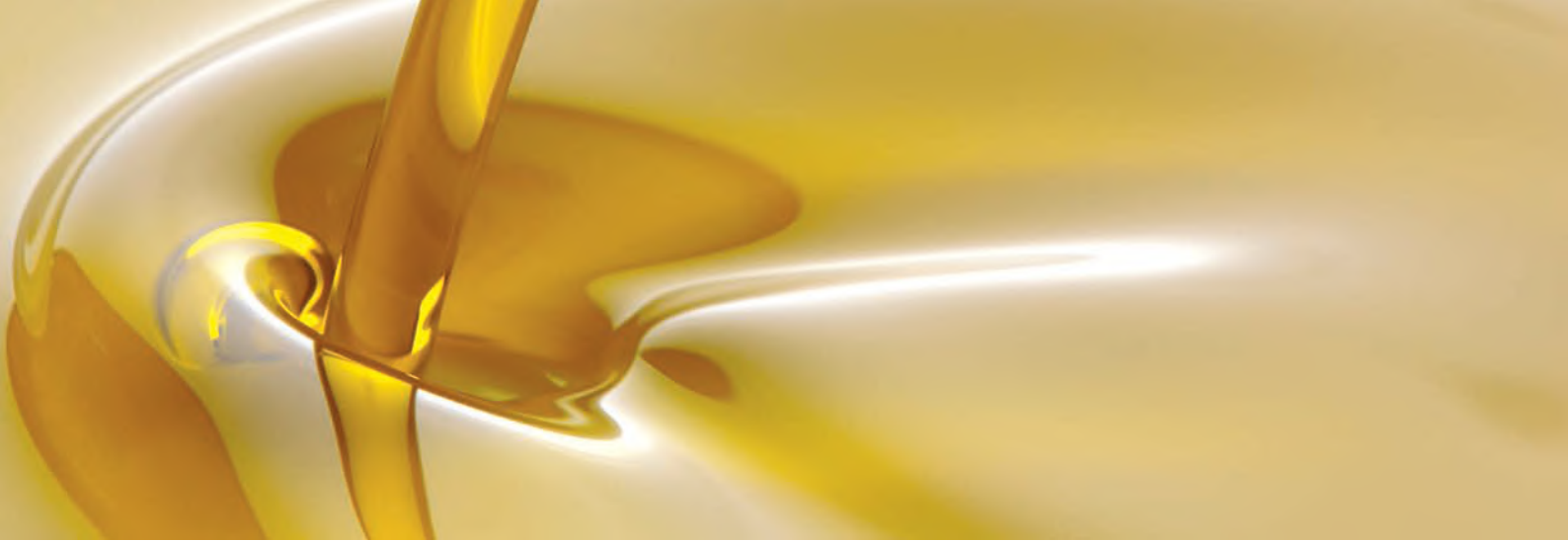
The compact spindle

- The spindle unit can be assembled/disassembled as a complete module
- The bearings are pre-mounted on the spindle
- Easy accessibility, enabling rapid replacement of the bearing bushes



The separator lubrication system

- The spindle bearing is lubricated through a closed lubrication circuit
- Speed-independent, precise and top lubrication performance at all times for a long service life of the bowl bearings
- Automatic monitoring of lubricant supply for high operational reliability
- Low lubricant consumption
- Autonomous system for optimum lubrication



FLOTTWEG IMPELLIZER SYSTEM

Innovative solution for the highest yields in the edible oil industry

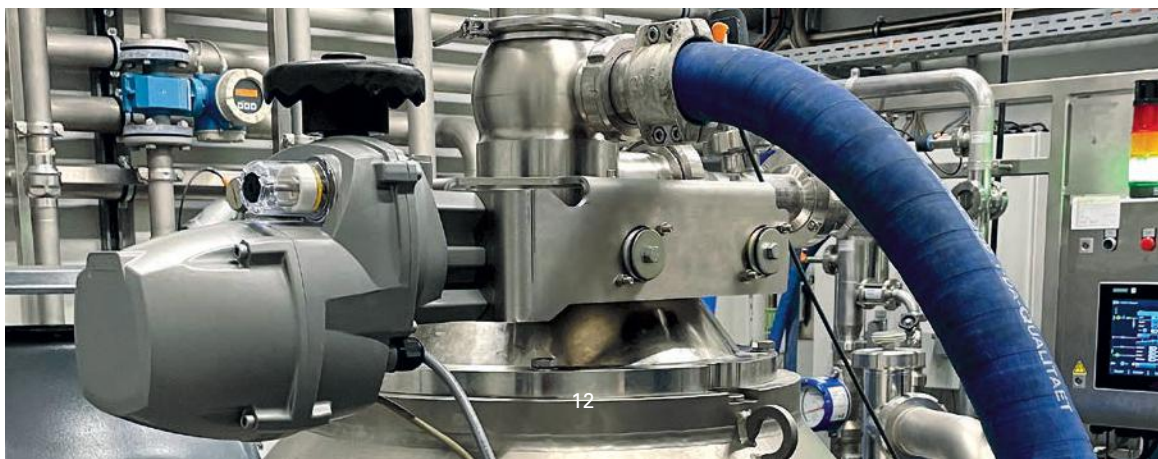
To meet the special needs of edible oil refining, the AC series can be equipped with the Flottweg impellizer system to ensure the highest yields.

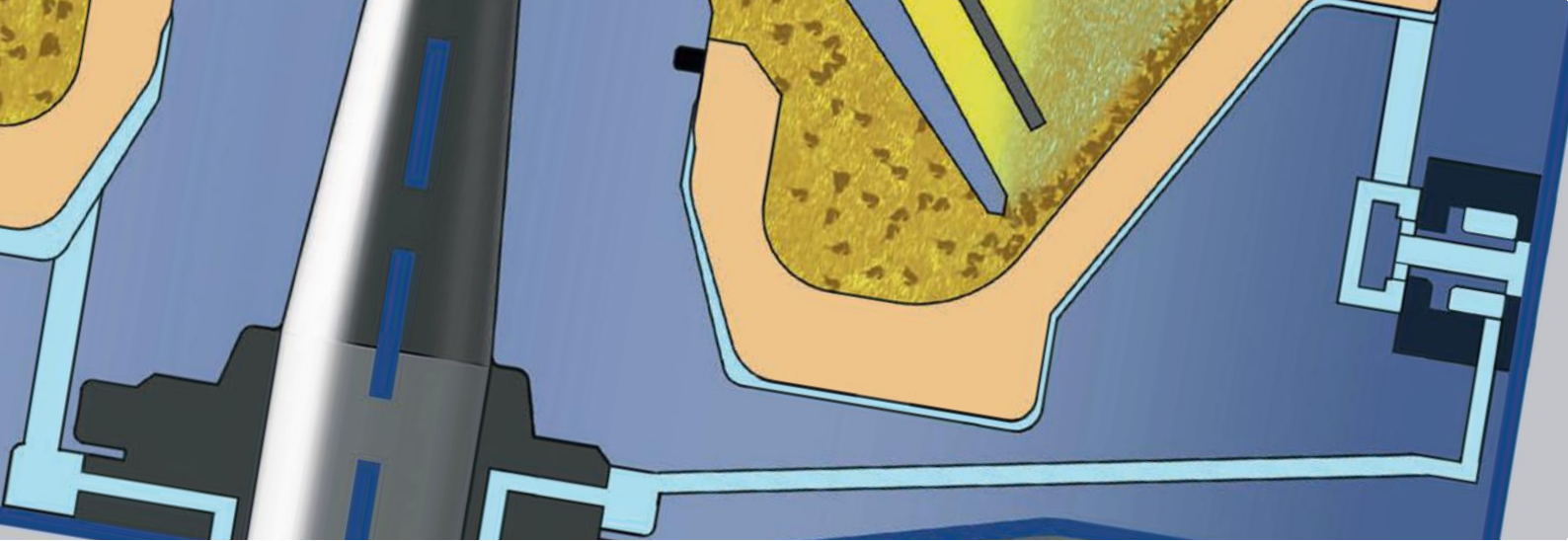
In the machine, a centripetal pump removes the clean (separated) edible oil from the machine under pressure and without foaming. The heavy phase (phospholipids or soaps) is discharged from the machine by means of an adjustable centripetal pump, known as the impellizer.

With the Flottweg impellizer, the separation zone in the machine can be flexibly adjusted. In combination with the Soft Shot® Flex discharge system, the highest yields are ensured even under fluctuating feed concentrations and during solids discharge.

Benefits of the Flottweg impellizer system

- Optimum adaptation of the separation zone to fluctuating feed concentrations
- No machine downtime required in the event of changing feed concentrations
- Separated liquid phases discharged under pressure (to prevent foaming)
- Manual or automatic version available with remote adjustment





FLOTTWEG SOFT SHOT® FLEX

The innovate solution for quiet operation and maximum product yield

Even faster, even more versatile, but still as quiet as always – Flottweg’s proven Soft Shot® discharge system has reached the next step in its evolution, the Soft Shot® FLEX discharge system.

Flottweg’s self-cleaning separators come equipped with the Soft Shot® FLEX discharge system as standard to discharge the separated solids from the bowl. The solids discharge system enables variable speeds and any combination of partial and full discharges. Depending on the products to be processed and the consistency of the solids, the combination of discharge modes and the speed of rotation can be adjusted to achieve optimal operation. In addition, the discharge quantities for the solids can be set to a precision of just a few milliliters.

Soft Shot® FLEX offers all the benefits of a hydraulic piston valve system – plus a few more

- Virtually silent solids discharge, without the bang on ejection. This improves the health and job satisfaction of employees.
- Partial and full discharges can be flexibly combined to maximize product yields and throughflow.
- The finely adjustable partial discharges and discharge quantities enable optimization of the dry matter content, which leads to less product losses and higher yields.
- Flexibly selectable bowl speeds. The system operates at the optimal speed, which reduces energy consumption and minimizes operating costs.
- Heavily-loaded components are subjected to less stress, which significantly reduces their wear. This results in lower maintenance costs and longer machine service lives.



FLOTTWEG SAFETY SHOT

The feature for safe production despite unstable power grids

As the share of renewable energy increases, the pressure on the stability and safety of power grids is increasing worldwide. This can have serious consequences for processing plant operators: Unplanned brownouts or power outages can cause separators to stop uncontrollably with potentially high costs and risks.

Abrupt shutdown of the separator can cause imbalances and damage to the machine. The subsequent cleaning and re-commissioning are time-consuming and labor-intensive – while production remains at a standstill.

Our solution for the AC series: intelligent use of rotational energy!

Our innovative safety shot uses the existing rotational energy of the separator to slow it down in a controlled manner in the event of a power failure. At the same time, the separator is completely emptied and filled with process water. This allows for a quick restart – without manual cleaning.

The machine is ready for production again within a maximum of one hour. The system is also available as a retrofit package and can be easily integrated into existing plants.

The advantages of the Flottweg safety shot at a glance

- Time savings of 5 to 13 hours, depending on machine size
- Minimized production downtime – restart in up to 1 hour
- Increased operational reliability – damage caused by unbalances is avoided
- Less work required – no manual cleaning of the bowl after a stoppage
- Can be retrofitted – also available for existing plants

FDS SERIES – FUNCTIONAL PRINCIPLE AND DESIGN

NOZZLE SEPARATOR

01

All Flottweg nozzle separators are used for the continuous separation of solids from liquids. They ensure highly efficient clarification or separation. The product to be clarified or separated flows via a stationary infeed pipe into the interior of the bowl and is gently accelerated by the distributor to the working speed. Flottweg nozzle separators are available as 2-phase and 3-phase separators.

02

In the 2-phase nozzle separator, larger solid particles are deposited directly in the centrifugal field. Finer solids are separated as they flow through the disk pack. The solid particles collect in the outer solid chambers of the bowl. From there, they are continuously discharged via the nozzles. The clarified fluid flows out of the disk pack and is discharged under pressure via a centripetal pump.



03

In the 3-phase nozzle separator, larger solid particles are separated off when flowing through the disk pack and are guided to the edge of the bowl as a result of the high centrifugal force. There, they collect in the outer solid chambers of the bowl and are continuously discharged via the nozzles. The remaining product stream is divided into a fraction and a concentrate phase. Smaller solid particles make up the fraction, which is discharged under pressure. The remaining liquid flows through the disk pack. This results in an almost clear concentrate phase. This phase is also discharged under pressure via an additional centripetal pump.





FEATURES AND SPECIFICATIONS



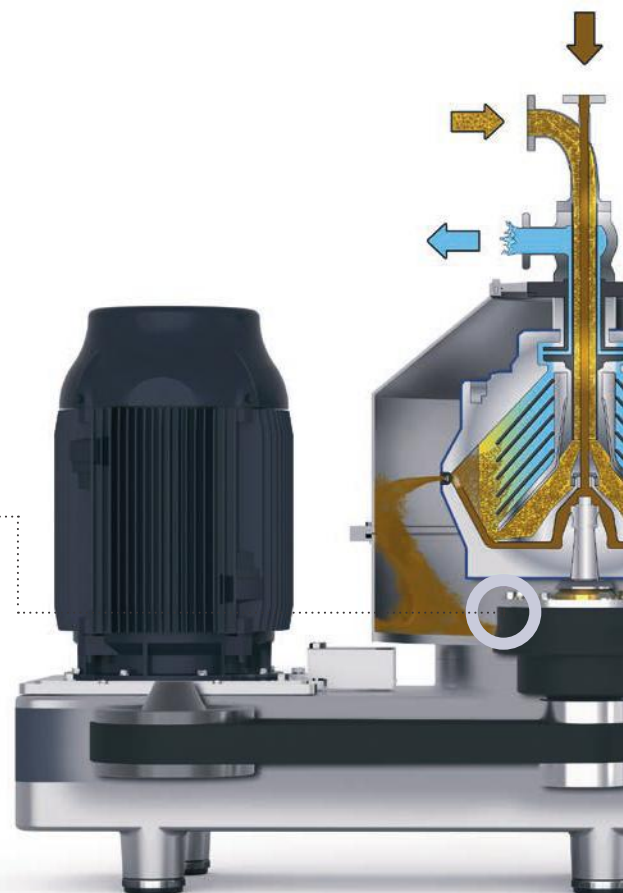
The Flottweg nozzle separator in 2-phase and 3-phase versions

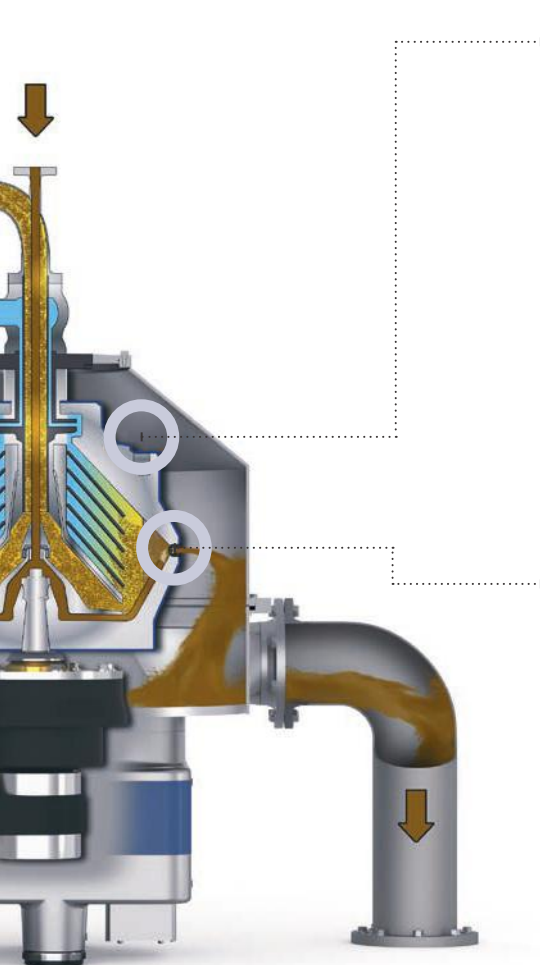
Our Flottweg nozzle separators are available in two basic versions: a 2-phase version for separating solids from liquids, and a 3-phase version for separating solids from liquids and for fractionating different particle sizes. This allows the Flottweg nozzle separators to be ideally integrated into existing processes and production workflows.



The compact spindle drive

- Reduced starting current results in the working speed being reached quickly
- Flexible adaptation to product requirements through simple, variable speed control
- Low-vibration operation
- Reduced power consumption and low mechanical load
- Standard drive motors, resulting in high availability
- Low-wear drive design with contactless sealing concept
- Simple maintenance thanks to modular design
- Quick replacement of the compact spindle





The bowl

- The bowl's innovative interior meets stringent hygiene requirements
- Smooth running
- Optional: contactless and maintenance-free pipe-in-pipe system for solids washing
- Optional concentration storage for reliable compensation of product fluctuations
- Easy to maintain: the entire bowl is a single, compact unit



The nozzles

- By simply and quickly changing the carbide nozzles, the system can be optimally adapted to the product to be processed
- Nozzles with different diameters for optimal adaptation to the production process
- Tungsten carbide wear protection for long nozzle life
- Maximum energy recovery during solids discharge thanks to innovative nozzle arrangement



Centripetal acceleration

- G-forces of up to 9,000 x g act in the nozzle separator.
- The high G-forces ensure efficient clarification or separation.



The savings champion

- Maximum energy savings through innovative bowl design
- Optimized flow behavior inside the machine
- The weight of all rotating components has been optimized



Hygienically impeccable

- Hygienic design
- Deposit-free solids discharge
- All components in contact with the product made of high-grade stainless steels
- Easy integration into CIP processes



Intelligently designed

- Closed lubrication circuit, which means fewer wear parts
- Contactless sealing concept
- Tungsten carbide wear protection for long nozzle life
- Belt drive for high machine availability
- Quick assembly and disassembly of the compact spindle drive, which means lower service and maintenance costs.





**FOR ALL FLOTTWEG
SEPARATORS:**

**EQUIPMENT
THAT MAKES
THE DIFFERENCE**





PURGING

There is a risk of explosion when processing substances whose vapors form a flammable mixture with atmospheric oxygen. For this reason, purging systems are used when it is necessary to prevent the escape of vapors into the atmosphere (contamination) or the entry of air into the plant (oxidation).

For such applications, Flottweg offers centrifuges with a purging concept perfectly tailored to the requirements. These concepts comply with the highest safety standards.





INTELLIGENT AUTOMATION WITH INGO

With digitization for maximum process reliability

Modern processes demand intelligent control – simple, reliable and flexible. With the Flottweg automation solution, operators of our centrifuges receive a powerful tool for optimum control and adaptation of the separation process.

The user-friendly InGo user interface with a 12" HMI and Siemens hardware is integrated as standard in all separator sizes and allows intuitive operation without restricting the range of functions.

Thanks to freely programmable recipe control, products can be processed individually with adapted process parameters. The system is complemented by numerous options such as the Safety Shot (for the AC series: safety in the event of a power failure), Flottweg Motice (condition monitoring of the bearings), the integration of peripheral devices and remote maintenance.

The plug & play solution consisting of control system, skid and machine is perfectly matched to each other.

Automated processes such as the fully automatic CIP cleaning program increase process reliability, reduce operating errors and increase productivity. The automatic feed and discharge control ensures the best possible clarification and fast reaction to changing feed concentrations.

Your benefits at a glance

- Thanks to Flottweg InGo: fully automatic operation with intuitive user guidance
- Universal control with 12" HMI and Siemens hardware – standard with all separator sizes
- Freely programmable recipe control for maximum flexibility
- Advanced monitoring functions: Safety Shot (for AC series), Motice, vibration and temperature monitoring
- Plug & play system: perfectly matched unit consisting of control system, skid and machine
- Fully automatic CIP program for high process reliability
- Automatic feed and discharge control for optimum separation performance



FLOTTWEG LONGLIFE CONCEPT

Durability for demanding processes

All Flottweg disk stack separators operate under extreme conditions due to their operating principle – high speeds, mechanical stress and continuous operation entail very high demands on maintenance, wear resistance and availability.

This is exactly where the Flottweg longlife concept comes in: It combines robust engineering, intelligent automation and maintenance-friendly design to create a solution that minimizes downtime and maximizes the life of your machines.



The Flottweg longlife concept at a glance



Bowl & discharge system

- “Made in Germany” – the central centrifuge components are of the highest quality
- Hydraulically damped Soft Shot® FLEX system for gentle, precise bowl discharge and long service life (with AC series)
- Contactless seals and minimum number of wearing parts for attractive operating costs
- Compact design for easy assembly/disassembly as a complete module



Drive unit

- Standard motors for high availability
- Closed lubrication circuit for long bearing life
- Maintenance-friendly compact spindle unit
- Low-vibration, quiet operation thanks to robust belt drive



Automation & monitoring

- Flottweg touch control for continuous monitoring of speed, vibration and temperature
- Early detection of abnormalities to avoid downtimes
- Advanced condition monitoring with the motice condition monitoring system





PROCESS ENGINEERING SPECIALISTS

Every process is different

Even just a few parameters can have a huge effect on the degree of separation. If these parameters are known, the yield and the efficiency of the separation process can be significantly increased.

We support our customers throughout the process, from analyzing the raw materials to laboratory tests and final acceptance. Flottweg has all the resources needed to analyze your products and identify untapped potential. We provide support and service to our customers through our worldwide network.

Taking advantage of our experience and testing resources, we develop custom-made solutions for your individual requirements.



TECHNICAL DATA

Technical data for the Flottweg AC separator*

	AC1000	AC1200	AC1500	AC1700	AC2000	AC2500	AC2800	AC 3000
g force	Max. 12,000 x g	Max. 11,000 x g	Max. 10,400 x g	Max. 10,850 x g	Max. 9,000 x g	Max. 9,000 x g	Max. 8,400 x g	Max. 8,000 x g
Speed	Max. 9,300 rpm	Max. 7,800 rpm	Max. 6,800 rpm	Max. 6,800 rpm	Max. 5,700 rpm	Max. 5,200 rpm	Max. 4,600 rpm	Max. 4,400 rpm
Drive performance	5.5 kW	7.5 - 11 kW	15 - 22 kW	18.5 - 22 kW	30 - 37 kW	37 - 75 kW	55 - 90 kW	55 - 90 kW
Hydraulic performance	10,000 l/h	17,000 l/h	22,000 l/h	28,000 l/h	45,000 l/h	85,000 l/h	150,000 l/h	150,000 l/h

* The data listed here are intended as guide values. The actual throughput depends on the characteristics of the product.
Subject to technical changes.





Technical data for the Flottweg FDS separator*

	FDS2000-210	FDS2000-231
Design	Concentrate phase via centripetal pump	Concentrate phase and fraction via centripetal pump
Nozzles	12 pieces	12 pieces
g force	Max. 9,000 x g	Max. 9,000 x g
Speed	Max. 5,200 rpm	Max. 5,200 rpm
Drive performance	75 - 110 kW	90 - 110 kW
Hydraulic performance	160,000 l/h	160,000 l/h

* The data listed here are intended as guide values. The actual throughput depends on the characteristics of the product.
Subject to technical changes.



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 more than 60 sales and service locations are available 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 afterward, 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.

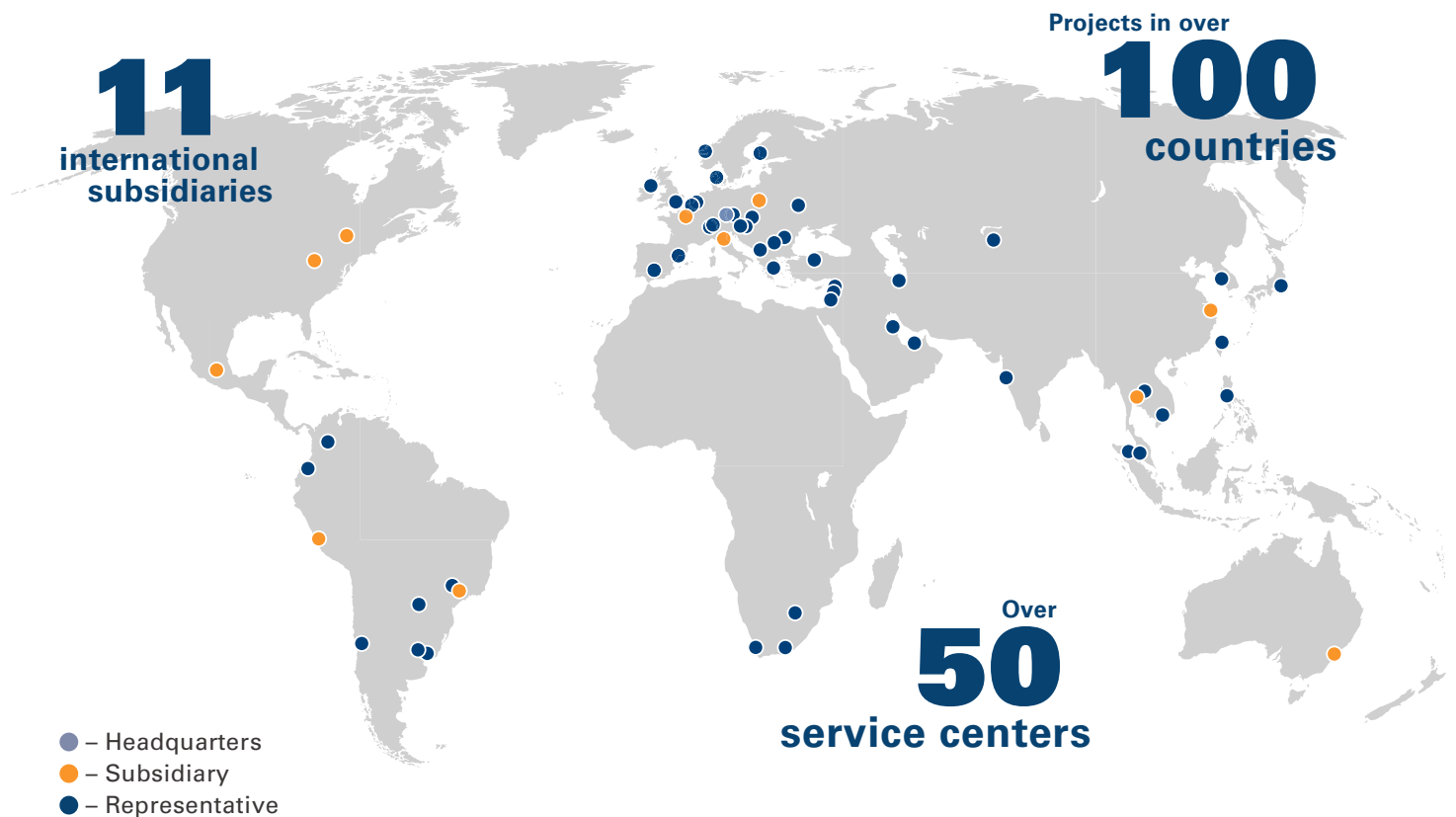
Make Flottweg the engineer of your success:

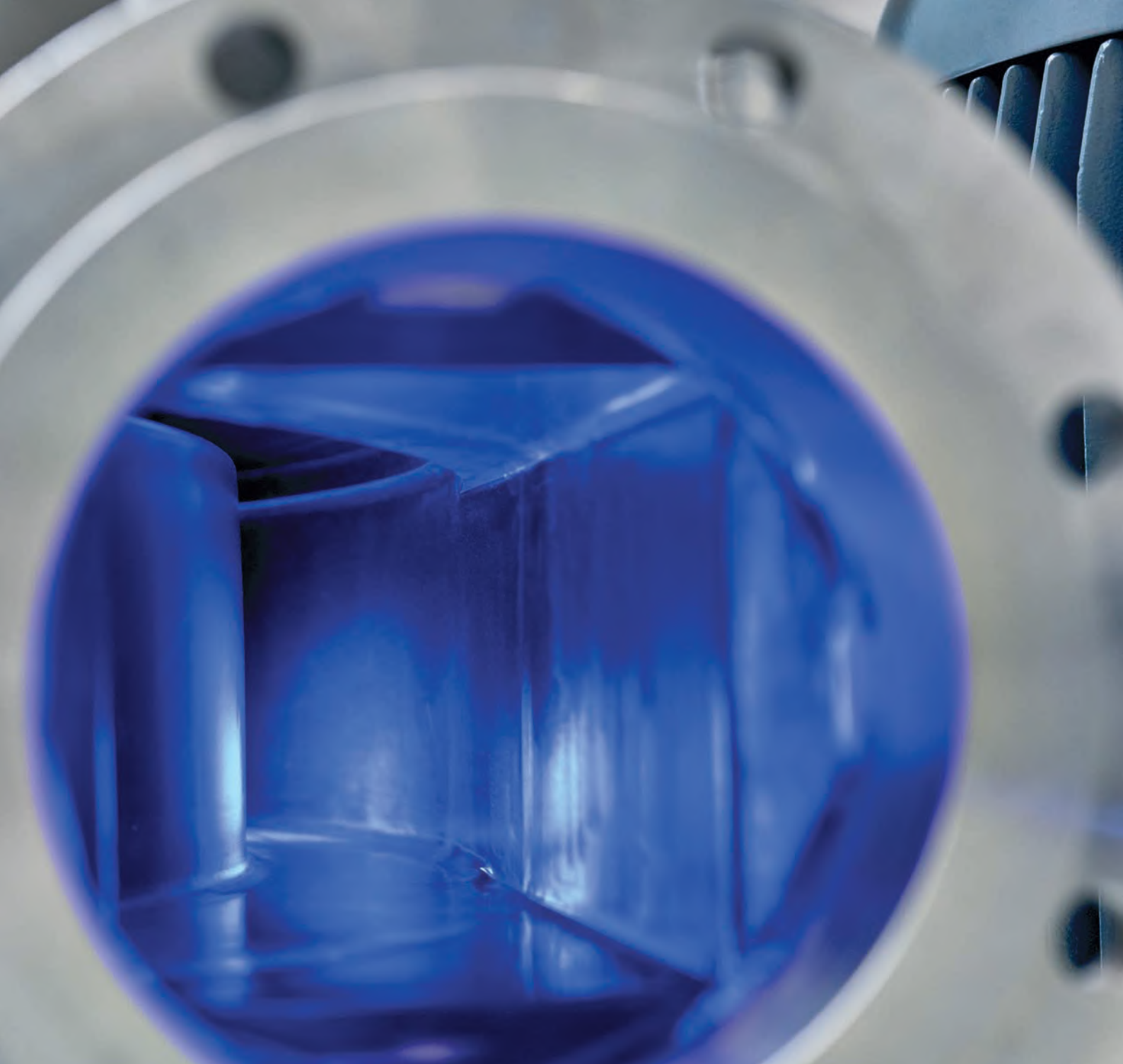
Our sales partners are looking forward to hearing about your ideas and challenges!



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.





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