

ferrum

**HIGHEST EFFICIENCY
VERTICAL BASKET CENTRIFUGES**



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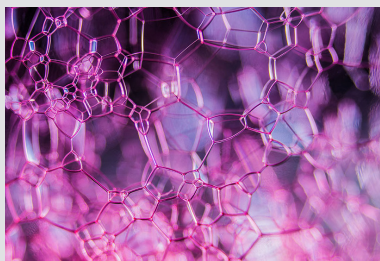
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FERRUM MORE THAN **100** YEARS
SINCE **1917**



APPLICATIONS SPECIFIC DESIGNS



CHEMICALS

- + **Chlorides**
 - Sodium Dichloroisocyanurate
- + **Sulphates**
 - Gypsum
- + **Intermediate Products**
 - Lithium carbonate
 - P-aminophenole
 - Sodium bicarbonate crude
- + **Fibrous Products**
 - CMC

FINE CHEMICAL/PHARMA

- + **Fine Chemicals**
 - Pigments
 - Herbicide
 - Insecticides
 - Sodium cyanide
 - Carbofuran
- + **Pharmaceuticals**
 - Antibiotics
 - Vitamines
 - APIs (all kinds)
 - Sodium chloride
 - Intermediates
- + **Sugar**
 - Dextrose, Fructose

MINERAL PROCESSING

- + **Mining**
 - Gold, Silver, Lead, Zinc, Nickel, Copper, Platinum
 - Kaolin, Calcium carbonate, Titanium dioxide,
 - Barite, Zinc sulphate, Aluminium hydroxide

PETROCHEMICALS

- + **Basic products**
 - MEG recovery

ENVIRONMENTAL

- + **Environment**
 - MEG recovery

CUSTOMISED SOLUTIONS

Ferrum vertical scraper and top discharge centrifuges have been proven in numerous applications in the chemical, fine chemical and pharmaceutical industry.

Our centrifuges offer a broad range of applications, from pilot plants and small-scale production to continuous production applications.

Scraper centrifuges are used for products that can be filtered with solids concentrations as low as 2 w% and particle sizes down to 4 µm.

VERTICAL SCRAPER CENTRIFUGES BOTTOM DISCHARGE

PRINCIPLE OF OPERATION AND APPLICATIONS

The VBC type vertical scraper centrifuges (Vertical Bottom discharge Centrifuge) work discontinuously. The solids are discharged vertically downwards in a completely closed system. Applications include the demanding operating conditions of the chemical industry as well as utilisation in complex pharmaceutical processes.

As a result of high modularity and the comprehensive range of optional equipment, the latest VBC centrifuge can be optimally adapted to your requirements.

MODULARITY AND OPTIONAL EQUIPMENT

- + Robust and reliable design in accordance with the latest standards, directives and GMP requirements
- + Optimally designed functional parts for efficient and reliable process cycles with low vibration
- + Reliable sealing of the bearing housing using the latest generation of sealing systems
- + Application-specific feed and wash systems: feed and wash pipe or inclined feed and wash disk
- + Position of filtrate discharge as well as cover opening can be selected as required
- + Scraper unit systems: scraper knife over the entire basket height or scraper knife with vertical movement
- + Motor arrangement: above or below the base plate
- + Systems for effective residual heel removal, even for products that are difficult to remove
- + CIP systems, entire process area can be flooded
- + Various diagnostic and monitoring systems
- + Ferrum InertoSafe® inertisation systems
- + State of the art control systems and HMI panels



**VBC-S, Vertical scraper centrifuge
with swivel open cover and housing**

TYPE VBC-W

SPECIAL DESIGN FEATURES

- + Simple, fast disassembly of the basket for best inspection of the process area
- + Clean room design using membrane connection possible
- + Pressure vessel design on request
- + Large diameter / radius for all connections allowing improved CIP efficiency, reduced CIP time and reduced CIP liquid requirements
- + Light weight design for minimised static loads
- + Reduced building volume requirements
- + Complete flooding of the product contacted area possible



VBC-W with housing welded directly onto base plate



Centrifuge basket



Scraper knife over the entire basket height, feed and wash pipe



Scraper knife with vertical movement, feed and wash disk

TYPE VBC-S

SPECIAL DESIGN FEATURES

- + Swivel open convex cover for easy access to internals
- + Swivel open housing for optimised inspection, even below the basket without the need to disassemble the basket
- + Light weight design for minimised static loads
- + Clean room design using membrane connection possible
- + Minimised down time between product changes thanks to simple inspection of all product contacted parts



VBC-S with housing open



VBC-S with cover open

TYPE VGC

SPECIAL DESIGN FEATURES

- + Robust and reliable design
- + Highest availability in permanent operation, even under extreme and irregular plant conditions
- + Minimum power consumption
- + Quiet and clean work environment
- + Best separation performance
- + High quality with maximum purity and minimal residual moisture
- + High throughput



VGC for chemical applications



VGC for chemical applications - top view

VERTICAL CENTRIFUGES TOP DISCHARGE

PRINCIPLE OF OPERATION AND APPLICATIONS

The VTC type vertical centrifuge (Vertical Top discharge Centrifuge) is used for batch type operations. The product is discharge through the top of the centrifuge. This design is suitable for products that can not be discharged using a scraper unit or in cases where crystal breakage must be prevented.

The applications range from kilo-lab units and pilot plant scale to fullsize production units in the chemical and pharmaceutical industries.

MODULARITY AND OPTIONAL EQUIPMENT

- + Reliable sealing of the bearing housing using the latest generation of sealing systems
- + Easy maintenance thanks to modular design
- + Application-specific feed and wash systems
- + Easy, quick disassembly of basket
- + Robust and reliable design in accordance with the latest standards and directives
- + State of the art control systems and HMI panels
- + Various CIP systems



TYPE VTC

SPECIAL DESIGN FEATURES

- + Various solids discharge systems: manual discharge, filter bag lift-out devices
- + Motor arrangement: above or below the base plate
- + Light weight design with minimum loads on civil structure
- + Cake loosening device with vertical movement
- + Design allowing various positions for the filtrate discharge and cover opening
- + Complete flooding of the product contacted area possible



Filter bag with removable basket brim



Lifting device for filter bag



Discharge device for filter bag

TYPE VTC-M

MOBILE | SPECIAL DESIGN FEATURES

- + Compact dimensions
- + Swing-open housing for optimal inspection
- + Designed for use in an Ex zone 1 area
- + Complete mobile unit for easy transfer from room to room
- + All instruments, motors and electrical components completely protected in a stainless steel housing



TYPE VTC-I

ISOLATOR | SPECIAL DESIGN FEATURES

- + Compact design ideal for installation inside an isolator
- + Process area and technical area separated by using a membrane connection
- + Various discharge systems: manual or using filter bag
- + Easy inspection of product contacted parts even when installed in an isolator



Isolator installation

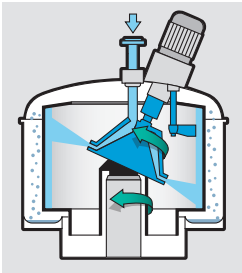
BOTTOM DISCHARGE CENTRIFUGES

HIGHEST EFFICIENCY

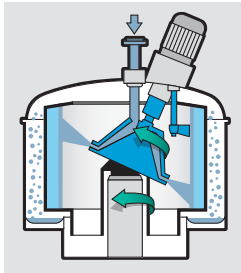
Solid-liquid separation with the bottom discharge centrifuge is effected discontinuously in a sequence of specific process steps. The individual process steps last from a few minutes to several hours depending on the characteristics of the product. Depending on the type of control system, the process can be operated fully automatic, semi-automatic or manual.

TYPICAL VBC

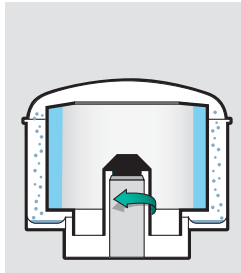
Filling and intermediate centrifugation



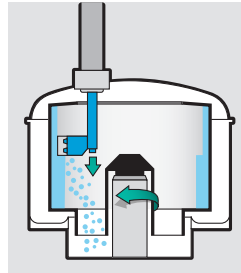
Washing



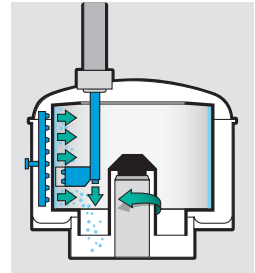
Centrifugation



Scraping, solids discharge



Residual heel removal



Filling

The suspension is applied evenly to the centrifuge basket via the feed pipe or optionally via the inclined feed disk. The fill level control prevents overfilling of the basket.

Intermediate centrifugation

The basket accelerates to centrifuge the liquid from the surface of the cake.

Washing

After intermediate centrifugation, wash liquid is sprayed evenly on to the product cake; this liquid enters the centrifuge via the inclined feed disk or the wash pipe.

Centrifugation

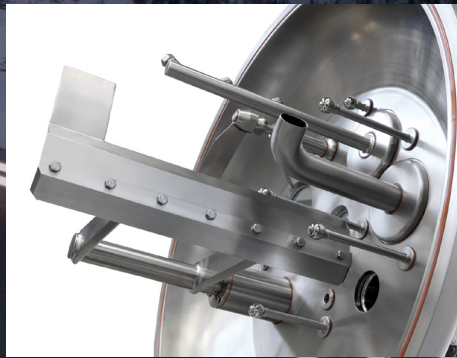
After washing, centrifugation takes place – until the required residual moisture of the filter cake is reached.

Scraping, solids discharge

At reduced speed, the scraper knife swings into the filter cake and scrapes out the product vertically downwards. If required, the residual heel removal on the scraper device can be switched on during scraping.

Residual heel removal

The heel can be blown into the solids discharge using pressurised gas pulses applied via nozzles outside the basket or, if necessary, additionally via nozzles on the scraper device. If the process area is purged with inert gas, nitrogen is used for blowing off the heel.



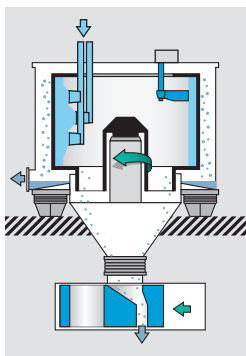
Feed and wash pipe,
scraper knife over entire basket height



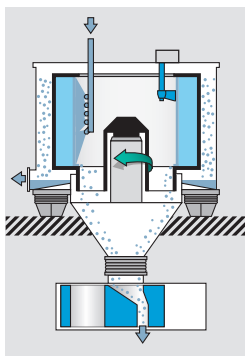
Inclined feed and wash disk,
scraper knife with vertical movement

TYPICAL VGC

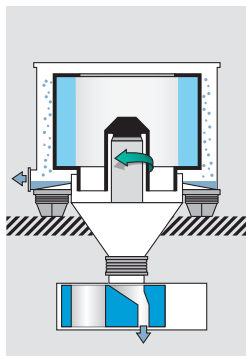
Filling and intermediate centrifugation



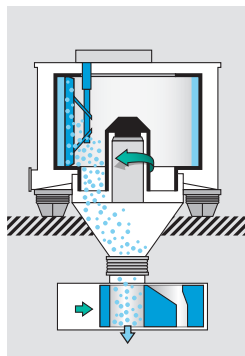
Washing



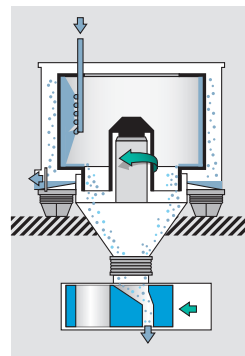
Centrifugation



Scraping, solids discharge



Residual heel removal



Filling

Before filling, the sorter mounted at the solids discharge cone is shifted to liquid discharge position. This prevents liquid reaching the next solids process step. The suspension is applied evenly to the centrifuge basket via two feed pipes. The fill level control prevents overfilling of the basket.

Intermediate centrifugation

The basket accelerates to centrifuge liquid from the surface of the cake.

Washing

After intermediate centrifugation, wash liquid is sprayed evenly on the product cake using the wash pipe. Impurities are washed out.

Centrifugation

After washing, centrifugation takes place until the required residual moisture of the filter cake is reached.

Scraping, solids discharge

Before scraping, the product sorter is shifted to solids discharge position. At reduced speed the scraper knife swings into the filter cake and scrapes out the product vertically downwards.

Residual heel removal

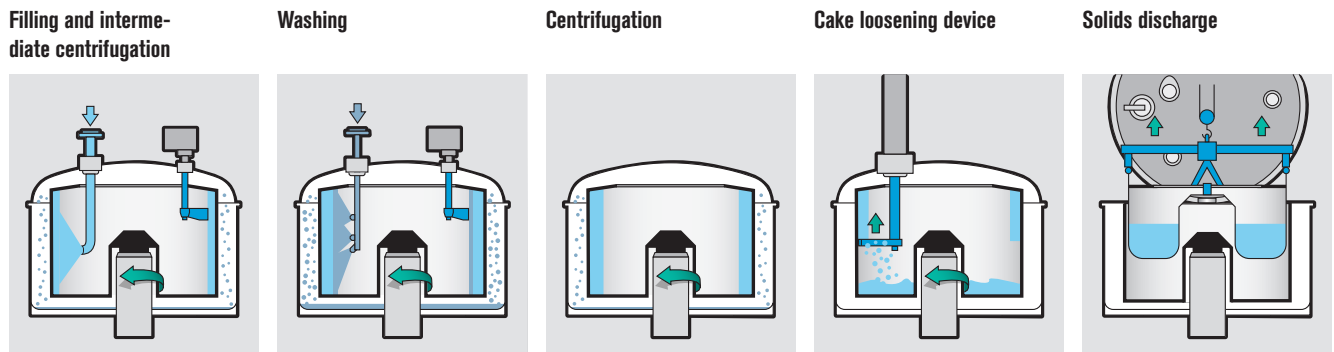
To protect the filter cloth during scraping, a residual heel is left on the filter cloth. Before residual heel removal, the product sorter is shifted to liquid discharge position. The residual heel can be removed periodically by using a separate wash pipe.

TOP DISCHARGE CENTRIFUGES

PRINCIPLE OF OPERATION

SIMPLE BUT PROVEN

The solid-liquid separation is effected discontinuously in a sequence of specific process steps. The individual process steps last from a few minutes to several hours depending on the characteristics of the product. Depending on the type of control system, the process can be automatic, semi-automatic or manual.



Design with cake loosening device and lifting device

- Filling** The suspension is applied evenly to the centrifuge basket via the feed pipe or optionally via the inclined feed disk. The fill level control prevents overfilling of the basket.
- Intermediate centrifugation** The basket accelerates to centrifuge the liquid from the surface of the cake.
- Washing** After intermediate centrifugation, the wash liquid is sprayed evenly on to the product cake; this liquid enters the centrifuge via the inclined feed disk or the wash pipe.
- Centrifugation** After washing, centrifugation takes place – until the required residual moisture of the filter cake is reached.
- Cake loosening device** The product can be released using a cake loosening device. Depending on the product, this will make subsequent discharge easier.



Feed and wash pipe, cake loosening device



Filter bag with lifting device

CIP AND SIP SYSTEMS

PURE AND CLEAN

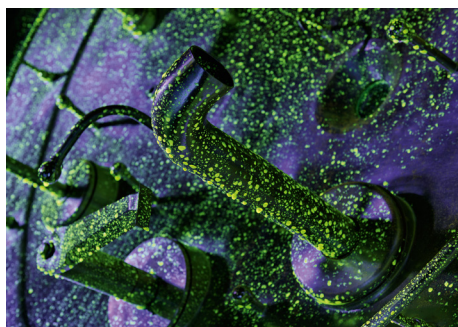
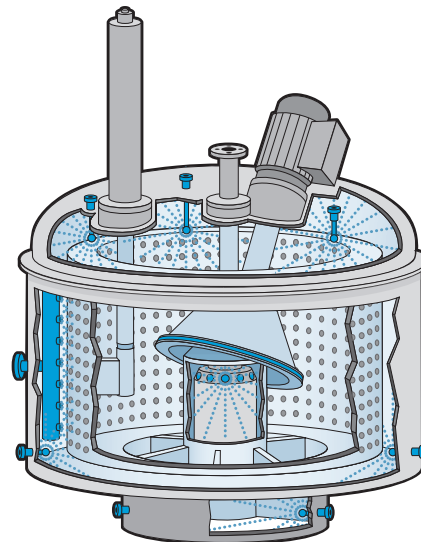
CIP system | For cleaning the centrifuge process area, a CIP system (Cleaning In Place) can be integrated in all our vertical centrifuges. This system is used during a product or batch change to eliminate the risk of cross-contamination. The CIP nozzles, the feed and wash system as well as the residual heel removal outside the basket can be used to clean the process area.

SIP system | After the CIP cleaning, SIP cleaning (Sterilisation In Place) can be undertaken. To kill microorganisms, the process area is wetted with disinfectant (e.g. hydrogen peroxide, sodium hydroxide, etc.) via the CIP system.

Optional flooding of the process area | The centrifuge can be flooded with CIP liquid to just below the cover. This process permits contact between the cleaning liquid and the soiled surfaces for as long as required and therefore maximum effect.

GMP design for efficient cleaning | Our designs comply with the latest GMP guidelines. The hygienic cleaning of the process area is made possible by a clean finish, excellent surface quality, compliance with minimum radii and the use of FDA-approved open O-rings.

Low solvent consumption | The compact design as well as optimised cleaning programs ensure efficient cleaning with low solvent consumption.



Riboflavin Test - before CIP

VERIFIABLE CLEANNES

We optimise the CIP programs for the different centrifuge types with the aid of riboflavin tests. This way it is ensured that even with low solvent consumption, all surfaces in the process area are wetted with cleaning liquid. Riboflavin tests can be demonstrated on request during the FAT (Factory Acceptance Test).



Riboflavin Test - after CIP

AUTOMATION SYSTEMS

RELIABLE CONTROL

Automation of centrifuges is of central importance to Ferrum. Ferrum has invested many years into the development of centrifuge automation systems. Proven, standardised hardware and software modules are used as a basis and are supplemented with customer specific elements.

OVERVIEW OF THE RANGE OF CONTROL SYSTEMS AND DRIVES

- + Safe, reliable and customised control solutions
- + Risk and safety analyses and calculations
- + Advice on all aspects of control system design
- + Planning, execution and commissioning for centrifuge and process controls
- + Secure VPN-based remote maintenance
- + Flexible connection options to control systems
- + Compliance with international standards and directives
- + Retrofit: adaptation and upgrading of existing control systems, taking into account current standards and directives
- + Complete and comprehensive documentation: electrical documentation, layout, concept descriptions, control descriptions, manuals, safety certificates



DRIVE SYSTEMS AND SAFETY CONTROL SYSTEMS

Our drive systems and safety control systems guarantee a safe and optimised operation of the centrifuge. The systems are state of the art. They are continuously developed and adapted to our risk analyses as well as to the latest directives and standards. Frequency converters of the latest generation with integrated safety functions are used to control the speed.

CONTROL SYSTEMS AND TERMINALS TO FACILITATE EASE OF USE

The control and visualisation software permits easy operation and control of the solid-liquid separation process. Thanks to our extensive range of different control systems, operator panels and components from leading suppliers, we efficiently implement comprehensive customer requirements.

Ferrum can supply operator panels for fully automatic and visualised process control systems with integrated safety functions which can be controlled by a safety control system.

The centrifuge can be operated in an automatic, semi-automatic, manual or service mode. A wide range of production recipes can be saved in an easy-to-use recipe management system.



Terminal with process visualisation for Ex-Zone 1



Terminal with process visualisation for Ex-Zone 2

EXPERIENCE FERRUM INNOVATION

Our innovations are the result of years of experience combined with current customer needs. Ferrum owns intellectual property on a wide range of applications and process solutions related to centrifuges for solid-liquid separation.

ONLINE PROCESS MONITORING

Process optimization includes shorter cycles, better product quality, automation and monitoring with the innovative CentriSense® camera system from Ferrum.

- + The future is here: touchless level, dryness and product purity measurement with our patented CentriSense System
- + Ensures 100% consistent process stability, preventing possible quality losses caused by mechanical scanning
- + Process optimization through automatic detection of residual moisture enables the highest possible throughput
- + Save time and ensure a clean process area with the automatic cleanliness monitoring
- + ATEX certified



METALLIC FILTER CLOTHS

A very robust and long service life alternative filter media

- + No fibres in the product
- + No changes in the cloth characteristics
- + Reduced residual heel
- + Easy installation
- + Complete upgrade kit for many baskets
- + Available in stainless steel 1.4404 (others on request)
- + Suitable for explosive dust atmospheres



WORLDWIDE



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