HIGHEST EFFICIENCY
VERTICAL BASKET CENTRIFUGES
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CHEMICAL INDUSTRY

- Chlorides | Trichloroisocyanuric acid | Sodium dichloroisocyanurate
- Sulphates | Gypsum | Iron sulphate heptahydrate
- Fibrous Products | Nitrocellulose Chips - Fibres | CMC

FINE CHEMICAL AND PHARMACEUTICAL INDUSTRY

- Fine Chemicals | Pigments | Herbicides, insecticides
- Pharmaceuticals | Antibiotics, APIs | Intermediates
- Vitamins | A, E
- Foods | Amino acids

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.
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 (PL d, SIL 2 certified)
- State of the art control systems and HMI panels
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-C**

**SPECIAL DESIGN FEATURES**

- One piece stator, housing support and base plate cast iron construction
- Low centre of gravity for stable vibration free operation
- Design with flat cover (optionally with convex cover)
- Manual cover opening with lifting gear or with hydraulic activation
- High flexibility allowing client a high degree of freedom to influence final design features

![VBC-C with cast iron base](image)

**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](image)

![VBC-S with cover open](image)
**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
**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
**BOTTOM DISCHARGE CENTRIFUGES**

**PRINCIPLE OF OPERATION**

**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.

*Feed and wash pipe, scraper knife over entire basket height*

*Inclined feed and wash disk, scraper knife with vertical movement*
**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.
**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.

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**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.

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Design with cake loosening device and lifting device
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.

VERIFIABLE CLEANNESS

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).
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

+ Safety analyses, safety circuits
+ Automation of the process, software programming
+ Design and installation of cabinets for control systems and drives, as well as operator panels
+ Sensors and monitoring equipment
+ Connection to distributed control systems, remote maintenance
+ Explosion protection up to Ex zone 1 (according to Directive 2014/34/EU)
+ Documentation: diagrams, concept descriptions, operating instructions, safety certificates, etc.
+ Commissioning of complete systems on-site

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.
EXPERIENCE
FERRUM INNOVATION

PULL ACTION FILTER CENTRIFUGES

The Pull Action Filter Centrifuge is an innovation by Ferrum which allows automatic discharge of the product without the use of a scraper knife system and therefore minimising crystal breakage.

+ Bottom discharge of the solids by pulling the filter cloth using a pneumatic cylinder
+ No scraper knife unit required
+ No residual heel
+ No crystal breakage