

**ferrum**

**DURABLE PERFORMANCE**  
**HORIZONTAL BASKET CENTRIFUGES**



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



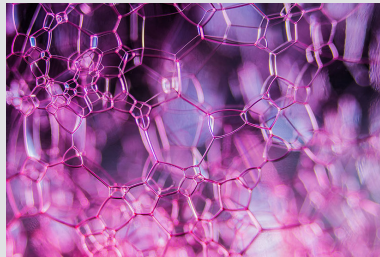
# APPLICATIONS SPECIFIC DESIGNS



## CHEMICALS

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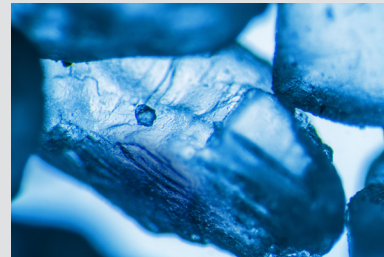
- + **Chlorides**
  - Sodium Dichloroisocyanurate
- + **Sulphates**
  - Gypsum
- + **Intermediate Products**
  - Lithium carbonate
  - P-aminophenole
  - Sodium bicarbonate crude
- + **Fibrous Products**
  - CMC



## FINE CHEMICAL/PHARMA

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



## MINERAL PROCESSING

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

## PETROCHEMICALS

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- + **Basic products**
  - MEG recovery

## ENVIRONMENTAL

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- + **Environment**
  - MEG recovery

## CUSTOMISED SOLUTIONS

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Ferrum horizontal scraper 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.

# HORIZONTAL SCRAPER CENTRIFUGES

## DISCONTINUOUS OPERATION

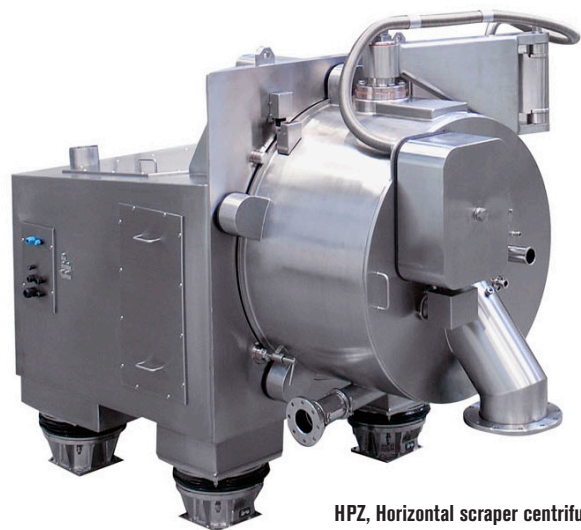
### PRINCIPLE OF OPERATION AND APPLICATIONS

Horizontal scraper centrifuges are discontinuously operating batch type centrifuges specifically adapted for the chemical, fine chemical and pharmaceutical industries. Due to the wide range of applications, many special design features have been developed to ensure that highest and consistent product quality is achieved. These range from various filling systems for optimal distribution of the suspension during the filling step, to solids discharge systems using discharge chutes or screw

conveyors. Optimised residual heel removal systems ensure maximum product discharge yields. Surface treatment of product contacted parts such as mechanical polishing and/or electro-polishing aid the CIP characteristics, allowing short turnaround times between batches or product changes. Sturdy, robust designs together with state of the art control systems result in higher throughputs by reducing batch times.

### MODULARITY AND OPTIONAL EQUIPMENT

- + Robust and reliable design in accordance with the latest standards and directives
- + Reliable sealing of the bearing housing using the latest generation of sealing systems
- + Easy maintenance thanks to modular design
- + Systems for effective residual heel removal, even for products that are difficult to remove
- + Various diagnostic and monitoring systems
- + Ferrum InertoSafe® inertisation systems
- + Residual heel removal systems with one or more nozzle rows



HPZ, Horizontal scraper centrifuge



# TYPE HCZ | CHEMICAL

## SPECIAL DESIGN FEATURES

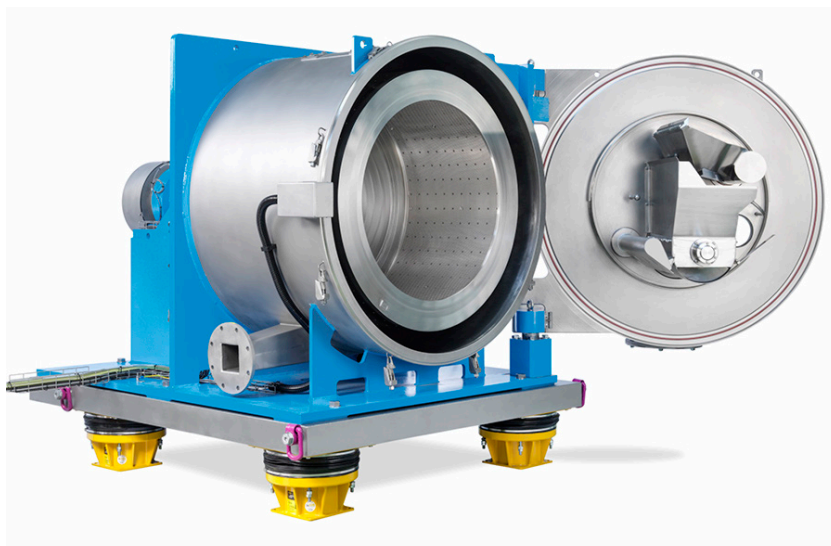
- + Very robust, reliable and function-optimized design for high throughputs and continuous operation under the toughest conditions
- + Various product area rinsing systems
- + Designs with discharge chute or discharge screw conveyor
- + Baskets for filtration or sedimentation
- + Drive systems designed to specific application
- + Bearing housing with sealing systems of the latest generation
- + Easy-to-maintain, hygienic design, optionally available in oil-free version

## ROBUST DESIGN FOR CONTINUOUS OPERATION

The various internals and components have a very robust design. Loads are simulated using FE analyses and the design is optimised as appropriate.

## DISCHARGE CHUTE/DISCHARGE SCREW CONVEYOR

During scraping the speed of the centrifuge basket is reduced. The scraper knife swings into the cake and scrapes out the product. Depending on the characteristics of the product and basket width, the solids are discharged via a chute or a screw conveyor.



Feed pipe with deflector



Solids discharge with discharge screw conveyor



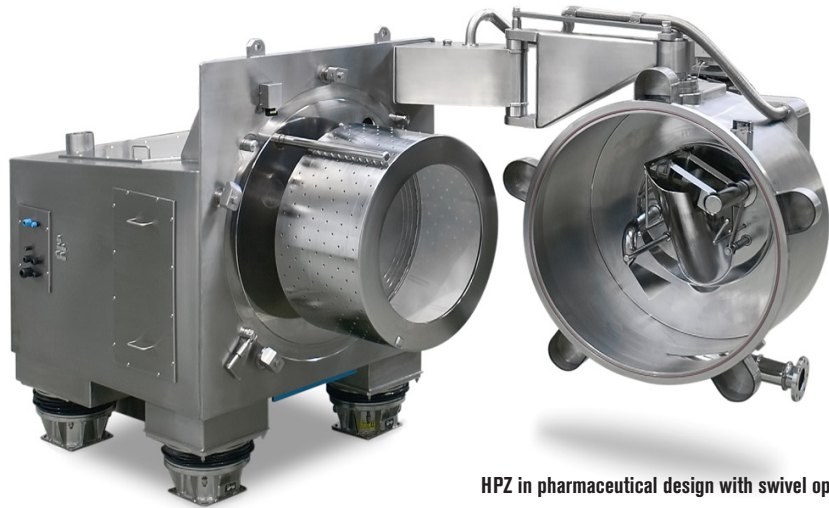
Solids discharge with discharge chute

# TYPE HPZ | PHARMACEUTICAL

## SPECIAL DESIGN FEATURES

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- + Best possible inspection of the process area and the internals
- + Optimally designed functional parts for efficient and reliable process cycles with low vibration
- + Clean room design using membrane connection
- + CIP systems, process area can be partially flooded
- + Swivel open housing and front door
- + Manual or hydraulic housing closure systems
- + Scraper knife with hydraulic, pneumatic or electric activation
- + GMP design for efficient CIP



HPZ in pharmaceutical design with swivel open housing



Solids discharge and scraper knife



Feed pipe with deflector and wash pipe

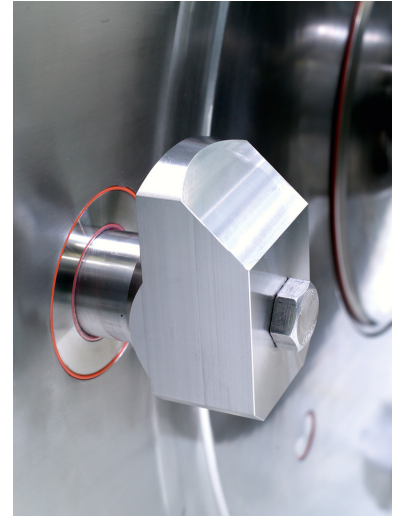


Residual heel removal (single row design)

## HOUSING CLOSURES

In addition to manual housing closures, an automatic closure system is also available. This closure system developed by Ferrum is hydro-pneumatically operated. The positions of each closure bracket are monitored using sensors. The closures are of a robust design and ensure gas-tight sealing of the centrifuge housing.

The design permits easy, reliable operation as well as the best possible cleaning and inspection of the closures and the area behind the centrifuge basket.



Automatic closure system

## CLEAN ROOM DESIGN USING MEMBRANE CONNECTION

Optionally, the centrifuge can be installed «through the wall»; as a result the machine area is separated from the centrifuge process area by a flexible membrane connection. The main drive as well as various sensors, hydraulic units, etc. are protected against aggressive vapours and solvents, and the process area from dust and dirt from the machine area.

If the clean room cannot be separated due to the situation on site, we can provide full cladding for the motor area with connections for external ventilation.



Clean room design, process area side



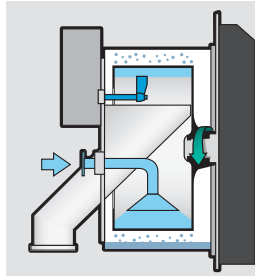
Clean room design, machine area side

# PERFECT SEPARATION

## PRINCIPLE OF OPERATION

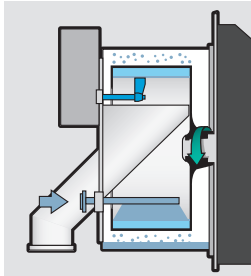
**High throughput** | Solid-liquid separation using horizontal scraper centrifuges is effected discontinuously in a sequence of specific process steps. The individual process steps last from a few minutes to several hours depending on the characteristics of the product. Depending on the type of control system, the process can be fully automatic, semi-automatic or manual.

**Filling and intermediate centrifugation**

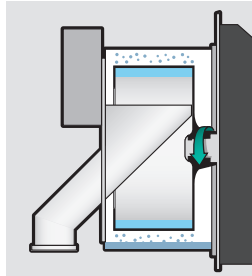


with discharge chute

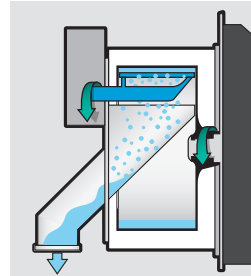
**Washing**



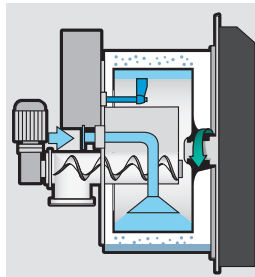
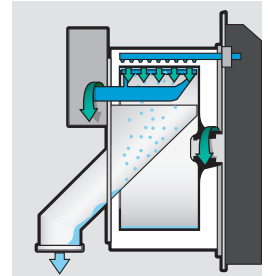
**Centrifugation**



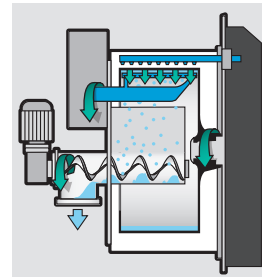
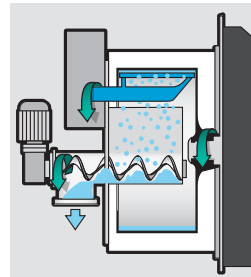
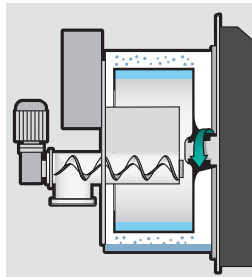
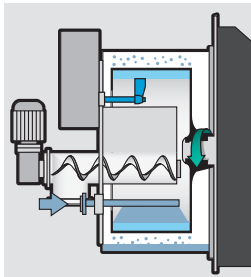
**Scraping, solids discharge**



**Residual heel removal**



with discharge screw conveyor



### Filling

The suspension is applied evenly to the centrifuge basket via a feed pipe with deflector. The fill level control prevents overfilling of the basket.

### Intermediate centrifugation

The basket accelerates to centrifuge liquid from the cake.

### Washing

After intermediate centrifugation, wash liquid is sprayed evenly on to the product cake. The liquid reaches the product cake using a wash pipe with drilled holes.

### 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 via the discharge chute. Depending on the characteristics of the product and the basket width, a discharge screw conveyor may be fitted in place of a chute.

### Residual heel removal

The residual heel can be discharged through the discharge chute using gas pressure pulses provided via nozzles outside the basket. If the process area is purged with inert gas, nitrogen is used for this process.



# CIP AND SIP SYSTEMS

## PURE AND CLEAN

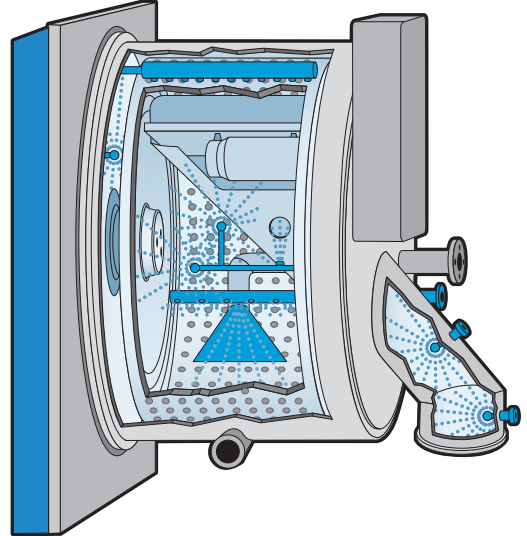
**CIP system** | For cleaning the centrifuge process area, a CIP system (Cleaning In Place) can be integrated in all our horizontal centrifuges. This system is used during a product or batch change to eliminate the risk of cross-contamination. The CIP nozzles, the feed and wash system as well as the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

**Partial flooding of the process area** | The process area can also be partially flooded. By changing the speed and direction of rotation of the basket, a «washing machine effect» is achieved, which contributes to effective cleaning of the process area.

**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 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. Riboflavintests 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



# FERRUM PROCESS SYSTEMS

## GLOBAL SUPPORT, WHEREVER YOU ARE



- LOCATIONS
- REPRESENTATIVES
- SERVICE PARTNER

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