

Horizontal scraper centrifuges
for chemical, fine chemical
and pharmaceutical applications



ferrum

2 Excellence since decades

- 1917 The Ferrum Ltd., engineering works and foundry, is founded as a family owned company in Rapperswil in Switzerland.
- 1935 For the first time Ferrum produces industrial centrifuges for the pharmaceutical and chemical industries.
- 1994 Ferrum takes over the centrifuge department of Sulzer-Escher Wyss with the complete range of pusher and scraper centrifuges, and also all the employees with their many years of experience. As a result of this take-over, Ferrum is able to significantly expand its product range and centrifuge know-how.
- Today With more than 3500 pusher centrifuges delivered as well as more than 2700 scraper centrifuges, Ferrum is a world-leading centrifuge manufacturer.



Our factory at our headquarters in Switzerland

Your benefits: A strong partner with excellent prospects!

Ferrum Ltd. is a Swiss family business and has been in the possession of the founding family since the beginning. The broad product range, the extensive know-how of the employees, the worldwide business, as well as a very high level of self-finance, ensure a very strong market position with excellent prospects for the future.

Expertise all under one roof

Ferrum offers you customer-specific complete systems from a single source and, with its unique vertical integration, guarantees the highest quality without interface problems. We build our centrifuges and automation systems in-house; we also manufacture most of the mechanical components in our foundry and production department.

Always state-of-the-art

Ferrum centrifuge systems are state-of-the-art. In collaboration with our customers we continuously further the development of our designs and automation systems, and modify them to suit the latest directives and standards.

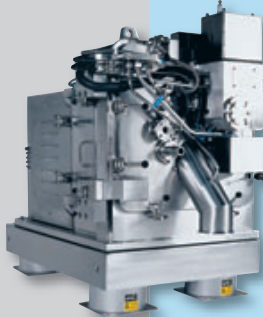
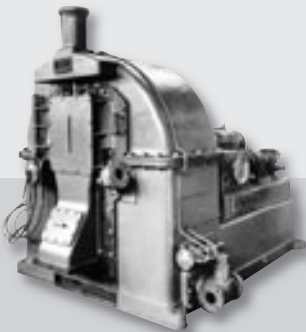
More than 75 years of horizontal scraper centrifuges from Sulzer-Escher Wyss and Ferrum!

75 years of experience flow into the development work: in 1935 Escher Wyss began to build horizontal scraper centrifuges, and since the take-over of the related department in 1994, Ferrum has developed the most advanced horizontal scraper centrifuges for solid-liquid separation in the chemical, fine chemical and pharmaceutical industries.

Chemical applications

ESCHER WYSS

ferrum



Pharmaceutical applications

1935

1970

1985

1995

2005

today



Scraper centrifuges HCZ 1600



Scraper centrifuge HPZ 1250

Custom solutions

Configuration

Our process engineers configure the centrifuges and peripheral components to suit the specific application in accordance with your requirements. With more than 6200 centrifuges delivered, we can draw on extensive experience in the area of solid-liquid separation.

Product tests

Product tests are undertaken as required at our test stand, in the fully equipped laboratory or directly on your site. On request we will optimise your existing installations on-site and undertake semi-industrial tests.

It is our objective, in collaboration with you, to realise trouble-free solid-liquid separation with maximum performance, minimum energy consumption and consistent, reproducible product quality.



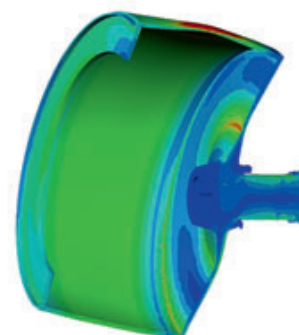
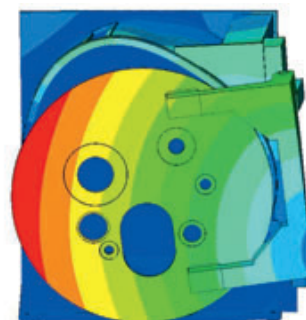
Our centrifuges – your benefits!

During development work our engineers simulate loads on the centrifuge structure using finite element analyses. In addition, we subject the centrifuges to comprehensive function, process and cleaning tests at our test stand.

Our designs and automation systems are continuously adapted to the latest directives and standards.

With our centrifuge systems we guarantee you the following benefits:

- High solids throughput with low energy consumption
- Gentle product discharge
- High wash efficiency
- Low residual moisture content
- Maximum functionality
- Efficient cleaning and best inspection
- Low-vibration operation
- Absolute reliability and durability
- Low maintenance costs



Finite element analyses

Application areas

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, reaching from pilot plants and small-quantity productions to continuous production applications.

Pharmaceutical centrifuges are used for products that can be filtered with solids concentrations from 2 w% and particle sizes of min. 4 μm . For chemical centrifuges the corresponding figures are little higher.



Scraper centrifuges HPZ 1250

Some application examples

- Pharmaceutical: API, antibiotics, salicylic acid, pharmaceutical intermediate products, etc.
- Fine chemical: herbicides, pesticides, dyes, cosmetics, etc.
- Food industry: lysine, proteins, starches, sweeteners, vitamins (C, A, K, etc.), etc.
- Special applications: ABS, iron sulphate, melamine, etc.

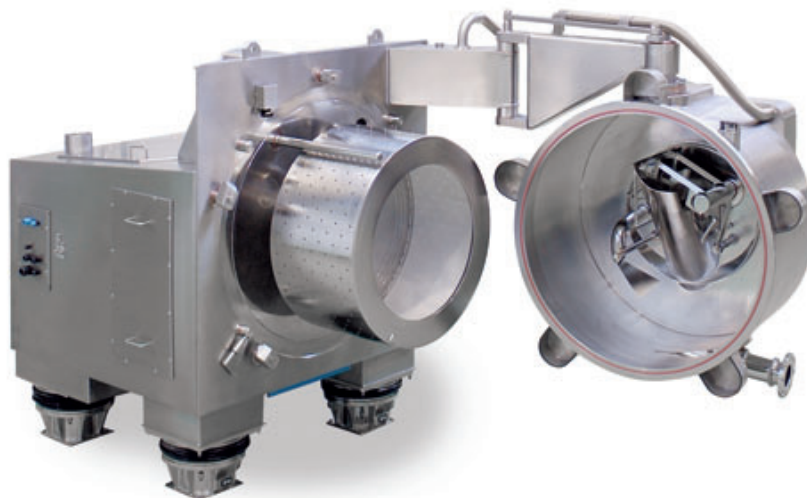
Type HPZ horizontal pharmaceutical scraper centrifuges

Principle of operation and applications

The HPZ scraper centrifuges (horizontal pharmaceutical centrifuge) work discontinuously; the solids are discharged through a chute or screw conveyor.

The applications range from pilot plants, small-quantity productions to production applications in the demanding pharmaceutical industry.

To inspect the process area and the internals, the entire housing is swivelled open. An optional front door further eases and improves inspection.



Special design with enclosed motor compartment

Design features

- Best inspection of the process area and the internals
- Robust and reliable design in accordance with the latest standards, directives and GMP requirements
- Optimally designed functional devices for efficient and reliable process cycles with low vibration
- Reliable sealing of the bearing housing with the latest generation sealing systems
- Easy maintenance thanks to modular design
- Suitable for Ex zone 1 (according to directive 94/9/EC)

Modularity and optional equipment

We can optimally adapt our latest HPZ centrifuges to your needs due to their modularity and the comprehensive optional equipment:

- Clean room design using membrane connection
- Systems for effective residual heel removal, even for products that are difficult to remove
- CIP systems, process area can be partially flooded
- Various diagnostic and monitoring systems
- Pressure vessel design on request
- Ferrum InertoSafe® inertisation systems (ATEX, SIL 2 certified)



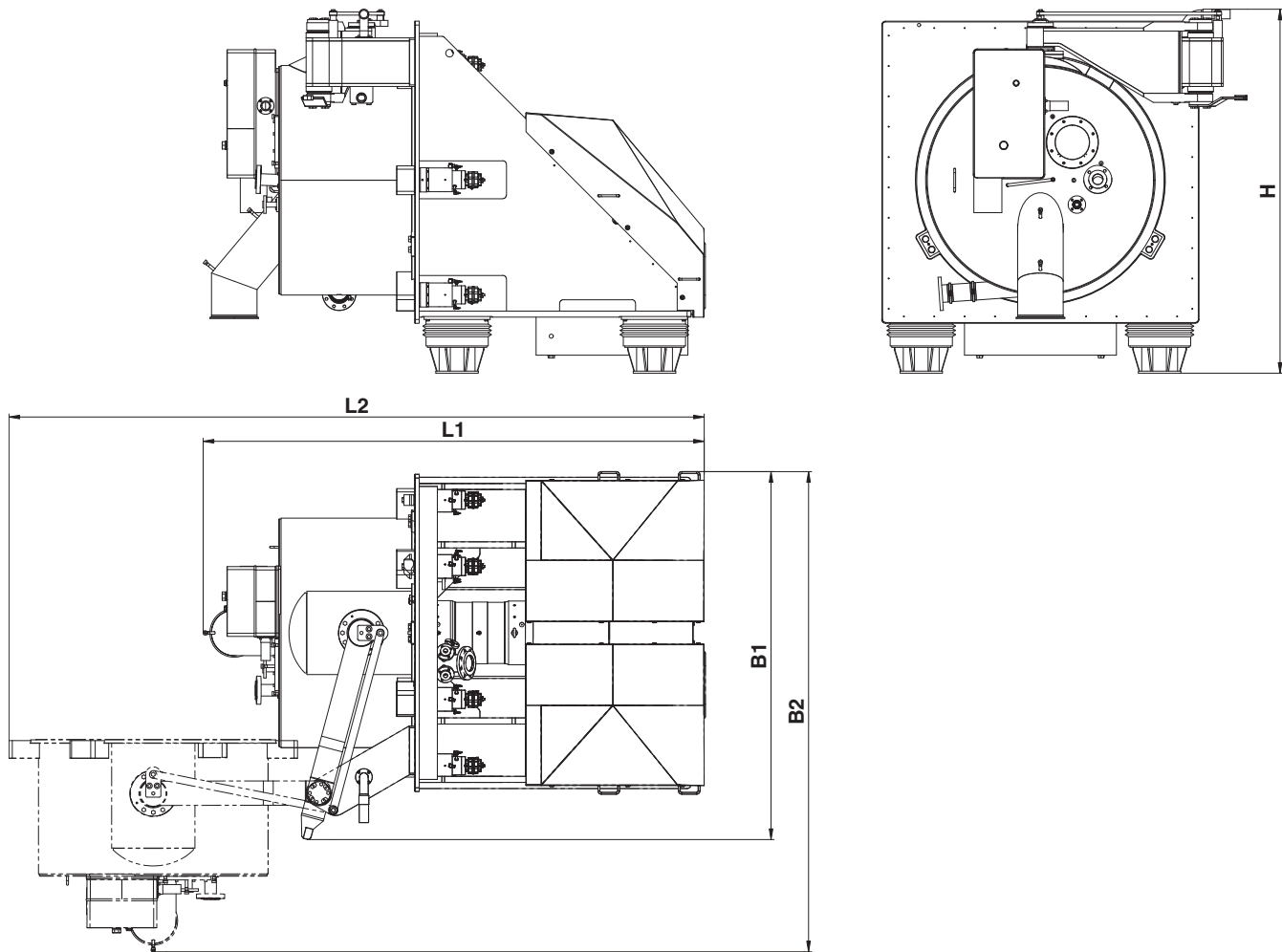
Solids discharge and scraper knife



Feed pipe with deflector and wash pipe



Residual heel removal (single row design)



HPZ	630/320	800/400	1000/500	1250/600	1600/800	Unit
Dimensions						
L1	2015	2275	2900	3215	3750	[mm]
L2	2745	3025	3740	4495	5300	[mm]
B1	1450	1600	1855	2386	2890	[mm]
B2	2010	2300	2690	3125	4040	[mm]
H	1645	1850	2330	2400	2950	[mm]

Technical data						
Basket diameter	630	800	1000	1250	1600	[mm]
Basket depth	320	400	500	600	800	[mm]
Basket opening	485	620	754	940	1200	[mm]
Filter surface	0.63	1.01	1.57	2.36	4.02	[m ²]
Useful volume (100%)	41	80	169	320	704	[dm ³]
Max. load	51	100	212	400	880	[kg]
Max. rotor speed	2400	1900	1500	1200	950	[min ⁻¹]
Max. G force	2028	1614	1258	1006	807	[g]
Centrifuge weight (without load)	4900	7300	9800	14000	22000	[kg]
Basket mass (1.4404)	150	280	440	830	1620	[kg]
Motor power for main drive	7.5	15.0	22.0	30.0	45	[kW]

Design pressure: 300 [mbarg], operating pressure: 4-20 [mbarg], gas tightness: 40 [mbarg], product temperature range: 0-80 [°C], ambient temperature: 0-40 [°C], other pressure and temperature ranges as well as motor sizes upon request

Good accessibility for best inspection

The swivel open housing permits optimum inspection behind the centrifuge basket. A swivel open front door is optionally available to open the housing. This door ensures optimum inspection of the internals of the centrifuge door.

Housing closures

Instead of the manual housing closures, an automatic closure is also available.

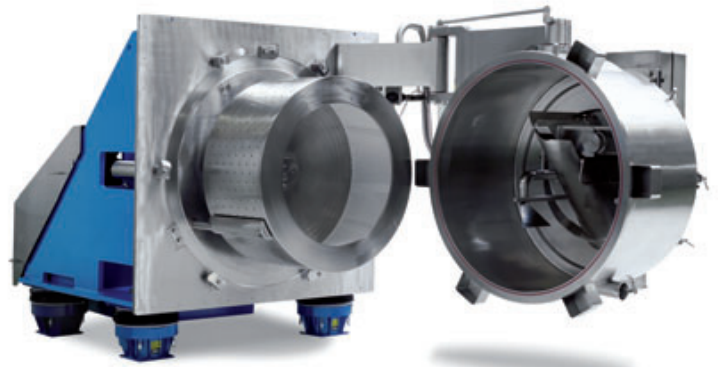
This closure system developed by Ferrum is hydro-pneumatically operated. The individual positions of the closure hooks are monitored using sensors. The closures are of a robust design and ensure leak-proof sealing of the centrifuge housing.

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.

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 membrane connection. The main drive as well as various sensors, units, etc. are therefore protected against aggressive vapours and solvents.

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



Swivel open housing



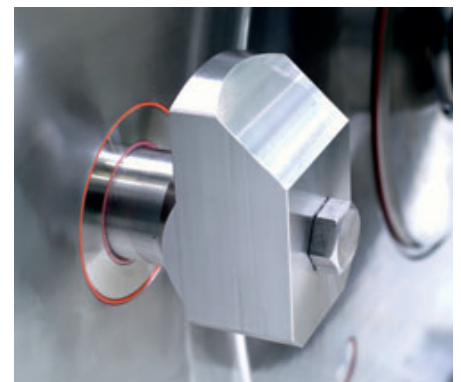
Swivel open front door



Clean room design, process area



Clean room design, machine area



Closure system

CIP system

For cleaning the centrifuge process area, a CIP system (Cleaning In Place) can be integrated. 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 clean the process area.

SIP system

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

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

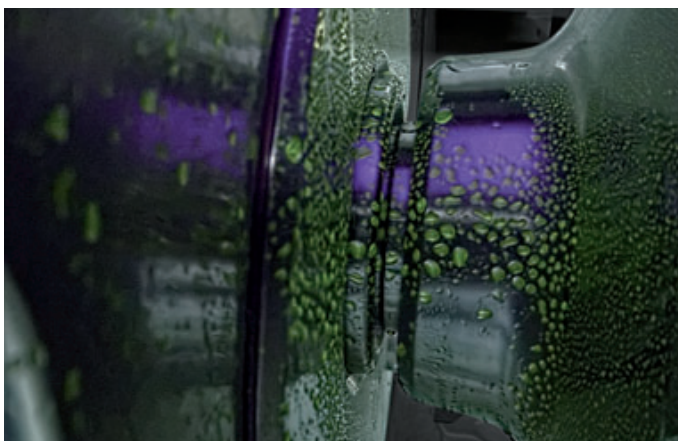
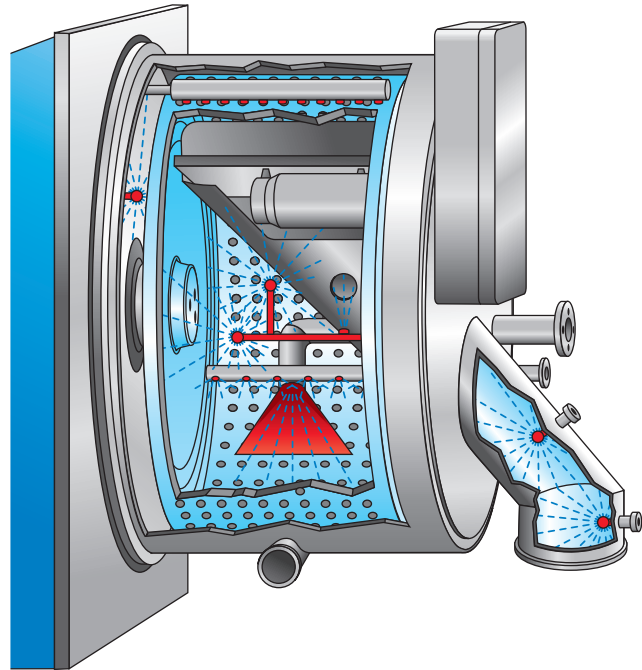
Our designs comply with the latest GMP directives. The hygienic cleaning of the process area is made possible by a clean finish, excellent surface quality, compliance with minimum radii and the use of FDA-approved open O-rings.

Low solvent consumption

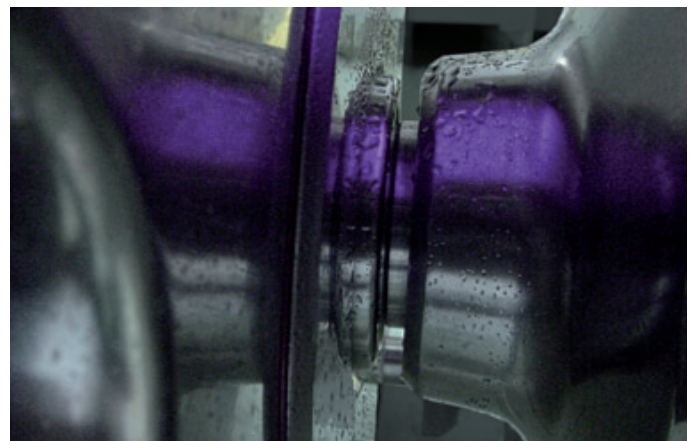
The compact design as well as optimised cleaning programs ensure efficient cleaning with low solvent consumption.

Riboflavin tests

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 will be demonstrated on request during the FAT (Factory Acceptance Test).



*Prior to the CIP program:
riboflavin is made visible with UV light*



*After the CIP program:
in UV light no more riboflavin residue is visible*

Type HCZ horizontal chemical scraper centrifuges

Principle of operation and applications

The HCZ scraper centrifuges (horizontal chemical centrifuge) work discontinuously; the solids are discharged through a chute or screw conveyor.

This type of centrifuge was specially designed for high throughputs and continuous operation under the toughest conditions in the chemical and fine chemical industry.

Design features

- Designed for high throughputs and continuous operation under the toughest conditions
- Very robust, reliable design in accordance with the latest standards and directives
- Sealing of the bearing housing with the latest generation sealing systems
- Easy maintenance due to modular design
- Suitable for Ex zone 1 (according to directive 94/9/EC)

Modularity and optional equipment

We can optimally adapt our latest HCZ centrifuges to your needs due to their modularity and the comprehensive optional equipment:

- Systems for effective residual heel removal, even for products that are difficult to remove
- Cleaning systems
- Various diagnostic and monitoring systems
- Pressure vessel design on request
- Ferrum InertoSafe® inertisation systems (ATEX, SIL 2 certified)



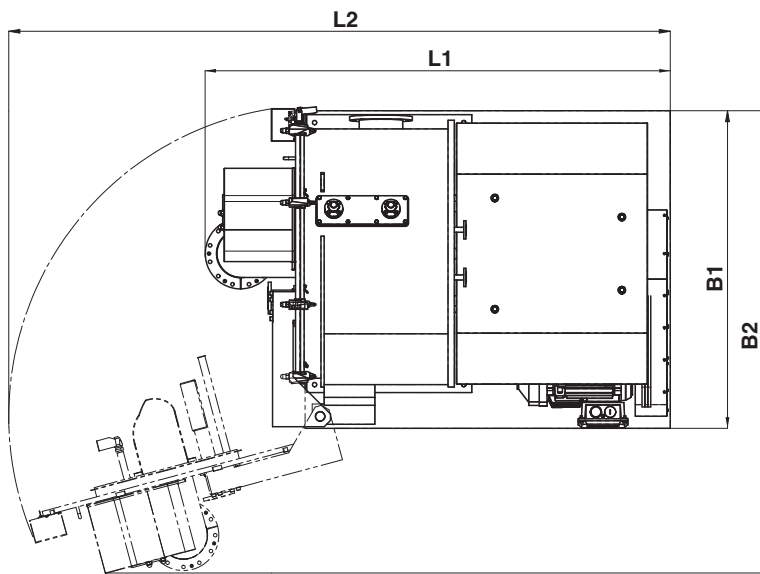
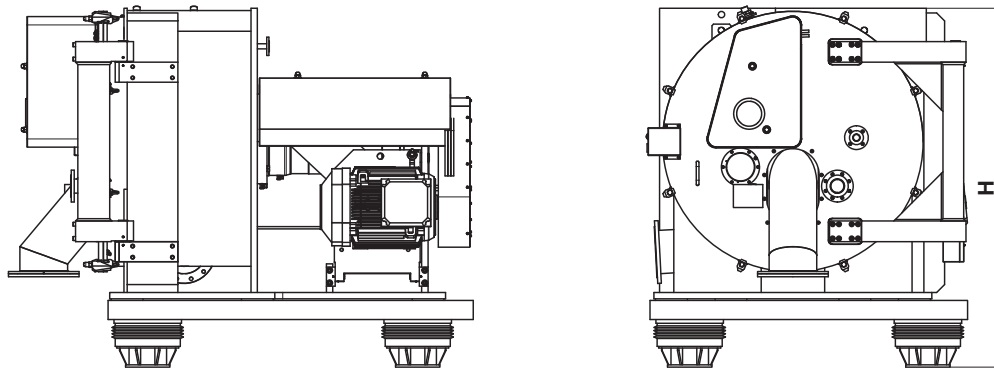
Feed pipe with deflector



Centrifuge basket



Residual heel removal (single row design)



HCZ	1000/500	1250/630	1250/800	1600/800	1600/1000	1800/1250	2000/1250	Unit
Dimensions								
L1	2300	2930	3100	3585	3785	4420	5300	[mm]
L2	3300	4165	4335	5060	5260	5900	6780	[mm]
B1	1750	2000	2000	2600	2600	3000	3400	[mm]
B2	2530	2915	2915	3600	3600	4100	4600	[mm]
H	1900	2260	2260	2850	2850	3150	3450	[mm]

Technical data								
Basket diameter	1000	1250	1250	1600	1600	1800	2000	[mm]
Basket depth	500	630	800	800	1000	1250	1250	[mm]
Basket opening	750	950	950	1'210	1210	1350	1500	[mm]
Filter surface	1.57	2.47	3.14	4.02	5.03	7.07	7.85	[m ²]
Useful volume (100%)	172	326	414	688	860	1392	1718	[dm ³]
Max. load	215	408	518	860	1075	1740	2150	[kg]
Max. rotor speed	1500	1200	1200	950	950	800	700	[min ⁻¹]
Max. G force	1258	1006	1006	807	807	644	548	[g]
Centrifuge weight (without load)	7900	13000	13500	26000	28500	41000	52000	[kg]
Basket mass (1.4404)	495	650	710	1680	1780	2490	3250	[kg]
Motor power for main drive	37	55	55	75	75	132	160	[kW]

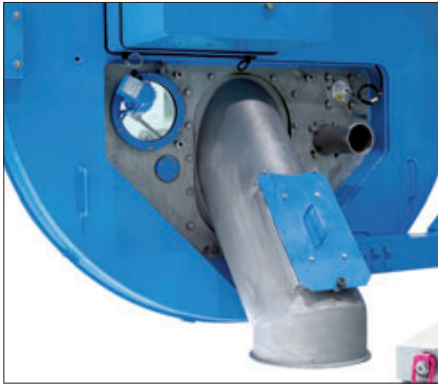
Design pressure: 300 [mbarg], operating pressure: 4-20 [mbarg], gas tightness: 40 [mbarg], product temperature range: 0-80 [°C], ambient temperature: 0-40 [°C], other pressure and temperature ranges as well as motor sizes upon request

Robust design for continuous operation

The various internals and components are of 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 to the filtrate cake and scrapes out the product. Depending on the characteristics of the product and basket width, the solids are emptied via a discharge chute or a discharge screw conveyor. In the case of the chute, the product is discharged on its smooth surface, and in the case of the discharge screw conveyor the product is discharged using a screw conveyor mounted in the front door.



Solids discharge with discharge chute



Solids discharge with discharge chute



Solids discharge with discharge screw conveyor

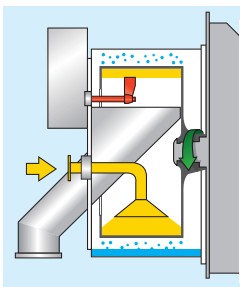


Solids discharge with discharge screw conveyor

Process of solid-liquid separation

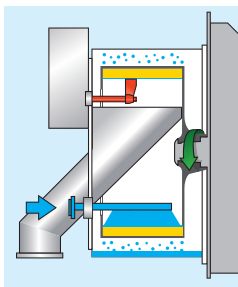
The solid-liquid separation is effected discontinuously in a sequence of specific process steps. The individual process steps last from a few minutes to several hours depending on the characteristics of the product. Depending on the type of control system, the process can be fully automated, semi-automated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

Filling and Intermediate centrifugation

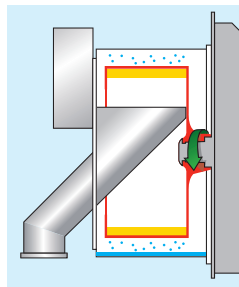


With discharge chute

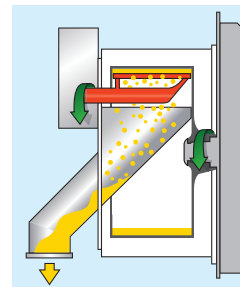
Washing



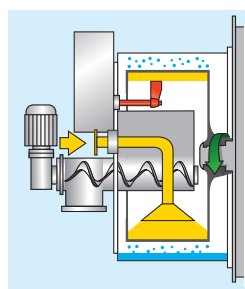
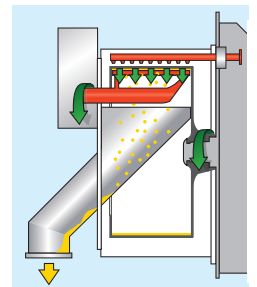
Dry-centrifugation



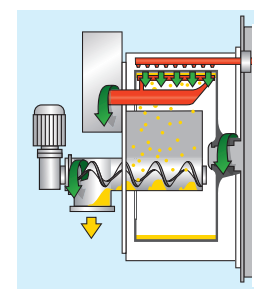
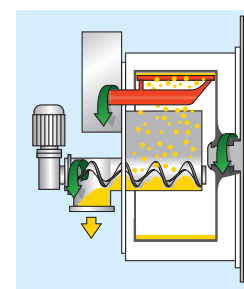
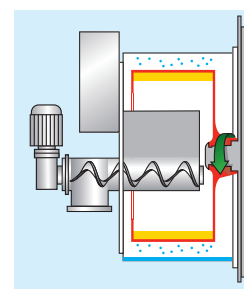
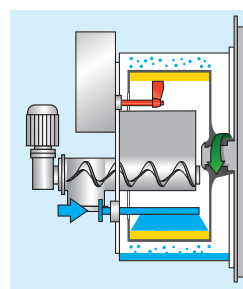
Scraping, solids discharge



Residual heel removal



With discharge screw conveyor



Filling

The suspension is evenly applied 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 the liquid from the cake.

Washing

After the intermediate centrifugation, wash liquid is evenly applied to the product cake. The liquid reaches the product cake via the wash pipe.

Dry-centrifugation

After washing, centrifugation takes place until the required residual moisture content in the filter cake is achieved.

Scraping, solids discharge

At reduced speed, the scraper knife swings into the filter cake and scrapes the product out vertically downward via the discharge chute. Depending on the characteristics of the product and basket width, a discharge screw conveyor may be fitted instead of the chute.

Residual heel removal

To protect the filter cloth clamped in the basket, during scraping a residual heel of product is left on the filter cloth. This heel may prevent fine content in the filtrate passing through the filter cloth during subsequent batches. The residual heel is removed after each batch, or periodically, to suit the specific application. The heel can be blown out via 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.

Efficient automation of centrifuge systems

The automation of centrifuges is of central importance at Ferrum.

Ferrum has invested many years of effort into the development of centrifuge automation. Proven, standardised hardware and software modules are used as a basis and are supplemented with customer-specific elements.

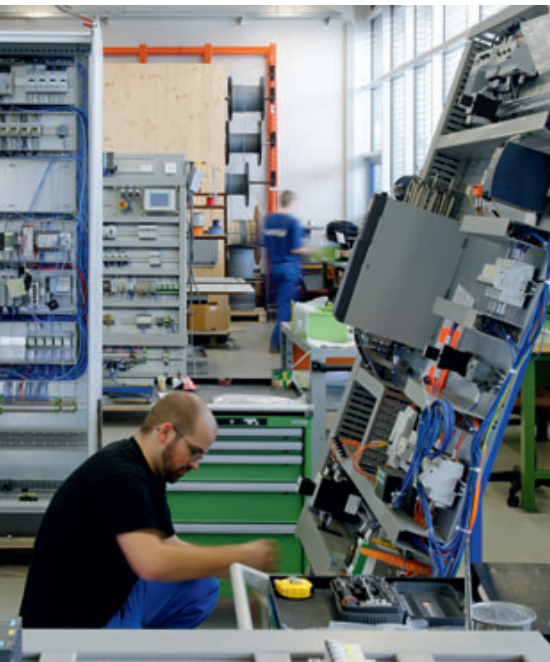
Overview of the range of control systems and drives

- 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
- Regenerative breaking unit, sensors and measurement acquisition
- Interface to process control systems, remote maintenance
- Explosion protection up to Ex zone 1 (according to directive 94/9/EC)
- Documentation: diagrams, concept descriptions, operating instructions, safety certificates, etc.
- Commissioning of complete systems on-site

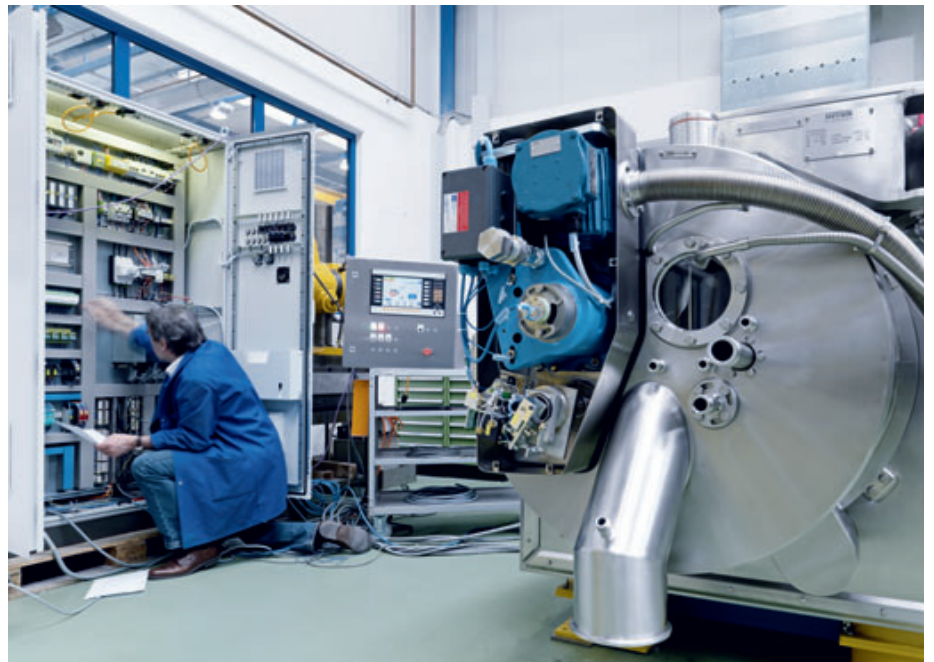
Drive systems and safety control systems

Our drive systems and safety control systems guarantee a safe, optimised operation of the centrifuge. The systems are state-of-the-art. They are continuously further developed and adapted to our risk analyses as well as the latest directives and standards.

Frequency converters of the latest generation with integrated safety functions are used to control the speed.



Ferrum automation department: design and assembly of drive and control systems



Automation system with terminal, control and drive system

Control systems and terminals for best possible ease of use

The control and information display software permits easy operation and control of the solid-liquid separation process.

Due to our extensive range of different control systems and components from leading suppliers, we efficiently implement comprehensive customer requirements.

Ferrum supplies simple operator panels on which the basic functions are controlled manually using pushbuttons, up to fully automatic process control systems with visualisation for multiple product systems.

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



Terminal with pushbuttons



Eco-terminal with visualisation



Terminal with process visualisation

If the centrifuge process area is classified as an explosive zone, the machine must be purged with inert gas (e.g. nitrogen). The certified inertisation systems developed by Ferrum, InertoSafe® SIL 2 and InertoSafe® ATEX guarantee you safe, trouble-free operation.



Ferrum InertoSafe® SIL 2

- For the inertisation of vessels of any type
- SIL 2 (EN 61511) certified inertisation system with control system
- Based on N₂ flow rate and pressure monitoring, O₂ measurement optional
- Independent system – no validation costs
- SIL 2 (EN 61511) validation certificate included
- UL, CSA certificates for all instruments



Ferrum InertoSafe® ATEX

- Can be used on all Ferrum centrifuges
- ATEX certified
- Based on N₂ flow rate and pressure monitoring, O₂ measurement optional
- Monitored by the centrifuge control system
- UL, CSA certificates for all instruments

Ferrum supplies various peripheral components that are required for the operation of the centrifuge. If necessary, these components can be integrated into the customer's or Ferrum's control system.

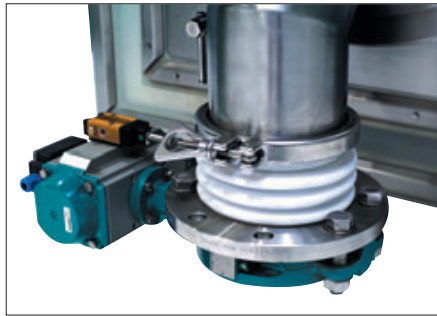
- Various valves and butterfly valves
- Flexible connections and flow sight glasses
- Siphons and pressure relief valves to ensure the nitrogen overpressure is maintained in the centrifuge
- CIP collectors and valves for the regulation of the CIP cleaning cycles
- Collectors on the centrifuge for the management of the control air, the nitrogen and the hydraulic oil
- Pilot valve blocks for the control of various system parts



Siphons



Pressure relief valves



Valves, flexible connections

Project management and documentation

Efficient project management

From project start (kick-off) through acceptance (FAT) in our factory to commissioning (SAT) on your site, our project managers guarantee professional project management.

Together we will run through the various approval as well as project phases based on an agreed schedule.

Clear documentation

With our centrifuges we supply detailed customer-specific documentation. This documentation includes documents to meet obligations as per customer specification (e.g. 3.1 Certification), various

documents to support DQ/IQ/OQ, AS BUILT documents, data sheets, operating manuals as well as a clear spare parts catalogue.



Customer-oriented Aftersales service



Overview of our range of services

- Large stock of spare parts
- Prompt and uncomplicated support from our customer service team
- Worldwide service centres
- Maintenance, inspections, maintenance contracts based on BGR 500
- Various modifications, upgrades and integration of new drive and control systems
- Customer-specific training

Customer service and consultation

A large team of experienced service specialists as well as various service centres are available to our customers worldwide. This way we ensure uncomplicated support as quickly as possible.

Large stock of spare parts

We maintain a large stock of spare parts at our factory in Schafisheim. Our inventory and careful stock management ensure continuous availability and short delivery times.

Reliable Ferrum used equipment

Know-how from the original equipment manufacturer

As the original supplier we make available to you our decades of centrifuge know-how. We therefore offer optimum consultation and support to implement customer-specific requirements.

Safe operation of used centrifuges

We know which regulations must be met and which modifications are necessary to ensure the safe operation of the used machine on your site.

Short delivery time and 12 month guarantee

With short delivery times, a 12 month guarantee as well as an excellent price-performance ratio, Ferrum offers you used equipment as an interesting alternative to new machines.

Complete overhaul

The centrifuges are completely overhauled in our factory in Switzerland and are subjected to various function tests and safety tests.

Application-specific modifications

If required we will modify the machine to suit your requirements using optional equipment and special designs. The latest drive and control systems can also be integrated.

Detailed documentation

With the centrifuge we supply a detailed documentation, including a corresponding spare parts catalogue.





*PM-230
Pusher centrifuge – Chemical applications*



*P-32 to P-50
Pusher centrifuges – Chemical applications*



*P-60 to P-120
Pusher centrifuges – Chemical applications*



*VBC 1000 – 1600
Vertical scraper centrifuges
Chemical, pharmaceutical applications*



*HPZ 630 – 1600
Horizontal scraper centrifuges
Pharmaceutical applications*



*HCZ 1000 – 2000
Horizontal scraper centrifuges
Chemical applications*



*VTC 630 – 1600
Vertical top discharge centrifuges
Chemical, pharmaceutical applications*



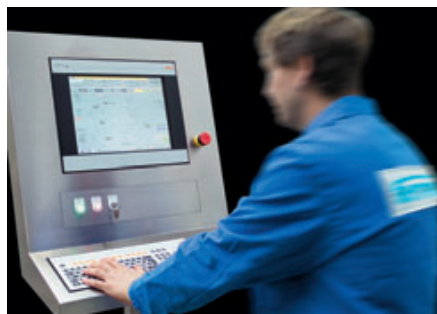
*VTC 320 – 500 mobile systems
Vertical top discharge centrifuges
Chemical, pharmaceutical applications*



*VTC 320 – 500 isolator centrifuges
Vertical top discharge centrifuges
Pharmaceutical, HAPI applications*



*Inertisation systems
Ferrum InertoSafe® SIL 2,
Ferrum InertoSafe® ATEX*



*Automation – Customer-specific control and
drive solutions, explosion protection up to
Ex zone 1 (according to directive 94/9/EC)*



*Used equipment at good value
Overhaul incl. function tests by Ferrum Ltd.,
short delivery times, 12 month guarantee*



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