

HEINKEL®

PAC®-System



HEINKEL

Excellence in separation

HEINKEL is a globally operating company whose 120 year history has been characterised by successful innovation and technological breakthrough. Today 150 employees contribute to the production of life science products through you our customers – products which help millions of people worldwide to lead longer, healthier and happier lives.

HEINKEL stands for leading solutions in the separation of solids and liquids for the Life-Science Industry (Pharmaceuticals, Fine Chemicals and Biotechnology)

Wherever high value solids, for example, APIs, speciality chemicals, and vitamins are separated from a liquid stream HEINKEL can be found. HEINKEL centrifuge technology will be at the centre of the solid from liquid isolation plant to ensure production continuity to the highest standards.

HEINKEL's success is based on a deep understanding of the processes our technology supports, a competence in developing innovative technologies and an appreciation of production quality and safety standards.

Our customers' choose HEINKEL because of our experience and expertise and the guarantee of the best after sales service support.

HEINKEL's excellent solutions ensure reliable, effective and safe production for our customers

HEINKEL is an international leader in the supply of separation systems. Our goal is to be as close to our customers as possible to achieve the highest level of customer satisfaction. We understand what is required to be a true partner and will deliver. HEINKEL's service is professional and comprehensive from the start of the project and throughout the life cycle of the separation system.

HEINKEL's technicians who are experienced and fully trained are available through our world-wide network of service centres. We guarantee to keep your plant operational, safe and delivering products to satisfy your output and quality standards.

HEINKEL's expert process engineers will support you in optimizing your solid from liquid separation processes from project initiation to completion. Rental machines and our technology centre are available to test your product.

As a reliable partner to our customers we meet today's standards and tomorrow's challenges.

HEINKEL's customers achieve the best possible results through our co-operation and assistance. HEINKEL's approach and attitude delivers quantifiable added business value to our customers' business.

Our size and organisation enables us to react quickly and with flexibility to your current and future requirements.

Committed and competent employees are the key to complete customer satisfaction. All of our people are characterised by a continuous endeavour to achieve higher quality, reliability and zero defects. We want to continue to develop as a company of excellence in every aspect. We will employ the best people and invest in them through the best available training and personnel development programmes.

The HEINKEL PAC®-System

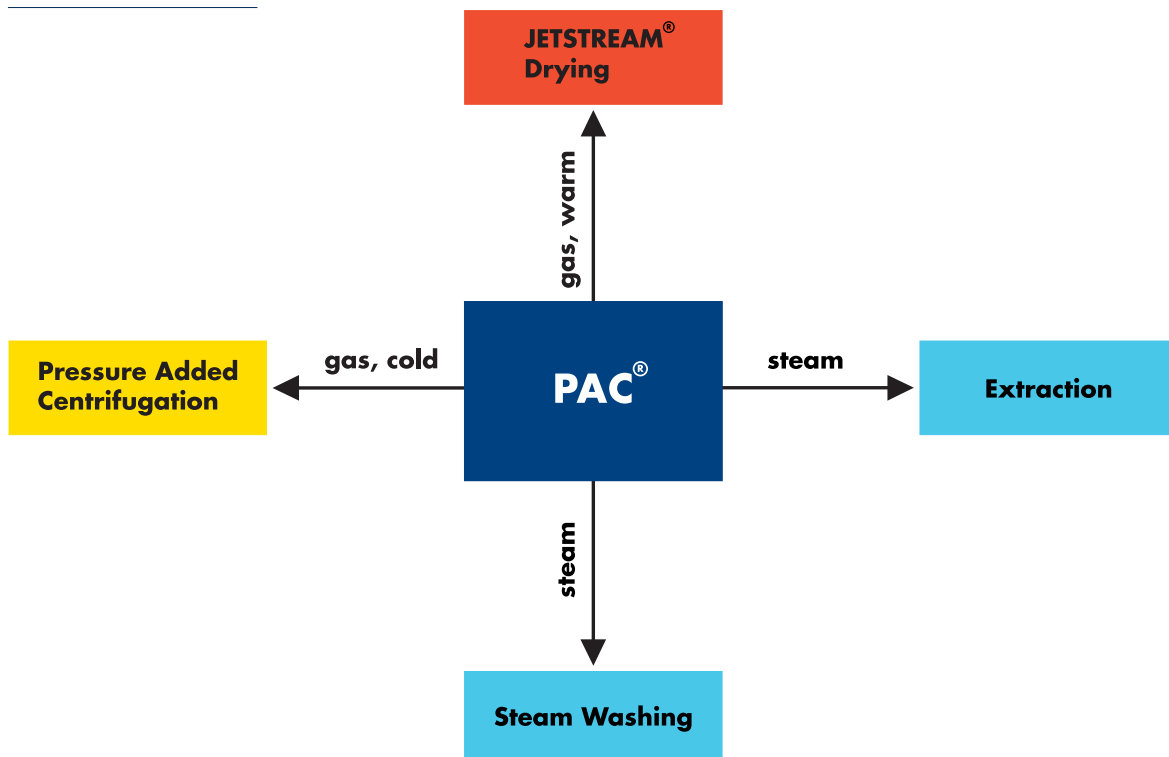
The optimum upgrade for your Inverting Filter Centrifuge

New process possibilities The PAC®-System developed and patented by HEINKEL is offered as an upgrade to increase the flexibility of HEINKEL Inverting Filter Centrifuges HF.

Installation of the system on a HEINKEL Inverting Filter Centrifuge HF opens up four further process applications:

- Pressurised centrifugation with HYPERCENTRIFUGATION®
- Fixed bed drying with JETSTREAM®-Centrifugation
- Steam wash of the filter cake
- Extraction processes

The PAC®-System design is based on a rotating pipe through which pressurized gas, steam or solvents are introduced to the process chamber.



Pharmaspecific Design

Successfully avoid seal wear and contamination



Avoidance of seal wear and product contamination

Inherent in the design of HEINKEL centrifuges is a virtually pressure tight bowl. However, there is a gap between the feed pipe and the bowl which needs to be sealed to avoid annoying and inadmissible seal wear in the product area.

All dynamic seals outside the process area

We presented this particularly challenging situation to our designers who developed a reliable, robust and safe solution. All dynamic seals are placed outside the process area. The fixed feed pipe of the HEINKEL Inverting Filter Centrifuge HF was replaced by a rotating one, which is turned by the same drive as the rotating bowl.

No movement between bowl and feed pipe

If the process necessitates it, the centrifuge bowl can be sealed from atmosphere by rotating the feed pipe of the PAC®-System at a speed synchronous to the speed of the rotating bowl.

Automated control of seal inflation

The sealing of the bowl is accomplished via a membrane type seal which is inflated during the PAC® phase of the centrifugation process.

Advantages of the PAC®-System

Convincing process opportunities

Flexible and versatile: HEINKEL Inverting Filter Centrifuges HF with PAC®-System offer the complete process flexibility required in multi production sites

Increased production: the capacity of an installed Inverting Filter Centrifuge can be increased with the addition of a PAC®-System

Improved product handling: Many products can be handled more effectively as a result of reduced liquid content

Fast separation: separation of products which are difficult to filter within relatively short cycles

Compressible solids: separation of compressible solids possible on a centrifuge

Fixed bed drying possible: addition of warm gas enables fixed bed drying in HEINKEL centrifuges (JETSTREAM®-Centrifugation)

Reduced volumes of wash media: option of steam washing of thermally stable products to reduce the consumption of wash media

Extraction: Apply the Inverting Filter Centrifuge HF for steam extraction

A system which can be retrofitted: a benefit of the HEINKEL modular design approach is that the PAC®-System can be easily fitted to installed machines

Normal housing pressure: Outer housing of the centrifuge remains under atmospheric pressure

No special approval required: A centrifuge with a PAC®-System is not subject to the pressure vessel directive

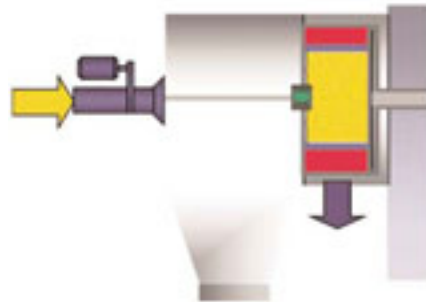
All feed pipe seals FDA approved

Low contamination risk: The HEINKEL sealing system ensures that the contamination risk is minimised

Pressurised Centrifugation

Reduced moisture and increased capacity

Pressure centrifugation



Isolation of a solid characterised by particles of very small diameter (< 80µm). This type of particle forms a finely porous filter cake with high capillary forces which make it particular difficult to remove liquid within the product stream. The addition of the additional pressure provided by the PAC®-System helps the centrifugal forces to drive of the liquid.

Low rotary speed prevents compaction

Two main benefits are:

- Reduction of residual moisture
- Capacity increase through reduced cycle time

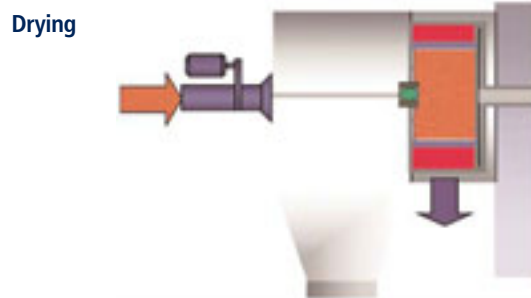
Another application for pressurised centrifugation is the separation of compressible materials where the filter cake tends to compact under high rotary speeds. The flow of liquid through the filter cake is consequently restricted loading, washing and draining necessitating significantly longer cycle times. HYPERCENTRIFUGATION® enables operation at low rotary speeds reducing the tendency of the isolated product to compact and resulting in lower residual moisture. Solids which previously could not be processed can now be separated effectively using all the other advantages of the HEINKEL Inverting Filter Centrifuge HF.

Examples

Product	Residual Moisture Centrifugation	Residual Moisture with HYPERCENTRIFUGATION®
Antiallergical substance	30 %	11%
Alkaloid	45 %	32 %
Food Additive	22%	5%
Metal Powder	26 %	12 %
Silicon Carbide	19 %	6 %
Vitamin	39 %	24 %

Drying

With JETSTREAM®-Centrifugation a dryer becomes obsolete



The advantages of one system isolating and drying the product are evident to the pharmaceutical, fine chemical and their intermediates manufacturer. These benefits are particularly important when processing, for example, high potency compounds.

High flow through speeds

JETSTREAM®-Centrifugation in the HEINKEL Inverting Filter Centrifuge HF is a particularly appropriate solution in this application.

Even drying of temperature sensitive products possible

The method of operation is similar to HYPERCENTRIFUGATION®. The inside of the bowl is pressurised with gas, but the gas is introduced at temperatures between 40°C and 100°C. Drying of heat sensitive products is possible. The extraordinary principle of centrifuge drying is also used in the innovative HEINKEL Centrifuge Dryer HD. You can find details in our brochure HEINKEL Centrifuge Dryer HD.

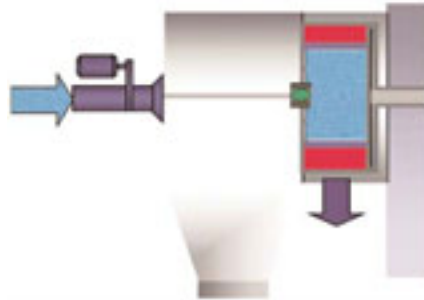
Examples

Product	Residual Moisture Centrifugation	Residual Moisture with JETSTREAM®-Centrifugation
Sodium Ascorbate	4,5 %	< 0,01 %
Mebhydrolynsalt	15,0 %	< 0,1 %
Acetyl Salicylic Acid	7,0 %	< 0,02 %
Food Colouring	7,8 %	0,2 %
Tenside	39,4 %	< 0,4 %
Penicillin	13,7 %	< 0,5 %

Steam Wash

Shorter cycle times and less wash filtrate

Steam wash



After isolation of the solids there is often a wash function implemented as part of the centrifugation process. A particularly efficient method of washing contaminants from the isolated product is by the introduction of steam. This is a useful alternative to the traditional displacement wash with liquids or re-suspension in a wash medium.

The process of steam wash

During the steam wash the bowl is fed with steam, which slowly flows through the filter cake from inside to outside. During this process the filter cake is heated to the condensation temperature of the steam. The resulting condensate is spun from the filter cake through the rotation of the bowl and discharged through the filtrate housing.

The steam wash is complete when the condensation front breaks through the filter cake.

The advantages at a glance

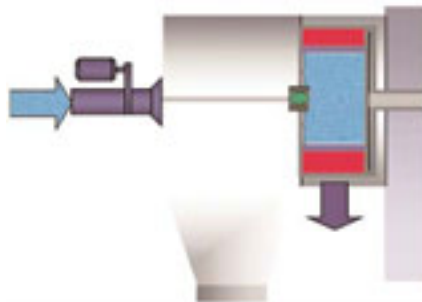
The process advantages of the steam wash include:

- Shorter cycle times: In comparison to liquid washing the cycle times are reduced and solid throughput per square metre of filter surface increased significantly
- Increased speed of diffusion through the entire product bed often removing the need for a displacement solvent wash
- Saves time: By reducing residual moisture and increasing energy in the isolated solid the time required for the subsequent drying step will be reduced
- Reduced amounts of wash filtrate thus reducing the costs for its treatment

Extraction

Less extract with higher yield

Extraction



Extraction is when the filtrate not the solid is the target of the process. The principle of operation is the same as with steam washing, however, the condensate is collected once it has passed through the bed of isolated product. It is this condensate which contains the valuable substance.

The advantages of extraction

The process advantages of extraction on an Inverting Filter Centrifuge include:

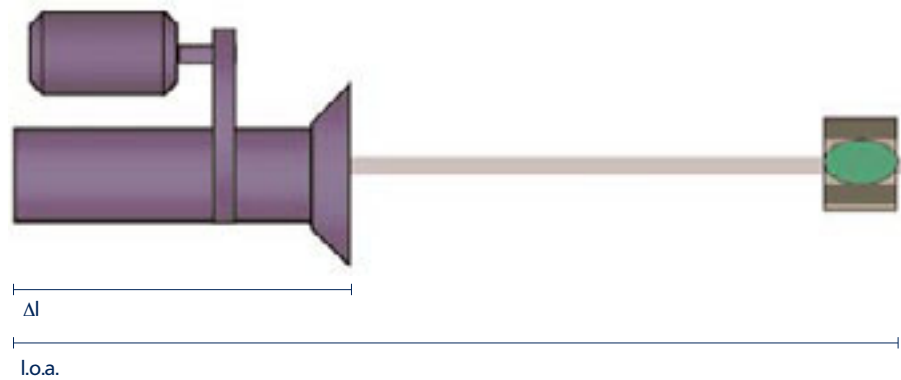
- Reduction of residual moisture and therefore improved quality of the product within the filter cake leads to significantly higher yield
- Reduction of the amount of extract, which needs to be treated or evaporated in subsequent process steps
- Compact equipment design

Fields of application

Extraction on Inverting Filter Centrifuges is applied among other fields to gain active substances from plant materials, which are used in the production of homeopathic substances as well as aromas and fragrances.

Technical Data

In detail



	PAC [®] 1	PAC [®] 2	PAC [®] 3
Overall Length l.o.a. in mm	883	1151	1516
Length l in mm	525	532	637
Operating Pressure in bar	2-6	2-6	2-6
Gas consumption in Nm ³ /h			
HYPERCENTRIFUGATION [®]	10	10	10
JETSTREAM [®]	100-300	200-800	600-1800
Steam wash	5	5	5
Extraction	5	5	5
Applicable in these machines	HF 300	HF 450/HF 600	HF 800/HF 1000

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