Krauss-Maffei HZ Ph peeler centrifuge for the pharmaceutical industry
Krauss-Maffei HZ Ph pharma centrifuge
Table of contents

Pharma centrifuge, HZ Ph 3
Process advantages 4
Pharma characteristics 5
Operation 6
Centrifuge controls 8
Process automation 9
Foundation/installation 10
Dimensions and weights 11
Technical data 11
Test centers 12
Services 13
Company profile 14
Product lines 15
High-value and sensitive products demand a reproducible quality in close tolerances. No matter how high your requirements are, Krauss-Maffei pharma centrifuges will meet these demands, ensuring consistent high quality as well as unmatched flexibility, productivity and economic performance.

The HZ Ph centrifuge has been specifically developed by ANDRITZ KMPT for applications in the pharmaceutical industry, in close cooperation with users and operators. The applications and experience range from A for amines to Z for zinc bacitracin. At ANDRITZ KMPT we have more than 20 years of experience with centrifuges in pharma design gathered from over 250 installations all over the world.

**Main applications**
- Pharmaceuticals and fine chemicals (Active pharmaceutical ingredients, amino acids, antibiotics, pharmaceutical intermediate products and active substances, etc.)
- Special fields (Vitamins, liquid crystals, silver compounds, etc.)
- Foodstuff (Sweeteners, etc.)

**Special features**
- Designed for multi-product plants, CIP ability, ideal for clean room installation

**Processing parameters**
- **Filter area**
  - 0.35-2.5 m²
- **Solids content**
  - From 3% by wt.
- **Average particle size**
  - 1-250 μm
- **Wash efficiency**
  - Excellent
- **Solids recovery**
  - Almost 100%

**Materials of construction:**
- Various grades of stainless steel
- Nickel-based alloys/titanium
- Special metals with or without lining
Krauss-Maffei HZ Ph pharma centrifuge

Process advantages

- **Pharma design**
  Total inspectable process area including the front shaft sealing. Dead zones have been eliminated. High surface quality for ideal cleanability.

- **Optimum process monitoring**
  View of the basket, feed pipe and peeler arm through inspection window. Analog and continuous detection and evaluation of the feed level by means of a contact-free measuring system or the new sound sensor which detects the liquid and solid height. Often required for CFR 21 part 11.

- **Fast product change**
  with easy adaptation of the process parameters to different products. Fully automatic CIP program for guaranteed and validated cleaning within the shortest possible time. Thanks to patented filter cloth retention rings with saw tooth closure, the cloth can be changed within 5 minutes.

- **Maximum yield**
  due to product discharge with virtually no losses, even for sticky products, thanks to optimized peeler and discharge geometry, fluidization, and pneumatic removal of residual heel.

- **Reduced footprint**
  and CIP consumption, as well as reduced consumption of resources as a result of the cylindrical housing. Smaller volumes and reduced surfaces also lead to lower consumption of cleaning medium in the individual CIP stages.

- **Low residual moistures**
  due to higher g-forces than vertical centrifuges and inverting filter centrifuges with excellent washing quality and very high product purities.

- **No product contamination**
  - Machine design keeps lubricants and mechanical abrasion outside the process area.
  - Seamless monofilament filter cloths prevent product bypass, as well as abrasion.

- **Easy assembly and maintenance**
  - Machines delivered fully assembled,
  - Simple exchange of filter cloths using quick-action retention rings,
  - Opening/closing of the housing via automatic clamp ring.

Krauss-Maffei-pharma-centrifuge-HZ-800-1.0-Ph
Krauss-Maffei HZ Ph pharma centrifuge

Pharma characteristics

The most striking feature of the Krauss-Maffei pharma centrifuge is its hinged housing. By means of an automatically operated quick-action retention ring the housing can be opened easily, quickly and safely, and then swung to the side manually. This provides a full view of the entire process area with all the seals. The process area boasts generous radii and avoids dead areas and crevices to provide easy cleaning. All surfaces have a high-quality finish.

All connections are fitted from the inside of the process housing and sealed with exposed O-rings. The process side lip of the main shaft seal can be fully viewed. Dead zones are virtually avoided and product deposits reduced. CIP nozzles are arranged in such a way that all areas can be perfectly accessed with cleaning agent. The housing can be flooded, enabling highly efficient cleaning. If required, the housing can be of pressure vessel or vacuum design. The centrifuge can be sterilized by using steam.

The process area and drive part of the centrifuge are kept completely separate for easy installation in clean rooms. The machine operates fully automatically. In order to allow operation with highly active substances and provide maximum purity, the product does not come into contact with any of the operators, nor with the environment.

Cleaning in place (CIP)
When changing the product, the equipment must be cleaned to such a degree that there can be no cross-contamination between different batches. Fully automatic cleaning with verifiable cleaning effect is state-of-the-art in a pharmaceuticals plant. Together with the operators and users, ANDRITZ KMPT has developed an effective CIP program. This mainly consists of:

Pre-cleaning:
In a first step the cleaning agent is fed in via the cleaning nozzles at reduced rotational speed. Here, most of the remaining solids are removed from the basket and the interior of the housing.

Main cleaning:
All discharge pipes of the centrifuge are closed. The centrifuge is filled up to the basket rim with cleaning agent. The speed and direction of rotation are now varied according to a defined program. The machine undergoes effective cleaning through this “washing machine effect”. Even the solids discharge pipe is completely flooded at the end of this step.

Final cleaning:
The machine is rinsed out again with water fed in through the cleaning nozzles in order to remove the final residues and surface dullness.

Efficient consumption:
Krauss-Maffei pharma centrifuges are of such compact design that consumption of cleaning agent can be kept to a minimum. The above mentioned routine even includes cleaning of the filter cloth so that the same cloth can be used for the next product if the application allows.
Krauss-Maffei HZ Ph pharma centrifuge

Operation

The individual cycle times for feeding, filtering, washing and peeling vary, depending on the filtration characteristics, from minutes to several hours. Krauss-Maffei pharma centrifuges are adapted to the prevailing process conditions, which allows an easy change of product. Process parameters are listed in a recipe that is stored in the centrifuge’s PLC or the DCS.

Feeding
During the feed process the slurry is fed into the centrifuge basket via the feed distributor. Feed pulses prevent the slurry from overflowing over the basket rim. The feed level is measured by a feed controller, detecting the level mechanically or contact-free in a continuous process. In most cases, the basket is filled to approx. 75-85% of the basket rim height. In the case of highly compressible or slow filtering products the cake thickness may only be a few millimeters. When the filter cake reaches the desired height, the feed process is complete.

Filtration
The main filtration starts with the feed process. It is considered completed when the overlaying slurry bath submerges into the filter cake.

Cake washing
When the liquid has submerged, one or several wash cycles may be carried out. For this purpose a wash liquid is fed into the basket via the feed pipe or an optional wash pipe. The level of the wash liquid is controlled during the feed procedure by the feed controller. Washing filtration is complete when the wash liquid has submerged into the filter cake. To adjust the wash liquid level to an optimum height and to document the washing cycle in the electronic data storage, an intelligent feed controller is the most suitable device. Especially in pharmaceutical synthesis steps, cake washing is an essential step in order to provide the specified product purity. Feed level data are evaluated as important information for CFR 21 part 11.

Dry spinning
At the end of the washing process the centrifuge is gradually accelerated to full speed. The spinning process continues until the desired residual moisture content of the cake is achieved. This is usually the mechanical dewatering limit, which is well below the residual moisture attainable with vacuum or pressure filters. Cake formation and structure, as well as the filter cloth, are decisive in obtaining low residual moisture.
Peeling
At the end of each centrifuge cycle the filter cake is removed from the basket by a pivoting peeling device equipped with a broad peeler knife. To prevent particle breakage, peeling is conducted at reduced basket speed with adjustable swivel advance velocity. The product layers peeled off are diverted into a trough and discharged from the centrifuge through an inclined chute. To protect the filter medium, a thin layer of filter cake is retained in the basket. This layer, referred to as the residual heel, prevents fine particles from permeating into the filtrate in subsequent cycles.

Further special features of Krauss-Maffei pharma centrifuges are:

- Nitrogen is blown in through a patented nozzle arrangement integrated into the peeling device. The nitrogen buffer prevents any direct contact between solids and the surface. This is another specific detail for preventing product deposits.

- During the washing and feed procedure the patented peeler knife covers the discharge chute. In this way, splashes from the feed process cannot enter the chute, where they would subsequently cause sticking. Thus, it is also possible to discharge products that are sticky and difficult to handle.

- In order to process sludgy or sticky products, the cake discharge is enhanced by using the patented chute wiper. It prevents blockages in the discharge chute and eliminates product residue there.

Residual heel removal
After several cycles, the residual heel may have compacted with fine solids, resulting in poor filtration performance. When this occurs the heel can be removed pneumatically. To increase the yield it is necessary to discharge the residual heel with minimum product loss. A nozzle assembly on the outside of the basket is swung into the basket in order to remove the residual heel. This allows minimum clearance to the basket and effective flow. Pressure pulses of compressed nitrogen are fed in through the nozzle assembly. The ANDRITZ KMPT design allows nitrogen to flow through the filter cloth, as well as creating a lift-off and vibration effect. The residual heel is detached from the filter cloth and discharged down the chute.
ANDRITZ KMPT
Centrifuge controls

Result-oriented control
In order to deal with frequent product changes Krauss-Maffei pharma centrifuges are equipped with appropriate measurement and control systems. The following parameters are measured continuously:
- Filling level in the basket
- Filtration speed
- Submersion point of the liquid in the filter cake

The values measured are evaluated by the control electronics, and the process parameters, such as feed time, dry spinning time, wash time etc., are optimized to suit. The control system is result-oriented. For optimized feed level detection, ANDRITZ KMPT recommends the following feed controllers.

Ultrasonic feed controller (UFKR)
Only Krauss-Maffei centrifuges are fitted with the KMPT-patented, contact-free, ultrasonic feed controller. An ultrasonic sensor emits a measuring signal in the direction of the charge in the basket. The ultrasonic signal reflected by the charge is picked up by a sensor and evaluated by the control electronics. If different solvents are used, a reference measure guarantees compensation of different sound velocities.

Advantages:
- Avoidance of splashing and caking due to contact-free measurement.
- Analog and continuous level detection measurement of the liquid and the cake height.
- Analog value can be stored electronically.
- No mechanical adjustments at machine, feed height is determined in process parameter recipe.
- No wear on the sensor, thus no contamination of the product with metal abrasion.

Solid detection feed controller (SFKR)
For challenging process conditions (varying solvents, foaming…) ANDRITZ KMPT recommends the innovative SFKR, combining analog feed level detection with solids detection. A sound sensor detects liquids or solids. Thus the liquid submersion point can be identified as quickly as possible and cake washing then initiated.

Advantages:
- Reliable analog measurement even with varying process conditions.
- Compact, sophisticated design to minimize splashing upon submersion.
- Reduced surface area to prevent product deposits forming.
- Liquid submersion point detected quickly and reliably.
- Detects and identifies liquids and solids.
Perfection in process engineering requires perfection in process automation.

The superior performance of our process equipment is based on perfecting the interface between equipment hardware, electrical components, electronics, informatics, and process know-how to create an all-encompassing custom-tailored solution for each application. Using intelligent sensors and state-of-the-art communication systems, we control and monitor our machines on a result-oriented basis.

**Automation of machines**

Individual adaptation – we can incorporate the automation concepts for our machine into your existing control system.

**Custom concepts**

We provide an individually designed service package to fit your specification – from the control of individual units, to incorporation into existing control systems or automation of complete plants ready for operation.

**Your benefits:**
- Enhanced equipment performance
- Consistent high product quality
- Reduced consumption of utilities
- Optional status diagnostics

**Services**

Based on your quality assurance program, we prepare all the required documents for validation and qualification of the automation software and hardware. Our extensive know-how, profound experience, and innovative drive qualify us as your partner for validation of our equipment to meet your production needs.

Machinery directives, ATEX, hazardous location regulations – there are many regulations to be met at the plant site. We are there to serve as your knowledgeable advisor for the safety of your plant.
Krauss-Maffei HZ Ph pharma centrifuge
Foundation/installation

Krauss-Maffei pharma centrifuges are designed for installation within a clean room or as non-clean room installation. The need for clean room separation depends on the containment level, the type of solids discharge device, as well as the toxicity and the requested purity of the product.

**Installation guidelines:**
- The feed pressure should be around 0.5 bar.
- Keep all supply and discharge lines short and with a maximum possible gradient.
- All connections to the centrifuge must be flexible.
- Provide for fast draining of all pipes either by venting or pressure compensation in closed loop systems.
- Install sight glasses and sample ports in all supply and discharge lines.
- Provide vertical solids drop without cross-sectional restrictions.
Krauss-Maffei HZ Ph pharma centrifuge
Dimensions and weights

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>HZ 500/0.4 Ph</td>
<td>2,000</td>
<td>1,900</td>
<td>1,000</td>
<td>1,400</td>
<td>2,000</td>
</tr>
<tr>
<td>HZ 630/0.6 Ph</td>
<td>2,090</td>
<td>2,250</td>
<td>1,530</td>
<td>1,540</td>
<td>4,200</td>
</tr>
<tr>
<td>HZ 800/1.0 Ph</td>
<td>2,360</td>
<td>2,350</td>
<td>1,630</td>
<td>1,800</td>
<td>6,100</td>
</tr>
<tr>
<td>HZ 1000/1.6 Ph</td>
<td>2,680</td>
<td>2,850</td>
<td>1,910</td>
<td>2,050</td>
<td>9,100</td>
</tr>
<tr>
<td>HZ 1250/2.5 Ph</td>
<td>3,020</td>
<td>3,500</td>
<td>2,200</td>
<td>2,240</td>
<td>13,000</td>
</tr>
</tbody>
</table>

Technical data

<table>
<thead>
<tr>
<th>Centrifuge model</th>
<th>Basket diameter [mm]</th>
<th>Basket length [mm]</th>
<th>Basket volume [l]</th>
<th>Filter area [m²]</th>
<th>Max. g-force* [-]</th>
<th>Max. speed [rpm]*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HZ 500/0.4 Ph</td>
<td>500</td>
<td>250</td>
<td>20</td>
<td>0.35</td>
<td>2,030</td>
<td>2,700</td>
</tr>
<tr>
<td>HZ 630/0.6 Ph</td>
<td>630</td>
<td>315</td>
<td>44</td>
<td>0.6</td>
<td>2,030</td>
<td>2,400</td>
</tr>
<tr>
<td>HZ 800/1.0 Ph</td>
<td>800</td>
<td>400</td>
<td>88</td>
<td>1.0</td>
<td>1,600</td>
<td>1,900</td>
</tr>
<tr>
<td>HZ 1000/1.6 Ph</td>
<td>1,000</td>
<td>500</td>
<td>172</td>
<td>1.6</td>
<td>1,290</td>
<td>1,520</td>
</tr>
<tr>
<td>HZ 1250/2.5 Ph</td>
<td>1,250</td>
<td>630</td>
<td>340</td>
<td>2.5</td>
<td>1,000</td>
<td>1,200</td>
</tr>
</tbody>
</table>

*) Basis: Density of saturated filter cake 1,250 kg/m³ at T=50°C
All technical data are approximate and subject to change without notice.
ANDRITZ KMPT
Test centers

ANDRITZ KMPT operates fully equipped test centers in Germany and the USA, offering both bench and pilot scale equipment. Our experienced engineers will consult with you to determine the equipment most appropriate for your product, then will perform the necessary trials to optimize the operating conditions for your process.

Based on these tests, we will provide a complete report which will recommend the best solution for your solid/liquid separation process, including scale-up information for the production equipment.

We can also assist in running long-term trials at your site with equipment from our rental machine pool.
ANDRITZ KMPT
Services

Our goal is to provide our customers with fast and reliable service, from the first process consultation throughout the entire service life of your ANDRITZ KMPT process equipment.

To assist our global customer base, we operate service facilities around the world staffed with experienced, dedicated service teams.

Spare parts
We keep over 6,000 different spare parts and components in stock for you. Our service centers in the USA, the UK, Italy, France, and China, for example, maintain their own spare parts stock to enable faster delivery to your plant site.

Reconditioned units
We maintain a select stock of reconditioned units available for fast delivery from our facility. All machines are fully disassembled, inspected and reconditioned by replacing worn or damaged parts. A final test run validates the mechanical guarantee we provide with our refurbished equipment. With our factory reconditioned units you gain production capacity quickly with minimal capital investment.

Repairs and maintenance
Our service centers are ready to provide you with regularly scheduled maintenance or emergency service at your site. Our experts provide assistance including assembly work, installation support, commissioning, upgrades, repair work, and optimization of your process conditions.

Advisory service
Our customer service team is ready to answer any question concerning machine safety, equipment upgrades, and process optimization.

Installation and commissioning
Our experienced service personnel assists you with the installation and start-up of your equipment.

Remote diagnostics
Using modern communications and diagnostic systems, our customer service is able to offer even faster and more efficient support. Via remote access our specialists receive information on the operating condition of your machine and carry out fault diagnoses. Maximum data security is of course guaranteed at all times. We only access the data from your machine when you give your specific approval for us to do so.

24-hour on-call service
You can reach our skilled and experienced service team around the clock.

Maintenance contracts
We offer you tailor-made, long-term contracts for preventive maintenance of your equipment.

Customer training
We train your operating personnel during commissioning of the plant. In addition, we also offer you seminars for maintenance and operation of our entire line of process equipment. This training can be conducted at our site or yours.
The ANDRITZ GROUP

The ANDRITZ GROUP is a globally leading supplier of plants and services for the hydropower, pulp and paper, metals, and other specialized industries. The Group is headquartered in Graz, Austria, and has a staff of approximately 16,100 employees worldwide. ANDRITZ operates over 120 production sites, service, and sales companies all around the world.

ANDRITZ SEPARATION

ANDRITZ SEPARATION is one of the leading global suppliers of plants, equipment, and services for mechanical and thermal solid/liquid separation (coal, ore and mineral processing, chemical, petrochemical, and food industries). The business area’s field of activity covers design and manufacture of key components (centrifuges, filter presses, rotating filters, drying plants), as well as erection and start-up of turnkey plants, including automation, safety engineering, and services.

ANDRITZ KMPT

ANDRITZ KMPT has been a world leader and innovator in the chemical process industry for over 75 years. The extensive experience of our engineers comes from testing more than 3,000 products and putting over 9,000 applications to work. Over 500 patents demonstrate our capacity for innovation. This extensive knowledge governs our process and equipment recommendations, all tailored to meet our customers’ requirements with an optimum in performance and cost.
ANDRITZ KMPT
Product lines

- **Krauss-Maffei centrifuges**
  With horizontal peeler centrifuges known for reliability, pharma centrifuges designed to meet highest quality standards, innovative vertical basket centrifuges and continuously operating pusher centrifuges, ANDRITZ KMPT has the capability to handle a broad range of separation applications in the chemicals, pharmaceuticals and environmental industries.

- **Krauss-Maffei filters**
  For vacuum or pressure filtration, our rotary drum and disc filters combine high yield with low production costs in the processing of chemicals, plastics and minerals.

- **Krauss-Maffei dryers**
  Batch drying in our conical mixer dryer with helical mixing assembly or continuous drying of free-flowing materials in our plate dryer – we offer the right choice of dryers for fine chemical and pharmaceutical producers.

- **ANDRITZ KMPT process systems**
  We apply our experience and expertise to create fully functional processing modules including peripherals and automation, saving the customer from having to deal with multiple vendors. ANDRITZ KMPT provides all the detailed engineering and reduces installation time with pre-assembled systems.
ANDRITZ stands for ultimate know-how in solid/liquid separation. Our decade-long background in this field and comprehensive technology offering enable us to supply our customers with the best solution for each application, whether in municipal or industrial sewage sludge treatment, the chemical or food industry, or for preparation of minerals and ores.

Food

Chemicals

Minerals

Mining

Environment