



SPICE PROCESSING

Solutions for spices, herbs and tea



**HOSOKAWA
MICRON GROUP**



» Fine impact mill UPZ 250,
Aust & Hachmann oHG, Hamburg

The Hosokawa Micron Group offers you innovative technologies from one single source for customised solutions. We can deliver the highest quality machines for your plant and product safety. Our established base of technical experts represents the conviction and trust in our know-how all over the world.

»» INNOVATIVE TECHNOLOGIES FROM ONE SINGLE SOURCE

»» CUSTOMISED SOLUTIONS FOR OPTIMUM RESULTS

»» HIGHEST QUALITY FOR YOUR MACHINE AND PRODUCT SAFETY

»» MORE THAN 120 YEARS OF EXPERIENCE IN YOUR PROCESS

»» POSSIBILITY OF TRIALS IN OUR TEST CENTRES FOR THE BEST TECHNICAL SOLUTION

FOUR TIMES COMPETENCE

We create synergies

The Hosokawa Micron Group, headquartered in Japan, has various locations around the world. Our European competence centres have combined their know-how to offer you customised process technologies for optimum solutions. With more than 120 years of experience in the processing of spices, we are a market leader in the development, design and manufacture of powder and particle processing machines and systems for size reduction, drying, grinding and blending.

With its wide range of particle processing technologies, the Hosokawa Micron Group has been setting and still sets trends and standards in particle processing.

HOSOKAWA MICRON LTD.
Size Reduction | Containment

HOSOKAWA MICRON B.V.
Mixing | Drying | Agglomeration

HOSOKAWA ALPINE AG
Milling | Classifying | Compaction

HOSOKAWA SOLIDS
Conveying | Weighing | Storage

HOSOKAWA SPICE TECHNOLOGIES

The production of spices - here using chili as an example - is a high-tech process comprising different steps for which high-performance

machines and systems are needed. The feed material is derived from the chili pepper plant and varies from source to source.





CLEANING

OF LIGHT AND / OR HEAVY IMPURITIES

The MZM Multi-Plex zigzag classifier removes light (e.g. hair, foils, papers) and heavy impurities (e.g. stones, stems, metal parts) from your product. Dependent on the product, the light or heavy fraction is used either as the end product or for post-processing.

Hosokawa Alpine manufactures a range of designs in numerous machine sizes as single-tube or multi-tube classifiers for sharp separations in the range of $d_{97} = \text{ca. } 0.3 \text{ to } 10 \text{ mm}$. Machine sizes can be offered for throughputs of several kg/h up to 200 t/h. Classification takes place in every angle of the zigzag tube to achieve a pure spice or tea product. MZM is flexibly adjustable for your individual products.

FEATURES AND BENEFITS

- Simple operation
- Easy design
- Low-maintenance and low-wear classifier
- Reliable in operation
- Wide application range

TYPICAL APPLICATIONS FOR CLEANING OF:



➤ Hibiscus



➤ Tea



➤ Coriander

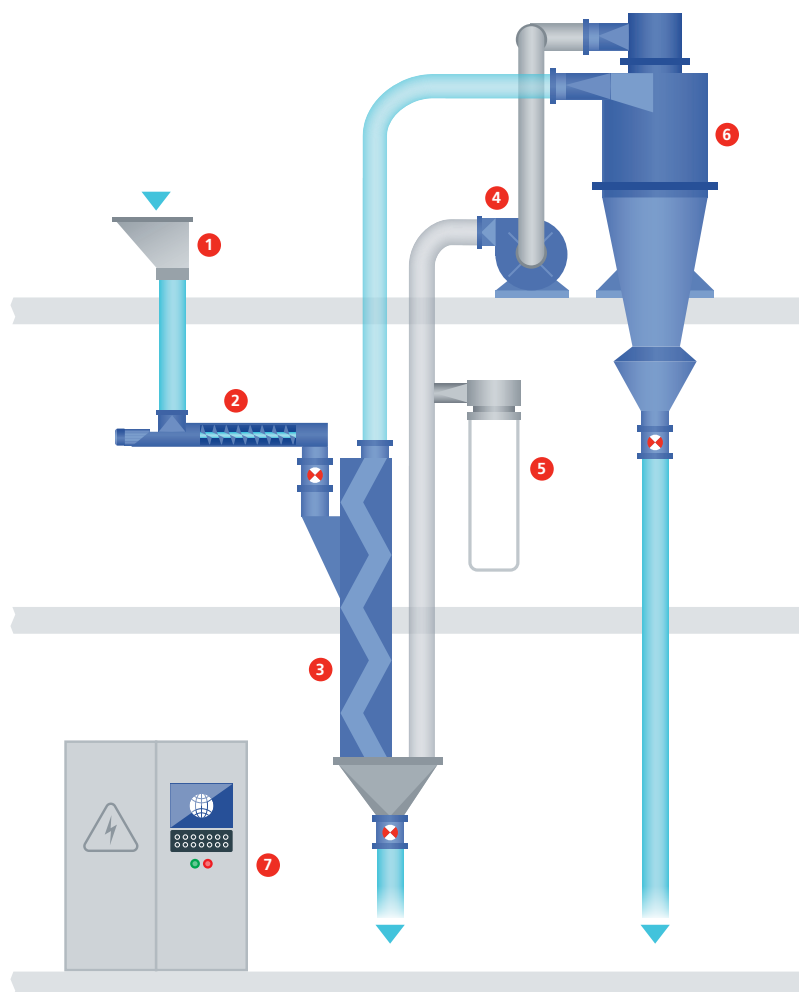


➤ Zigzag classifier Multi-Plex
MZM 1-80x250

REFERENCE PRODUCTS (BASED ON MZM 1-80 x 250)

PRODUCT	PROCESS	THROUGHPUT
Anise	Cleaning of heavy and light impurities	40 – 100 kg/h
Calendula	Separating of the flower leaves	30 – 60 kg/h
Line Seed	Cleaning of dust	100 – 150 kg/h
Onions	Separation of hulls	70 – 110 kg/h
Parsley	Cleaning of Stemps	40 – 60 kg/h
Pepper	Cleaning of heavy and light impurities	70 – 100 kg/h
Tea	Cleaning of heavy and light impurities	70 – 120 kg/h

CLASSIFICATION WITH ZIGZAG CLASSIFIER MZM



- | | |
|---|-----------------------|
| 1 | Feeding bin |
| 2 | Feeding screw |
| 3 | Zigzag classifier MZM |
| 4 | Blower |
| 5 | Filter sleeve |
| 6 | Cyclone |
| 7 | Control cabinet |



CRUSHING & CUTTING

OF SPICES, HERBS AND TEA

Spices, herbs and tea are reduced to uniformly fine, clean-cut granules with a minimum of dust using the Rotoplex granulators. The patented cross-scissor-cut rotor of the Rotoplex granulators guarantees an ideal production of fine to coarse grained products.

TYPICAL APPLICATIONS ARE:



➤ Ginger



➤ Chestnuts



➤ Garlic



➤ Oregano



➤ Chilli



➤ Fruit teas



➤ Rotoplex Ro 36/60

Another typical application area is the preliminary size reduction of large spices as a stage for fine grinding.

REFERENCE PRODUCTS (BASED ON RO 28/40)

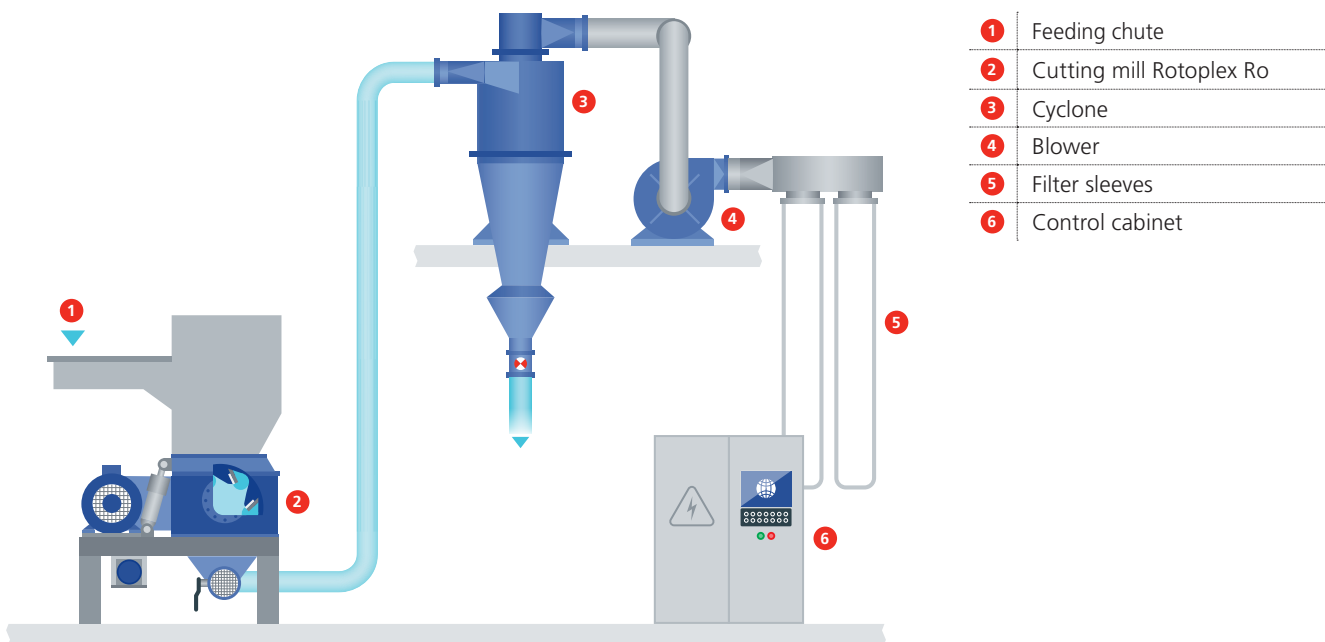
PRODUCT	FINENESS	THROUGHPUT
Catechu	98 % < 6.3 mm	750 kg/h
Chili	95 % < 5 mm	870 kg/h
Dried onions	95 % < 2.5 mm	1000 kg/h
Ginger	97 % < 4 mm	780 kg/h
Nutmeg	95 % < 4 mm	660 kg/h

PRODUCT	FINENESS	THROUGHPUT
Coarse Tea bag cut	1.5 – 5 mm	250 – 500 kg/h
Fine Tea bag cut	0.25 – 1.5 mm	150 – 250 kg/h
Herbs	6 – 7 mm	600 kg/h
Tobacco	2 – 4 mm	200 – 500 kg/h

Please note: Spices are subject to natural variations.

To obtain exact results, the systems must be tested with your own products.

CUTTING PLANT WITH ROTOPLEX RO



MACHINE SIZES

Rotoplex Ro	Scale-Up Factor	Drive (kW)
Ro 28/40	1.0	11.0
Ro 36/60	1.8	22
Ro 50/63	3.2	30

* Guide values for cutting at normal temperature and standard product properties. Kindly contact our friendly sales team for any questions relating to the fundamental properties and deviations from the rule. End-product fineness measured on air jet sieve



FINE GRINDING WITH MAXIMUM FLEXIBILITY

FOR VARIOUS SPICES AND MARKET REQUIREMENTS

Ultraplex UPZ mill is known as the universal spice mill, due to its flexibility of using different grinding tools and adjustable rotor speeds. The material properties, and especially the wear behaviour, dictate selection of the mill. UPZ mills are the mill of choice for root spices, seeds, fruit skins and husks with a high ash content and extremely hard seed pods such as rose hips. The moisture content, purity, content of essential oil as well as the origin influence the grinding behaviour, throughput performance and product quality. The mill door can be opened in a wide angle for easy cleaning.

FEATURES AND BENEFITS

- High flexibility due to easily exchangeable milling tools and easily exchangeable
- High fineness with top size limitation
- Perfect for fibrous roots & spices
- Easy cleaning and easy accessibility
- Cool and cryogenic options available (see page 14)
- Dust explosion protection available
- Bearing protected against dust ingress by air rinsing
- Safety equipment conforms to European standards
- Low energy consumption



**MAXIMUM
FLEXIBILITY**

➤ *Ultraplex UPZ 1000 equipped with plate beater unit and grinding track*

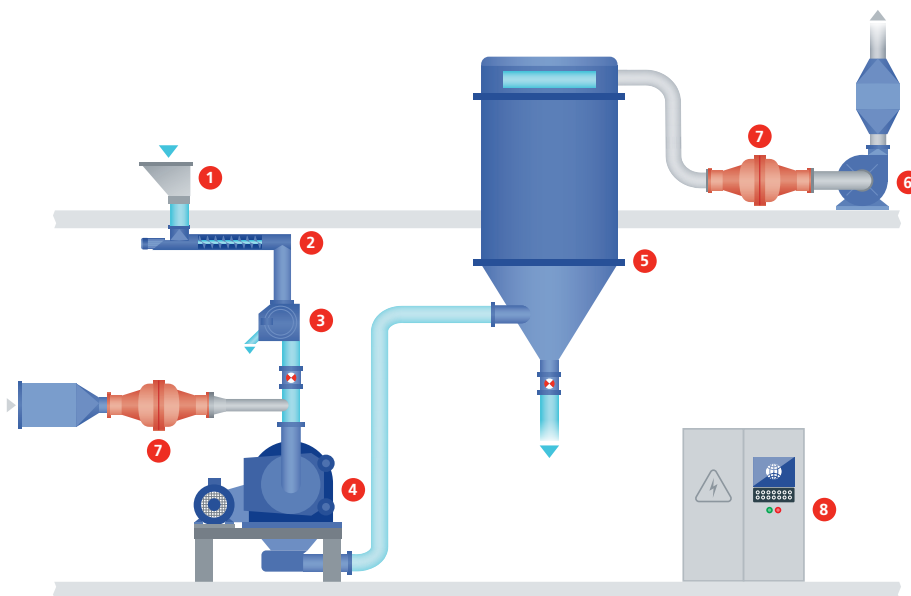
REFERENCE PRODUCTS (BASED ON UPZ 315)

PRODUCT	FINENESS	THROUGHPUT
Chili	95 % < 500 µm	160 kg/h
Cinnamon	96 % < 315 µm	200 kg/h
Coriander	99 % < 630 µm	100 kg/h
Cumin	92 % < 500 µm	380 kg/h
Ginger	96 % < 500 µm	460 kg/h
Pepper black	96 % < 500 µm	110 kg/h
Turmeric	98 % < 250 µm	160 kg/h
Vanilla	95 % < 400 µm	160 kg/h

Please note: Spices are subject to natural variations.

To obtain exact results, the systems must be tested with your own products.

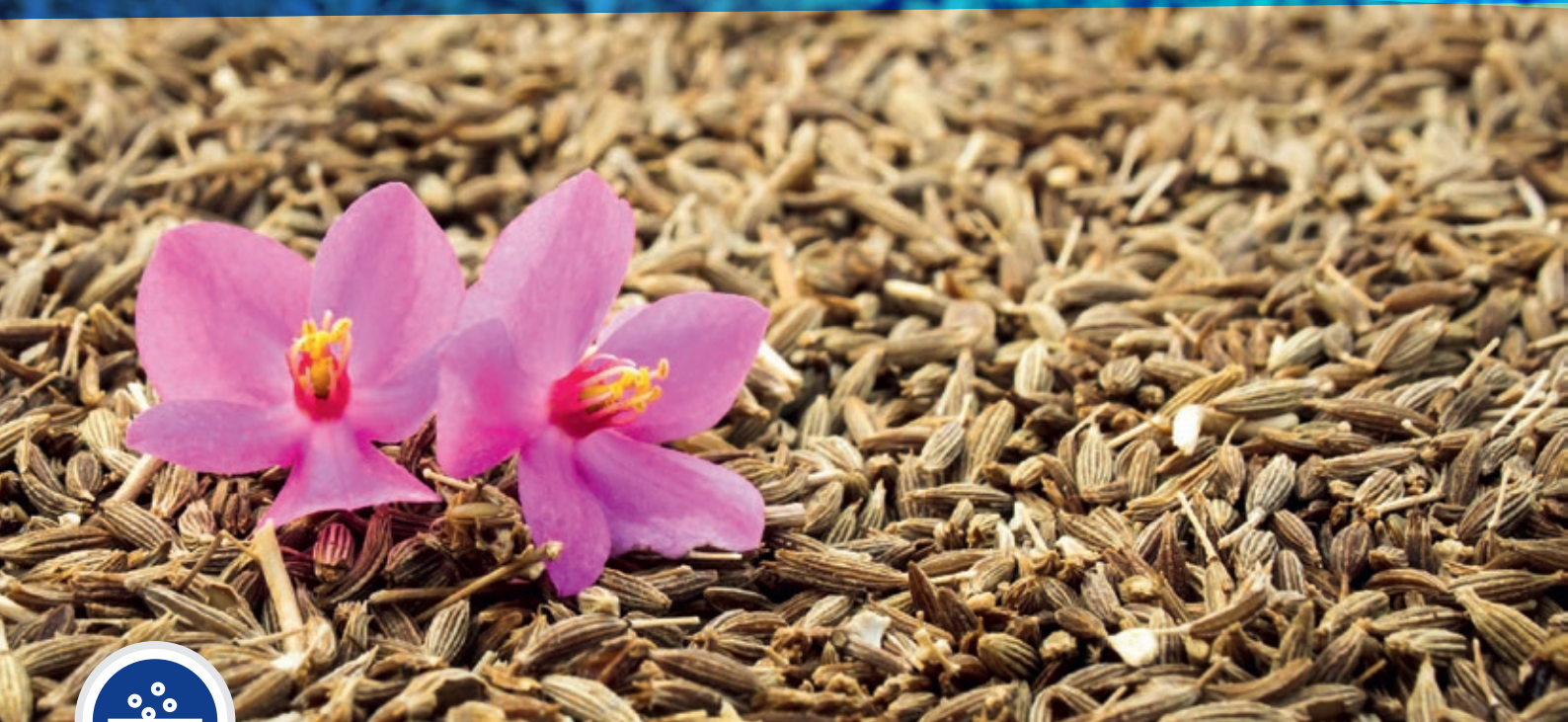
GRINDING PLANT WITH ULTRAPLEX UPZ



1	Feeding bin
2	Feeding screw
3	Metal separator
4	Fine impact mill UPZ
5	Automatic filter
6	Blower
7	Explosion barrier valves
8	Control cabinet

MACHINE SIZES

Fine impact mill UPZ	Scale-up factor	Drive (kW)	Fine impact mill UPZ	Scale-up factor	Drive (kW)
UPZ 100	0.06	1.5	UPZ 630	3.6	75
UPZ 160	0.25	5.5	UPZ 800	4.5	90
UPZ 250	0.5	11	UPZ 1000	6.3	110
UPZ 315	1	18.5	UPZ 1250	9	250
UPZ 500	2	37	UPZ 1400	14	315



FINE GRINDING WITH MAXIMUM PERFORMANCE

FOR OILY SEED SPICES

The two pin discs driven in contrary motion (that is why the mill is called Contraplex) in combination with the special drop shape of the housing minimise deposit formation and enable longer production times with difficult products.

In counter-rotating mode, the Contraplex pin mill achieves much higher relative speeds than the UPZ fine impact mill. The fineness can be adjusted by changing the pin disc speeds. The centrifugal forces acting on both discs ensure that even moist, greasy and sticky products such as nutmeg/mace, cardamom or mustard seeds can be processed. The design with the wide-chamber housing is ideal for processing such critical products. The feed material is often embrittled by intensive mixing with liquid nitrogen (see page 14).

FEATURES AND BENEFITS

- Perfect mill size for your needs: several machine sizes available
- Easier cleaning and maintenance: new door design for easy access to the grinding area
- Finer grinding: higher speeds allow better deagglomeration and hence finest results
- New drives: new, gearless drives avoid any possible contamination in the production area
- Low energy consumption



➤ Fine impact pin mill CW 250 II

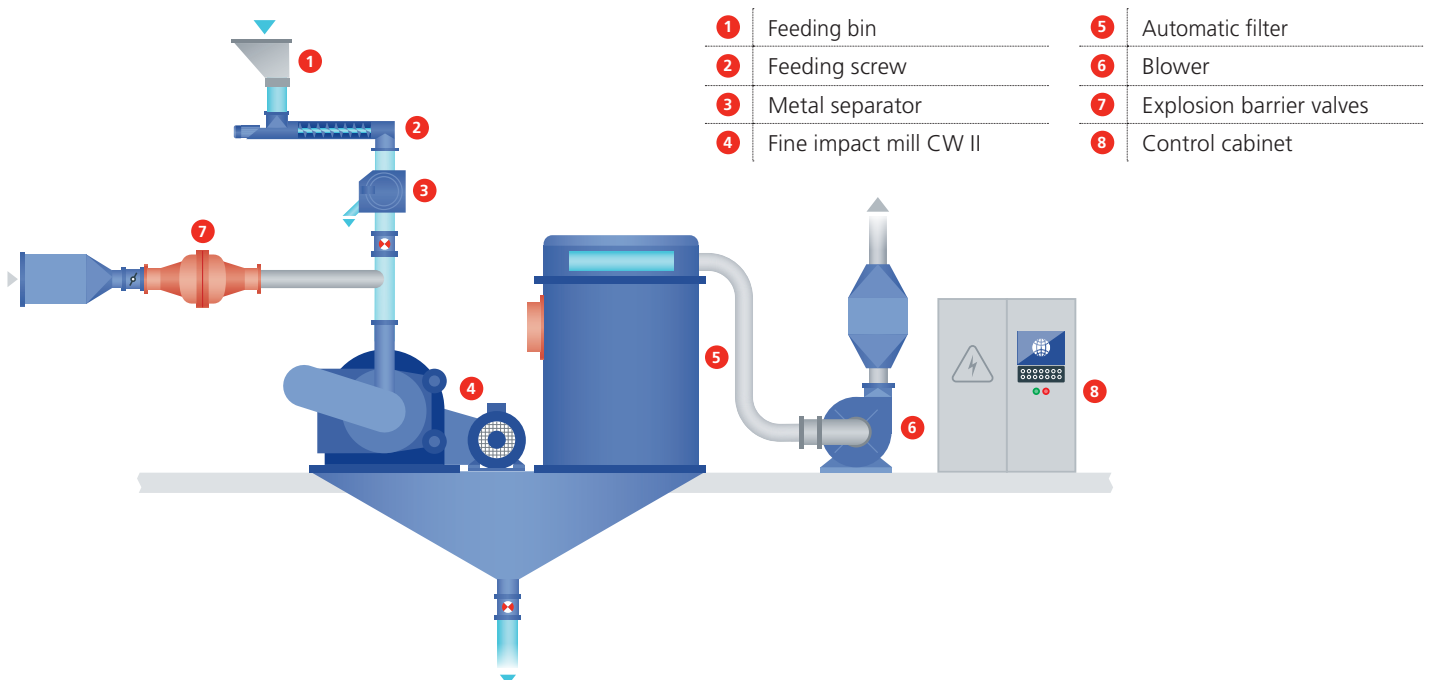
REFERENCE PRODUCTS (BASED ON CW 250 II)

PRODUCT	FINENESS	THROUGHPUT
Caraway	98 % < 800 µm	150 kg/h
Clove	98 % < 500 µm	220 kg/h
Coriander	95 % < 500 µm	150 kg/h
Cumin	98 % < 500 µm	330 kg/h
Nutmeg	97 % < 400 µm	370 kg/h
Pepper black	95 % < 400 µm	190 kg/h

Please note: Spices are subject to natural variations.

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GRINDING PLANT WITH CONTRAPLEX CW II



MACHINE SIZES

Fine impact pin mill CW II	Power factor F	Drive – housing kW	Drive – door kW
CW 250 II	1.0	15	15
CW 400 II	2.0	30	30
CW 630 II	5.0	75	75
CW 800 II	9.0	132	132



CRYOGENIC FINE GRINDING

PROCESS STABILITY AND HIGH FINENESS FOR OILY PRODUCTS

The heat generated during the grinding leads on the one hand to evaporation of the essential oils and on the other hand causes the heat-sensitive fats to melt. In the worst case, this can cause the grinding elements to clog up and the entire mill to block and stall. Because of this and to optimise the product properties and process control, cryogenic grinding is employed with these types of products. Mainly liquid nitrogen is used as cooling agent. The product and the system are cooled either by direct injection of the cooling agent into

the mill or, if longer residence times or lower temperatures are necessary, by pre-cooling and embrittlement of the material in a whirling motion cooling screw.

Because cryogenic grinding reduces the loss of essential oils (approx. 3 – 10 % loss) in comparison to grinding at ambient temperature (approx. 15 – 43 % loss), it is possible to improve the aroma and flavour. In addition, the grinding performance is about twice as high, and the risk of fire is eliminated.

CRYOGENIC EQUIPMENT

The systems are designed especially for operation under cryogenic conditions. These include:

- Vacuum-insulated nitrogen tank, ductings and tubing (provided by the customer)
- Insulation of the closed-circuit system
- Stainless steel design on account of condensation
- Cryogenic control valve unit for exact dosing of the requisite amount of liquid nitrogen
- Whirling motion cooling screw to cool the feed product
- Temperature control, oxygen monitoring

➤ Cryogenic grinding plant with UPZ 100



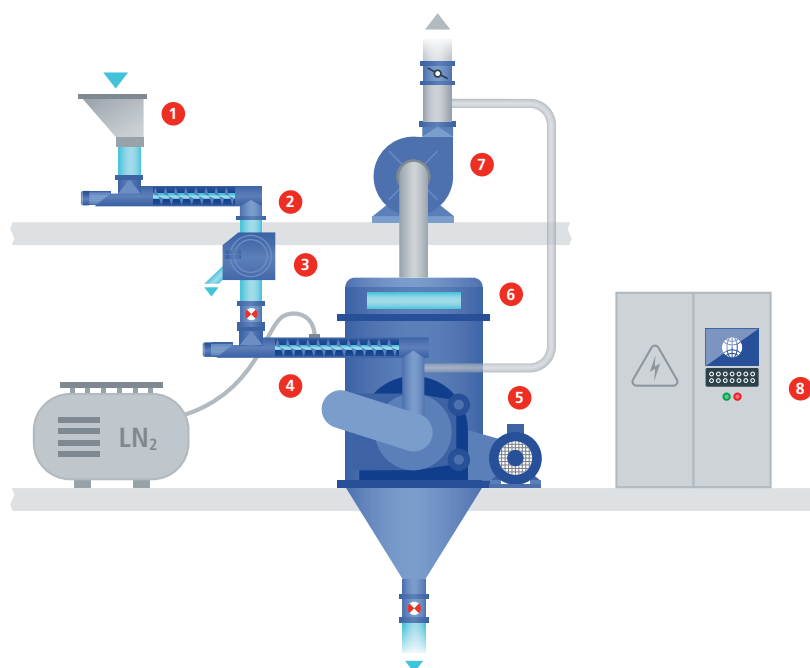
REFERENCE PRODUCTS

PRODUCT	SYSTEM	FINENESS	THROUGHPUT
Coriander	UPZ 315	97 % < 315 µm	77 kg/h
Cumin	UPZ 315	95 % < 500 µm	530 kg/h
Pepper	UPZ 315	99 % < 200 µm	110 kg/h
Cassia	CW 250	99 % < 315 µm	140 kg/h
Caraway	CW 250	97 % < 500 µm	210 kg/h
Coriander	CW 250	97 % < 400 µm	300 kg/h
Macis	CW 250	92 % < 250 µm	200 kg/h
Nutmeg	CW 250	92 % < 315 µm	100 kg/h
Pepper black	CW 250	98 % < 315 µm	260 kg/h
Pepper white	CW 250	98 % < 315 µm	280 kg/h

Please note: Spices are subject to natural variations.
To obtain exact results, the systems must be tested
with your own products.



CRYOGENIC GRINDING PLANT



- 1 Feeding bin
- 2 Feeding screw
- 3 Metal separator
- 4 Cooling screw
- 5 Fine impact mill CW II
- 6 Automatic filter
- 7 Blower
- 8 Control cabinet

COMPARISON OF ESSENTIAL OIL CONTENTS

TYPE	ORIGINAL		AMBIENT		CRYOGENIC	
	v/g	%	v/g	%	v/g	%
Cloves	17.3	100	11.5	66.0	16.5	95.0
Mace	16.1	100	9.10	56.5	14.5	90.0
Pepper black	3.37	100	2.21	65.7	3.09	92.0
Pepper white	3.38	100	1.95	57.8	3.19	94.5

V/g = ml/100 g
Example for pepper
white at -10°C: LN₂
usage = 0.3 kg LN₂/kg
product



HOMOGENISATION / MIXING

Nauta conical screw mixer

The Nauta conical batch mixer is well known in the world of processing herbs and spices. It offers a robust and versatile mixing solution for low-intensity mixing of different types of herbs and spices with a variety of product characteristics.

The Nauta mixer guarantees the highest level of mixing accuracy at short mixing times and maximum process flexibility in terms of products and batch sizes. The conical shape of the vessel with the central bottom outlet guarantees maximum yield after product discharge.

FEATURES AND BENEFITS

- Batch volumes from 2.5 up to 80,000 litres
- Gentle mixing with minimum energy input and product distortion
- Process flexibility in working volume and operating conditions
- Robust and simple design with cantilevered mixing screw
- For batch and continuous operation
- Addition of liquids/fats



➤ *Nauta conical screw mixer*



HOMOGENISATION / MIXING

Vitomix ribbon screw mixer

The Vitomix ribbon screw mixer is a vertical, low to mid-shear mixer, capable of ultra-short cycle times, up to 4 times faster than conventional ribbon screw mixers. It is specially designed for the addition of liquids/fats to powders without using choppers.

The Vitomix guarantees the highest level of mixing accuracy at short mixing times and maximum process flexibility in terms of products and batch sizes, combined with liquid injection. The conical vessel with central bottom outlet guarantees maximum yield after product discharge.

FEATURES AND BENEFITS

- Batch volumes from 50 up to 10,000 litres
- Mixing process for addition of oil or fat to powders
- Gentle mixing with minimum energy input and product distortion
- Process flexibility in working volume and operating conditions
- Robust and simple design with cantilevered mixing screws
- Full discharge



➤ *Vitomix ribbon screw mixer*



STEAM STERILISATION

CPD steam steriliser

The CPD steam steriliser offers a flexible, economical and environmentally safe batch process for sterilising herbs and spices. It ensures optimal removal of all pathogenic organisms and germs, with minimum risk of product distortion or loss of colour and taste. The system offers maximum process flexibility in terms of process conditions, batch sizes and products, whole and ground.

After sterilisation, the product moisture content can be brought to the desired level by vacuum drying. The unique design allows for quick product changes.

FEATURES AND BENEFITS

- Batch volumes from 200 up to 10,000 litres
- Multi-purpose system; sterilisation, drying and mixing in one operation
- Suitable for processing leaves and grains in whole and ground products
- Gentle and fast processing, while preserving product characteristics
- Compliant with international food standards
- Fully automated, recipe-driven system



➤ *CPD steam steriliser*



PUREE GRINDING

For wet purees and sauces

The Hosokawa Micron Angle Disintegrator Unit comprises a range of specialist Disintegrator machines offering efficient size reduction of wet and dry spices, purees and sauces down to 300 µm (subject to product and application).

The processing chamber is easy to open without special tools, ensuring rapid product changeover. It is also available in pressure resistant and shock pressure designs as well as in a dual discharge design for continuous ejection of non-friable/reject materials.

FEATURES AND BENEFITS

- Size reduction, homogenisation and intense mixing processes all from the same machine
- Hygienic / Sanitary design., GMP compliant
- Construction facilitates quick product changes., rapid machine access and minimal downtime
- Designed for in-situ wet or dry cleaning (manual or automated)
- Full range of machine sizes and powers (lab to full production)



➤ Hosokawa Micron
Disintegrator (RA & RP Series)



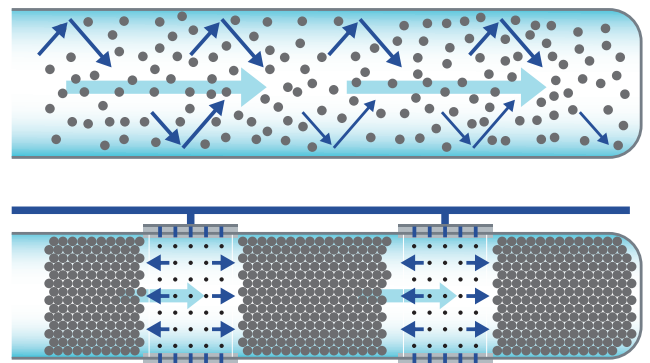
PNEUMATIC CONVEYING

Of various spices

To guarantee optimum product quality, different conveying methods must be used at various process steps. Adapted to the product characteristics (grain size & shape, density, hardness, fat & water content, ...) as well as to the individual process requirements (capacity, conveying distance, environmental conditions, truck unloading, ...), the most advantageous system for pneumatic conveying is applied.

YOUR ADVANTAGES AT A GLANCE

- Dilute phase conveying: simple and cheap implementation
- Plug conveying: gentle to the product, almost no grain destruction
- Preservation of aroma substances and essential oils through gentle conveying
- Individually adapted processes as pressure or suction conveying system
- Reliable, proven conveying systems





STORAGE, CHARGE & DISCHARGE

Product-appropriate storage of spices

The special properties of spices place special demands on storage. This can be done in a mass flow silo with a suitable discharge aid, in big bags or sacks.

YOUR ADVANTAGES AT A GLANCE

- First in, first out
- Reliable, residue-free discharge
- Complete systems with full equipment
- Dust-tight
- Gentle handling of the material to be discharged



➤ Emptying silos, hoppers



DOSING & WEIGHING

Dosing and filling of spices

Via dosing and weighing technology, your product arrives where it is needed in the right quantity: in the mixer or for filling of silo vehicle, big bag or bag. The weighing process is optimized by matching the dosing unit, scale and control system to the special requirements of the spices.

YOUR ADVANTAGES AT A GLANCE

- Integrated control system for high operational reliability
- User-friendly system
- Functionally reliable system technology
- Precise weighing and dosing technology
- Filling under hygienic conditions





APPLICATION CENTER FOOD

FOOD DESIGN SYSTEMS FOR FOOD CUSTOMERS

In 2021, Hosokawa Alpine opened the Application Center Food in Augsburg with the following machines in stainless steel and ATEX-design: air classifier mill ACM 10, classifier ATP 200 and fine impact mill UPZ 315.

The Application Center Food is a separate room within the well-known test center in Augsburg. The fine impact mill Sugarplex SX Flow with crystallisation for shelf stable sugar is installed nearby.

THERE ARE SEVERAL REASONS FOR TESTING:

- › Our customers would like to see the mills running and discover the Alpine experience with all their senses: Feel, touch and hear (and maybe smell and taste) the mills and their products!
- › At the same time, we discuss the technical special features of the projects with you, e.g. plant layout, ATEX issues etc.
- › Last but not least, a performance-warranty for throughput/fineness is given on the basis of the tests.





INNOVATIVE TEST CENTRES

Our research and testing facilities can provide you with a wealth of machines and complete systems for the most varied plant configurations, all available on a global level. Precision, quality and innovative technologies: Do your testing with us.



YEARS OF EXPERIENCE

Profit from our many years of experience in the provision of solutions and our mastery of sophisticated processes. Well-known customers all over the world place their trust in the technology and know-how of the Hosokawa Micron Group.



GLOBAL SERVICE

Our service teams take care of repairs and maintenance, both on site and in our modern workshops equipped with the latest technology – smoothly, speedily and all around the world! The Hosokawa Micron Group – a partner you can rely on. Find out for yourself, you are sure to be impressed.



CONTRACT MANUFACTURING

The Hosokawa Micron Group is also your professional and reliable partner for toll processing. We are allowing you to concentrate fully on your core business and to offset capacity bottlenecks without investment risks or long-term personnel commitment. Whether for a one-time project or a recurring job – our crew as well as our equipment are very flexible in adapting to your specifications!



ADVANTAGEOUS SYNERGIES

The know-how and experience of numerous specialists are bundled in the Hosokawa Micron Group to produce perfect solutions. Experience from a variety of customer segments in mechanical process engineering ensures that you, as the user, enjoy optimum solutions for practically every product – from an individual component to an entire plant.



HOSOKAWA MICRON GROUP



HOSOKAWA ALPINE

Milling | Classifying | Compaction

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