ULTRA CENTRIFUGAL MILL ZM 300



Rotor mills are used for high-speed size reduction of soft to medium-hard as well as temperature-sensitive or fibrous materials.
The powerful Ultra Centrifugal Mill ZM 300 provides maximum grinding performance combined with ease of use. The variable speed from 6,000 to 23,000 rpm allows for gentle, neutral-to-analysis sample preparation in a very short time.

Thanks to an integrated temperature monitoring system, reproducibility is guaranteed even for long grinding processes or pulverization of large sample volumes.

The wide selection of rotors, ring sieves and cassettes makes the ZM 300 a true allrounder which meets the requirements of a great variety of size reduction tasks.



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THE STANDARD FOR FOOD & FEED

- Gentle high-speed pulverization due to pre- and fine grinding in one working run
- Optimum process control and reproducibility based on monitoring of the cassette temperature
- Patented cassette system for maximum sample recovery and easy cleaning
- Optional cassette for sample volumes up to 600 ml
- Wide speed range from 6,000 to 23,000 rpm
- Defined final fineness due to ring sieves with aperture sizes from 0.08 – 10 mm
- Collecting vessels for sample volumes from 250 ml to 4.5 l
- Automated vibratory feeder and various cyclone systems available



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INCREASED REPRODUCIBILITY THROUGH TEMPERATURE MONITORING

The speed range from 6000 to 23000 rpm allows for optimum adaptation of the grinding process to the sample requirements by keeping the grinding time as short as possible and the temperature increase as moderate as possible. Too much heat may have a negative effect on the grinding results, for example, if moisture or volatile components escape.



The ZM 300 is equipped with an integrated temperature sensor which measures the temperature of the cassette lid near the ring sieve. The measured temperature is constantly shown in the mill's display, allowing the user to optimize the grinding process and improve reproducibility.

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MAXIMUM SPEED FOR HIGH FINAL FINENESS AND INCREASED THROUGHPUT

The maximum speed of classic centrifugal mills, like the widely used ZM 200, is usually limited to 18,000 rpm (rotor peripheral speed 98 m/s). The ZM 300 achieves a maximum speed of 23,000 rpm (rotor peripheral speed 118 m/s) and produces particles which are 15 to 20 % finer in comparison, depending on the material.

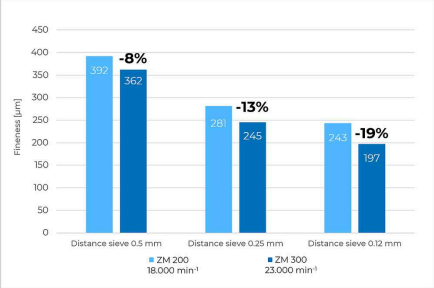
The higher speed has a particularly positive impact on the grind sizes of polymer samples which are pulverized cryogenically, or of fibrous materials like hay. Compared to models with a maximum speed of 18,000 rpm, the throughput may be increased by 10 to 15 %.

APPLICATION EXAMPLES

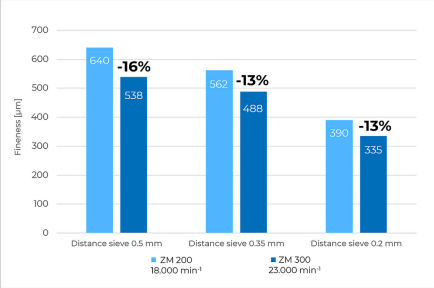
Grind sizes of plastic materials (POM or PP) after grinding with different sieves and speeds. The speed of 23,000 rpm results in a higher fineness for all sieves compared to grinding at 18,000 rpm. For example, a 19 % reduction in fineness can be achieved when POM is ground with a 0.12 mm distance sieve at 23,000 rpm.

The maximum sample throughput, e.g. when crushing chicken feed with a 0.5 mm ring sieve, could be increased by 16% when crushing at maximum speed of 23,000 min-1 instead of 18,000 min-1.

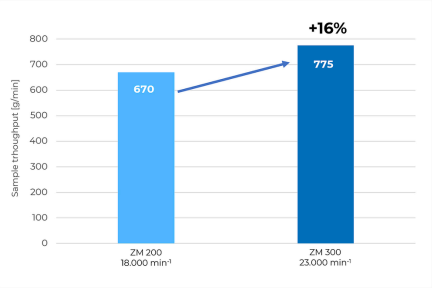
POLYMER POM



POLYMER PP



GRINDING ANIMAL FEED



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REDUCING THE FINE FRACTION

The fines content in a pulverized sample can be controlled by speed reduction. If, for example, the grains of an animal feed sample are to be coarsely ground to avoid dust formation, a reduction to 6,000 - 10,000 rpm will provide the desired result.

Thanks to the variable speed, the ZM 300 can be flexibly adapted to all requirements in the food and feed industry, chemical industry, and in agriculture.

CRYOGENIC GRINDING

Cryogenic or cold grinding is the ideal solution for pulverizing samples that cannot be reduced to the required fineness at room temperature. This procedure involves the use of grinding aids such as liquid nitrogen (-196 °C, embrittlement of the sample outside the mill) or dry ice (-78 °C, sample/dry ice mixture) to embrittle the sample material by cooling, and thus improve the breaking behavior.

In addition, highly volatile components are better preserved in the sample by cooling. Cryogenic grinding is easy to perform with the ZM 300 and is recommended especially for plastics or very temperature-sensitive samples. The video shows the process with the predecessor model ZM 200, which is identical in the ZM 300.



Click to view video

This video shows dryice grinding of plastic granules with the ZM 200 which also applies to the ZM 300.

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IDEAL FOR LIGHT & HEAT-SENSITIVE MATERIALS

When operated with the optional cyclone-suction-combination, the ZM 300 is also suitable for grinding low-density or heat-sensitive sample materials.

- Efficient cooling of sample and grinding tools
- Improved sample discharge from the grinding chamber
- Particularly suitable for large volumes
- The cyclone accommodates sample bottles of 0.25, 3 and 5 liters
- Ideal for cryogenic grinding



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ACCESSORIES FOR ZM 300



RING SIEVES

For the ZM 300 ring sieves with reinforced rim are used which are equipped with four grooves for secure locking. Distance sieves, also secured and fixed by four grooves, have a gap between the sieve mesh and the rotor, which reduces shearing effects and thereby heat generation.



ROTORS

Rotors are available with either 6, 12 or 24 teeth. The standard rotor with 12 teeth is suitable for almost any material and requirement. For fibrous samples, such as straw, the rotor with 6 teeth is typically used, while for fine samples the rotor with 24 teeth is best suited.



HEAVY-METAL-FREE GRINDING

For neutral-to-analysis work, or for pulverizing abrasive samples, grinding tools in various materials are available: titanium (titanium-niobium coating), steel 1.4404, tungsten carbide coating.



COLLECTING VESSELS

In the standard collecting vessel with 900 ml nominal volume, up to 300 ml of sample can be ground in one working step. With the large-volume cassette, the useful volume can be doubled to 600 ml. When utilizing a cassette with cyclone, various collecting vessels up to 4,500 ml useful volume are available.



VIBRATORY FEEDER DR 100

The Vibratory Feeder DR 100 is controlled via an interface and conveys material in a load-dependent manner to the hopper of the ZM 300. This procedure ensures uniform grinding with maximum sample feed. The use of a feeder is particularly advantageous for large sample quantities.

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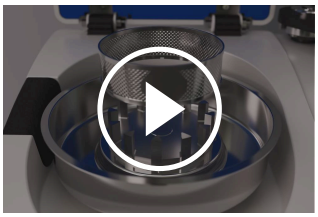
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CONVENIENT OPERATION AND EASY CLEANING

The ZM 300 is easy and safe to operate. The large touch display with rotary knob permits convenient entry of the grinding parameters. It shows the current cassette temperature and load during grinding which helps to prevent overloads by feeding the sample too quickly.

A push-fit system without screws and the patented cassette principle allow for easy insertion and removal without tools.

As a result, cleaning rotors and ring sieves is particularly quick and easy. All parts in contact with the sample can be cleaned under running water or in the dishwasher.



Click to view video

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TYPICAL SAMPLE MATERIALS

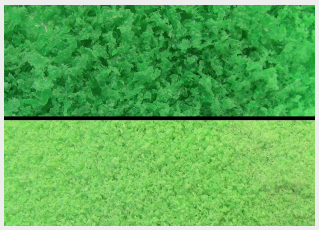
The versatile Ultra Centrifugal Mill ZM 300 processes materials such as bones, cereals, chemical products, coal, coffee beans, collagen, corn, dried fruit and vegetables, dried larvae, drugs, electronic components, feed pellets, fertilizers, food, grain, graphite, minerals, paper, pharmaceutical materials, plant materials, polymers, powder coatings, rice, rubber, seeds, spices, straw, sweets, textiles, tobacco, waste, wood



powder coatings



coffee beans



PET flakes



herbs

To find the best solution for your sample preparation task, visit our application database.

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ULTRA CENTRIFUGAL MILL ZM 300

TECHNICAL DATA

Applications	fine grinding
Field of application	agriculture, biology, chemistry / plastics, construction materials, engineering / electronics, environment / recycling, food, geology / metallurgy, medicine / pharmaceuticals
Feed material	soft, medium-hard, brittle, fibrous
Size reduction principle	impact, shearing
Material feed size*	< 10 mm
Final fineness*	< 40 µm
Batch size / feed quantity*	300 ml with standard cassette 600 ml with volume cassette 4500 ml / 2500 ml / 450 ml / 230 ml with cyclone
Speed at 50 Hz (60 Hz)	6,000 - 23,000 min-1, free selectable
Rotor peripheral speed	31 - 119 m/s
Rotor diameter	99 mm
Types of rotors	6-tooth rotor / 12-tooth rotor / 24-tooth rotor
Material of grinding tools	stainless steel, titanium, stainless steel with wear-resistant coating
Sieve sizes	trapezoid holes 0.08 / 0.12 / 0.20 / 0.25 / 0.50 / 0.75 / 1.00 / 1.50 / 2.00 mm round holes 3.00 / 4.00 / 5.00 / 6.00 / 10.00 mm
Setting of grinding time	no
Collector capacity	900 ml with standard cassette 1200 ml with volume cassette 5000 ml / 3000 ml / 500 ml / 250 ml with cyclone
Drive	3-phase asynchronous motor with frequency converter
Power connection	1-phase
Protection code	IP 20
Power consumption	1750 VA ((200..240V), 1400 VA (110..120V)
W x H x D closed	452 x 431 x 426 mm
Net weight	~ 38 kg
Standards	CE

*depending on feed material and instrument configuration/settings

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FUNCTIONAL PRINCIPLE

In the Ultra Centrifugal Mill ZM 300 size reduction takes place by impact and shearing effects between the rotor and the fixed ring sieve. The feed material passes through the hopper (with splash-back protection) onto the rotor. Centrifugal acceleration throws it outward with great energy and it is pre-crushed on impact with the wedge-shaped rotor teeth moving at a high speed. It is then finely ground between the rotor and the ring sieve.

This 2-step grinding ensures particularly gentle but fast processing. The feed material only remains in the grinding chamber for a very short time, which means that the characteristic features of the sample to be determined are not altered. The ground sample is collected in the collecting cassette surrounding the grinding chamber or in the downstream cyclone or paper filter bag.



Click to view video

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