

Size reduction with Rotor Mills



Retsch[®]
Solutions in Milling & Sieving

Ultra Centrifugal Mill ZM 200

The powerful drive of the innovative Ultra Centrifugal Mill ZM 200 ensures rapid grinding results. Together with its extremely efficient operation the ZM 200 can prepare 100 samples or more per day for analysis. **More on page 4.**





Milling

- Jaw Crushers
- **Rotor Mills**
- Cutting Mills
- Knife Mills
- Disc Mills
- Mortar Grinders
- Mixer Mills
- Planetary Ball Mills

Sieving

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The **rotor mill series** includes ultra centrifugal mills, rotor beater mills and cross beater mills. Depending on the particular instrument **they are suitable for the preliminary and fine size reduction of soft, fibrous and also hard materials**. A final fineness of down to 40 µm can often be achieved in the first working step. The maximum feed size depends on the mill and ranges from 10 to 15 mm. Material which is larger than this must first undergo preliminary size reduction.

Preliminary size reduction



For the coarse and preliminary size reduction of hard, brittle or hard-tough materials the **RETSCH jaw crushers** have proven themselves in practice. In contrast, **bulky, soft, fibrous or tough materials** are best processed in **RETSCH cutting mills**.

Sample dividers



Sample dividers, rotary tube sample dividers, sample splitters – with **RETSCH sample dividers** you will obtain **representative part samples** from pourable powders and bulk goods **for meaningful analysis results**.

The main areas of application for ultra centrifugal mills are:

Agriculture

Fertilizers, plant materials, seeds, straw, tobacco, wood

Biology

Animal tissue, bones, collagen, dried larvae

Chemicals and plastics

Activated charcoal, plastics (PET, PP, ABS, polystyrene, polycarbonate etc.), powder coatings, rubber granulate, super-absorbent polymers, synthetic resins

Environmental research

Electronic components (circuit boards), fossil and secondary fuels, waste

Food and feeds

Coffee beans, corn, feed pellets, dried fruit and vegetables, rice, spices, sweets, tea leaves

Geology and metallurgy

Bentonite, coal, coke, limestone

Medicine and pharmaceuticals

Pharmaceutical raw materials and finished products

and many more...

Applications

Ultra Centrifugal Mill

The powerful and versatile ZM 200 offers **the ultimate in performance and operating comfort**. The mill pulverizes a great variety of soft to medium-hard and fibrous substances extremely fast, thus allowing for a high sample throughput. The ultra centrifugal mill is used in both quality control and R&D. Thanks to its high efficiency and superior results the Ultra Centrifugal Mill ZM 200 has established itself as a **standard laboratory device** in the feeds industry as well as for chemical and agricultural applications. It is frequently used for **sample preparation to NIR and ICP analyses**.

Free test grinding

As part of RETSCH's professional customer support we offer our customers the individual advice required to find the optimum solution for their sample preparation task. To achieve this our application laboratories process and measure samples free-of-charge and provide a recommendation for the most suitable method and instrument.

For more information please visit our website www.retsch.com/testgrinding.



Application examples

| Ultra Centrifugal Mill | Accessories/ grinding aids | Rotor | Ring sieve aperture size | Feed size | Sample amount | Grinding time | Speed | Final fineness |
|-----------------------------|----------------------------------|----------|--------------------------|-----------|-------------------|---------------|------------|---------------------|
| Bentonite | Cyclone, Vibratory Feeder | 12 teeth | 0.25 mm | 0-5 mm | 1,500 g | 15 min. | 18,000 rpm | 90% <63 µm |
| Coal | Cyclone, Vibratory Feeder | 12 teeth | 0.2 mm | 1-15 mm | 550 g | 5 min. | 18,000 rpm | 99% <100 µm |
| Corn | Cyclone | 12 teeth | 1 mm | 5 mm | 100 g | 15 s | 18,000 rpm | 90% <500 µm |
| Feed pellets | | 12 teeth | 2 mm | 10x30 mm | 200 g | 2 min. | 18,000 rpm | 80% <500 µm |
| Fertilizer | | 12 teeth | 0.25 mm | 1-4 mm | 80 g | 2 min. | 18,000 rpm | <100 µm |
| Licorice (a) / Wine gum (b) | Dry ice, talc | 12 teeth | 2 mm* (a) / 0.5 mm* (b) | 1-15 mm | 15 g | 3 min. | 18,000 rpm | homogeneous <300 µm |
| Powder coating | Cyclone, Vibratory Feeder | 12 teeth | 0.08 mm* | 1-15 mm | 120 g | 2 min. | 18,000 rpm | 80% <53 µm |
| PP granules | Pre-cooling with LN ₂ | 12 teeth | 0.75 mm | 1-3 mm | 40 g | 7 min. | 18,000 rpm | 90% <500 µm |
| Rice | Cyclone, Vibratory Feeder | 12 teeth | 0.5 mm | 2-8 mm | 400 g | 2.5 min | 18,000 rpm | 80% <200 µm |
| Saffron fibres | | 6 teeth | 0.5 mm | 1-15 mm | 5-10 g | 10 s | 18,000 rpm | <200 µm |
| Secondary fuels | Cyclone, dry ice | 12 teeth | 1 mm | 1-10 mm | 200 g | 5 min. | 18,000 rpm | 80% <500 µm |
| Tablets | | 24 teeth | 0.08 mm | 10-20 mm | 25 g (20 tablets) | 30 s | 18,000 rpm | 80% <40 µm |

*Distance sieve
This chart serves only for orientation purposes.

RETSCH's application database contains more than 1,000 application reports. Please visit www.retsch.com/applicationdatabase.

Ultra Centrifugal Mill

ZM 200

Versatile and efficient

Benefits at a glance

- Powerdrive with optimally matched frequency converter and 3-phase motor
- Wide speed range, adjustable from 6,000 to 18,000 rpm
- Patented cassette system for maximum sample recovery and easy cleaning
- Defined final fineness
- Comfortable safety housing with automatic cover closure
- Comfortable parameter setting via display and ergonomic 1-button operation
- Wide range of accessories



ZM 200

High-speed power for excellent grinding results

With the Ultra Centrifugal Mill ZM 200 RETSCH offers a mill with previously unmatched performance. The heart of the ZM 200 is the **innovative Powerdrive** which ensures higher performance with increased torque. The perfectly matched frequency converter and 3-phase motor provide a considerably higher throughput when compared with other rotor mills. Temporary overloads are easily balanced at continued output which ensures particularly effective grinding.

The extremely quick size reduction process increases sample throughput

while the **2-step rotor-ring sieve system** ensures that the sample characteristics remain unaltered.

Soft, elastic products such as plastics, which do not process well at room temperature, can be fed into the mill after **embrittlement with liquid nitrogen or dry ice**.

Because of the efficient size reduction technique and the comprehensive range of accessories **the ZM 200 ensures the gentle preparation of analytical samples in a very short time.**

ZM 200 technology

In the ultra centrifugal mill 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. The particles are 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 avoids the risk of overheating and ensures that the characteristics of the sample to be analyzed remain unaltered. The ground sample is collected in the cassette surrounding the grinding chamber or in the downstream cyclone or paper filter bag.



ZM 200 – powerful, safe, flexible

Rotors and ring sieves

The selection of the push-fit rotor and ring sieve depends on the properties of the sample, the required final fineness and the subsequent analysis.

The ring sieve aperture size is primarily chosen according to the required final fineness and the feed material. With most materials approx. **80% of the total sample achieves a fineness of less than half the aperture size of the ring sieve used.**

Rotors and ring sieves are available in various materials and types. The **reinforced rims** provide the ring sieves with greater stability.

Temperature-sensitive, brittle materials such as powder coatings and resins are particularly easy to grind with the **distance sieves** that have been specially developed for this purpose.



(1) Standard ring sieve
(2) Ring sieve with reinforced rim
(3) Distance sieve

Rotors and ring sieves with an **abrasion-resistant coating** are used for reducing the size of abrasive substances such as fertilizers.

For **heavy-metal-free size reduction** of non-abrasive materials we recommend the use of rotors and ring sieves made from titanium

together with cassette and covers with a titanium-niobium coating.

Thanks to the wide range of accessories with rotors, ring sieves and different types of collection systems, the ZM 200 can be easily adapted to suit a wide variety of applications.

Rotor selection guide

| Rotor | Field of application |
|--------------------|--|
| 6-tooth rotor | coarse, bulky, fibrous goods such as feed pellets, hay and straw |
| 12-tooth rotor | medium-coarse goods such as wheat, oats, corn, tablets, powder coatings and plastics |
| 24-tooth rotor | fine goods such as chemicals, coal and sugar |
| 8-tooth mini-rotor | specially for size reduction of small sample amounts up to 20 ml |

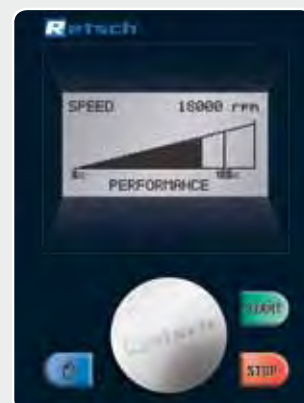
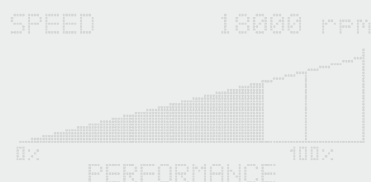
New technology with maximum operating comfort

The ZM 200 is very simple and safe to use. The parameters are easily set via a graphics display and 1-button operation. All relevant data can be comfortably entered or called up, e.g.

- speed
- drive load
- operating hours
- service intervals
- clear text error messages

With manual feeding of the sample, the performance display allows to monitor the load of the drive and to adjust the feed rate for optimized results.

The electronic safety and diagnosis system **virtually rules out operating errors.**



Suitable for almost any task

Its wide range of accessories and the possibility to individually select the rotor speed make the ZM 200 easily adaptable to any size reduction task.

The feed material is introduced either manually or via an optional load-controlled Vibratory Feeder DR 100 which is connected to the mill through an interface. **The automatic, regular sample feed maximizes the throughput without any risk of overloads and ensures uniform grinding results.** The ground sample is collected in the cassette. The innovative cassette principle ensures easy and loss-free material removal and avoids cross-contamination.

When using a **cyclone** or paper filter bag, the sample material is additionally cooled by the air stream and more rapidly discharged from the grinding chamber via the cassette pan with outlet. This effect can be increased by **connecting a vacuum cleaner**. The cyclone can be equipped with a 250 ml or 500 ml sample bottle; for **grinding larger volumes**, collecting receptacles of 3 l and 5 l are available.

All parts coming into contact with the sample can be removed, cleaned and reassembled without using any tools.



Controlled and uniform material feed:
ZM 200 with Vibratory Feeder DR 100



Automatic size reduction of large amounts:
ZM 200 with Vibratory Feeder DR 100 and cyclone

| Performance data | | ZM 200 | | | | |
|---|--|------------------------------|---------------------------------------|--------------------|------------------------|------------------------|
| www.retsch.com/zm200 | | | | | | |
| Application | fine grinding | | | | | |
| Field of application | agriculture, biology, chemistry/plastics, construction materials, engineering/electronics, environment, food, geology/metallurgy, medicine/pharmaceuticals | | | | | |
| Feed material | soft, medium-hard, brittle, fibrous | | | | | |
| Feed size | < 10 mm | | | | | |
| Final fineness* | < 40 µm | | | | | |
| Sample volume (nominal) | | | | | | |
| with standard cassette | with mini-cassette | with paper filter bag | with cyclone | | | |
| up to 300 ml (900 ml) | up to 20 ml (50 ml) | up to 1.000 ml (3.000 ml) | up to 230 ml (250 ml) | 450 ml (500 ml) | 2.500 ml (3.000 ml) | 4.500 ml (5.000 ml) |
| Speed range | | | 6,000 - 18,000 rpm, freely selectable | | | |
| Rotor peripheral speed | | | 31 - 93 m/s | | | |
| *depending on feed material and instrument configuration/settings | | | | | | |
| Technical data | | | | | | |
| Power consumption | | approx. 1,300 W (VA) | | | | |
| W x H x D | | 410 x 515 x 365 mm | | | | |
| Weight, net | | approx. 38 kg | | | | |
| Noise values (noise measurement according to DIN 45635-31-01-KL3) | | | | | | |
| Emission value with regard to workplace | | L _{pAeq} 77.5 dB(A) | | | | |
| Measuring conditions: | | | | | | |
| Sample | | burnt lime | | | | |
| Feed size | | < 5 mm | | | | |
| Rotor used | | 12-tooth rotor | | | | |
| Ring sieve used | | 0.5 mm trapezoid holes | | | | |

Accessories for grinding small volumes

In many fields, e.g. in the pharmaceutical industry, the required sample amounts are very small. The **mini-cassette** for the ZM 200 **for sample volumes of up to 20 ml**, which is used in combination with the 8-tooth mini-rotor, is the ideal tool for such applications. The loss-free recovery of smaller amounts of sample is made easier by the reduced cassette diameter. Suitable **ring sieves** are available

with aperture sizes from 0.08 to 2.00 mm. If the grinding tools for small volumes are used in the ZM 200 only a small labyrinth disk is required. The necessary accessories are available as a conversion kit.

All parts coming into contact with the sample, including the cassette and ring sieves, are made from corrosion-resistant steel 1.4404 (316).

Order data for Ultra Centrifugal Mill ZM 200

| Ultra Centrifugal Mill ZM 200 | | | | | | | | | | | | | Item No. |
|---|-------------------------|--|--|--|--|--|--|--|--|--|--|--|-------------|
| ZM 200 with cassette (900 ml) (please order push-fit rotor and ring sieve separately) | | | | | | | | | | | | | |
| ZM 200 | for 200-240 V, 50/60 Hz | | | | | | | | | | | | 20.823.0001 |
| ZM 200 | for 110 V, 50/60 Hz | | | | | | | | | | | | 20.823.0002 |
| ZM 200 | for 120 V, 50/60 Hz | | | | | | | | | | | | 20.823.0003 |

| Push-fit rotors and ring sieves for normal use | | | | | | | | | | | | | Item No. | |
|--|-----------------|------|------|------|------|------|------|------|------|------|-------------|-------------|-------------|-------------|
| Push-fit rotor | | | | | | | | | | | | 6-tooth | 12-tooth | 24-tooth |
| Push-fit rotor, stainless steel | | | | | | | | | | | | 02.608.0040 | 02.608.0041 | 02.608.0042 |
| Ring sieves | Trapezoid holes | | | | | | | | | | Round holes | | | |
| Aperture sizes in mm | 0.08 | 0.12 | 0.20 | 0.25 | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | |
| Ring sieves, stainless steel | | | | | | | | | | | | | | |
| Item No.: 03.647... | 0231 | 0232 | 0233 | 0234 | 0235 | 0236 | 0237 | 0238 | 0239 | 0240 | 0241 | 0242 | 0243 | |
| Ring sieves, stainless steel, with reinforced rim, recommended for tough materials | | | | | | | | | | | | | | |
| Item No.: 03.647... | 0244 | 0245 | 0246 | 0247 | 0248 | 0249 | 0250 | 0251 | 0252 | 0272 | 0273 | 0274 | 0275 | |
| Distance sieves, stainless steel, recommended for temperature-sensitive materials | | | | | | | | | | | | | | |
| Item No.: 03.647... | 0253 | 0254 | 0255 | 0256 | 0257 | 0258 | 0259 | 0260 | 0304 | - | 0261 | - | - | |
| Distance sieves, stainless steel, square holes, 10 mm, for pre-grinding | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | 03.647.0298 |

| Push-fit rotors and ring sieves for abrasive products | | | | | | | | | | | | | Item No. | |
|---|-----------------|------|------|------|------|------|------|------|------|------|-------------|-------------|-------------|-------------|
| Push-fit rotor | | | | | | | | | | | | 6-tooth | 12-tooth | 24-tooth |
| Push-fit rotor, stainless steel, with wear-resistant coating | | | | | | | | | | | | 02.608.0043 | 02.608.0044 | 02.608.0045 |
| Ring sieves | Trapezoid holes | | | | | | | | | | Round holes | | | |
| Aperture sizes in mm | 0.08 | 0.12 | 0.20 | 0.25 | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | |
| Ring sieves, stainless steel, with reinforced rim, wear-resistant coating | | | | | | | | | | | | | | |
| Item No.: 03.647... | - | - | 0262 | 0263 | 0264 | 0265 | 0266 | 0267 | 0268 | 0269 | - | - | - | |

| Push-fit rotors and ring sieves for heavy-metal-free grinding | | | | | | | | | | | | | Item No. | |
|--|-----------------|------|------|------|------|------|------|------|------|------|-------------|-------------|----------|--|
| Push-fit rotor | | | | | | | | | | | | 12-tooth | | |
| Push-fit rotor, titanium | | | | | | | | | | | | 02.608.0047 | | |
| Cassette, titanium-niobium coating, complete (pan, cover and gasket) | | | | | | | | | | | | 22.355.0006 | | |
| Ring sieves | Trapezoid holes | | | | | | | | | | Round holes | | | |
| Aperture sizes in mm | 0.08 | 0.12 | 0.20 | 0.25 | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | |
| Ring sieves, titanium, with reinforced rim | | | | | | | | | | | | | | |
| Item No.: 03.647... | 0270 | 0271 | 0276 | 0277 | 0278 | 0279 | 0280 | 0281 | 0282 | - | 0283 | - | - | |

| Accessories for grinding small volumes | | | | | | | | | | | | | Item No. | |
|--|-----------------|------|------|------|------|------|------|------|------|------|-------------|-------------|----------|--|
| Conversion kit for grinding small volumes, consisting of 8-tooth push-fit rotor, labyrinth disc and cassette (50 ml) | | | | | | | | | | | | 22.786.0002 | | |
| 8-tooth push-fit rotor, corrosion-resistant steel 1.4404 (316) | | | | | | | | | | | | 02.608.0057 | | |
| Labyrinth disc | | | | | | | | | | | | 02.706.0247 | | |
| Cassette (50 ml), corrosion-resistant steel 1.4404 (316), complete (pan, cover and gasket) | | | | | | | | | | | | 02.010.0039 | | |
| Ring sieves | Trapezoid holes | | | | | | | | | | Round holes | | | |
| Aperture sizes in mm | 0.08 | 0.12 | 0.20 | 0.25 | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | |
| Ring sieves, corrosion-resistant steel 1.4404 (316) | | | | | | | | | | | | | | |
| Item No.: 03.647... | 0287 | 0288 | 0289 | 0290 | 0285 | 0291 | 0292 | 0293 | 0294 | - | - | - | - | |

| Cyclone | | | | | | | | | | | | | Item No. |
|---|--|--|--|--|--|--|--|--|--|--|--|-----------------|---|
| Cyclone for ZM 200 incl. cassette with outlet and support | | | | | | | | | | | | with filter bag | with connection for vacuum cleaner ¹ |
| Cyclone with 5 l collecting receptacle | | | | | | | | | | | | 22.935.0016 | 22.935.0019 |
| Cyclone with 3 l collecting receptacle | | | | | | | | | | | | 22.935.0015 | 22.935.0018 |
| Cyclone with 1 sample bottle 250 ml and 1 sample bottle 500 ml | | | | | | | | | | | | 22.935.0014 | 22.935.0017 |
| ¹ Inner-Ø: 31.2 mm / Outer-Ø: 36 mm, for item number of vacuum cleaner see page 12 | | | | | | | | | | | | | |

| Paper filter bags | | | | | | | | | | | | | Item No. |
|--|--|--|--|--|--|--|--|--|--|--|--|-------------|----------|
| Paper filter bags (12 pieces) with passage receptacle and flange | | | | | | | | | | | | 22.261.0003 | |

| Accessories for automatic material feed | | | | | | | | | | | | | Item No. |
|--|----------------------|--|--|--|--|--|--|--|--|--|--|--|-------------|
| Feeder kit DR 100, complete with feeding kit with 40 mm push-fit feed chute, length 250 mm, hopper, stand and data cable | | | | | | | | | | | | | |
| DR 100 | for 220-240 V, 50 Hz | | | | | | | | | | | | 22.936.0001 |
| DR 100 | for 110-120 V, 60 Hz | | | | | | | | | | | | 22.936.0002 |

| Other accessories / Spare parts | | | | | | | | | | | | | Item No. |
|--|--|--|--|--|--|--|--|--|--|--|--|--|-------------|
| Spare cassette (900 ml), stainless steel, complete (pan, cover and gasket) | | | | | | | | | | | | | 02.010.0037 |
| Spare cassette cover, stainless steel, with gasket | | | | | | | | | | | | | 22.355.0003 |
| See price list for further accessories. | | | | | | | | | | | | | |

Applications

Cyclone Mill TWISTER

The innovative Cyclone Mill TWISTER is used for sample preparation to subsequent NIR analysis. It processes **fibrous and soft products** quickly and gently to the required analytical fineness. The mill is ideally suited for grinding **feeds, forage and cereals** as well as various types of **food**.

Free test grinding

As part of RETSCH's professional customer support we offer our customers the individual advice required to find the optimum solution for their sample preparation task. To achieve this our application laboratories process and measure samples free-of-charge and provide a recommendation for the most suitable method and instrument.

For more information please visit our website www.retsch.com/testgrinding.



The main areas of application for cyclone mills are:

Agriculture

Cereals, forage, tobacco

Foods & Feeds

Corn, feed pellets, pasta, rice, soy

Medicine and pharmaceuticals

Pharmaceutical raw materials and finished products

and many more...

Application Examples

| Cyclone mill TWISTER | Sieve insert | Feed size | Feed quantity | Grinding time | Speed | Final fineness |
|----------------------|--------------|-------------|---------------|---------------|--------------------------|--------------------|
| Corn | 1 mm | 0.1 - 5 mm | 100 g | 1 min | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Feed pellets | 1 mm | 5 - 15 mm | 50 g | 30 s | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Hay | 1 mm | 0.1 - 20 mm | 10 g | 1 min | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Rice | 1 mm | 2 - 10 mm | 50 g | 20 s | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Soy | 1 mm | 4 - 8 mm | 50 g | 30 s | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Tablets | 1 mm | 10 mm | 20 pcs. | 10 s | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Tobacco | 1 mm | 0.1 - 20 mm | 10 g | 15 s | 14,000 min ⁻¹ | homogeneous, <1 mm |
| Unripe spelt grain | 1 mm | 2 - 5 mm | 50 g | 30 s | 10,000 min ⁻¹ | homogeneous, <1 mm |
| Wheat | 1 mm | 3 - 8 mm | 50 g | 1 min | 14,000 min ⁻¹ | homogeneous, <1 mm |

This chart serves only for orientation purposes.

RETSCH's application database contains more than 1,000 application reports. Please visit www.retsch.com/applicationdatabase.

Cyclone Mill TWISTER

Ideal for feeds,
forage, cereals

Reproducible sample preparation to NIR analysis

The Cyclone Mill TWISTER was specially designed for the processing of food and feeds for subsequent NIR (Near Infrared Spectroscopy) analysis.

For NIR spectroscopy the precision and reproducibility of the analysis depend to a great extent on a uniform particle size distribution of the sample. To obtain meaningful analysis results, the quick and reproducible homogenization of the sample with TWISTER is essential.



Benefits at a glance

- Ideal for grinding feeds, grains, forage and similar products
- 3 controlled speeds
- Cyclone separator with 250 ml collecting bottle for quick extraction of sample
- No cross contamination thanks to easy cleaning
- Convenient operating panel
- Professional industrial design with long lifetime

The TWISTER is equipped with a rotor and grinding ring with sieve insert. The high speed and the optimized geometry of rotor and grinding chamber generate an air stream which carries the sample through the **integrated cyclone** into the sample bottle. The cyclone provides additional cooling of the sample and the grinding tools. This **prevents loss of**

moisture and thermal degradation and ensures preservation of the sample properties to be determined. The ground material is separated in the cyclone and collected in a sample bottle for complete recovery. The provided sieves guarantee an optimum particle size distribution so that it is not necessary to recalibrate the NIR spectrometer

Cyclone mill technology

In the Cyclone Mill TWISTER size reduction is effected by **impact and friction** between the rotor and the abrasive surface of the fixed grinding ring. The feed material passes through the hopper (with splash-back protection) onto the rotor, which is rotating with high speed, and is thus submitted to preliminary size reduction. The sample is then thrown outwards by centrifugal ac-

celeration and is pulverized between rotor and grinding ring until the particles are smaller than the aperture size of the sieve insert. The 2-step grinding ensures particularly gentle but fast processing. The feed material only remains in the grinding chamber for a very short time which **prevents the sample from getting too warm.**



Easy operation and cleaning

Operating the cyclone mill via a clearly structured keypad is simple and safe. The user can choose between **3 preset rotor speeds** allowing for perfect adaptation to sample requirements. For most products the air stream effects a complete discharge of the material from the grinding chamber, particularly if a **vacuum cleaner** is connected, so that **hardly any cleaning is required**. This helps to avoid cross contaminations and is especially convenient when processing a series of samples. The quick and easy exchange of the sample bottles adds to the comfortable operation of the TWISTER mill.

| Performance data | TWISTER |
|---|--|
| | www.retsch.com/twister |
| Application | sample preparation to NIR analysis |
| Fields of application | agriculture food & feeds, medicine/pharmaceuticals |
| Feed material | fibrous, soft |
| Feed size* | < 10 mm |
| Final fineness* | < 500 µm |
| Batch size/sample volume* | < 250 ml |
| Speed | 10,000 / 12,000 / 14,000 min ⁻¹ |
| Rotor peripheral speed | 52 / 62 / 93 m/s |
| Connection for vacuum cleaner | inner Ø: 31.2 mm / outer Ø: 36 mm |
| *depending on feed material and instrument configuration/settings | |
| Technical Data | |
| Drive | series-characteristic motor |
| Drive power | 900 W |
| W x H x D | 449 x 427 x 283 mm |
| Weight, net | approx. 14 kg |
| Noise values (noise measurement according to DIN 45635-31-01-KL3) | |
| Emission value with regard to workplace | L _{pAeq} 67.5 dB(A) |
| Measuring conditions | 10,000 min ⁻¹ , without sample material |

The Cyclone Mill TWISTER is supplied with the following components:

- aluminum rotor (1)
- stainless steel grinding ring with molybdenum coating (2)
- two stainless steel sieve inserts (1 mm and 2 mm) (3)
- adapter for connection of vacuum cleaner (4)
- filter bag (5)
- ten 250 ml sample bottles



Cyclone technology and benefits

A rotating air stream is generated inside the cyclone either by a vacuum cleaner connected to the upper outlet of the cyclone and/or by the rotor revolutions of the mill to which it is attached. Due to centrifugal forces acting on the sample, the particles settle on the cyclone walls and are lead in spiraled tracks into the attached sample bottle.

By using a cyclone, the sample and grinding tools are cooled during the grinding process, the throughput is increased and the discharge of the material from the grinding chamber is improved.

The results are a complete recovery of the sample as well as reduced cleaning times.



Order data for Cyclone Mill TWISTER

| Cyclone Mill TWISTER | | Item No. |
|--|---------------------|-------------|
| Complete with rotor, grinding ring, sieve inserts (1.0 mm and 2.0 mm), 10 sample bottles 250 ml, filter bag and adapter for connection of vacuum cleaner | | |
| TWISTER | 220–240 V, 50/60 Hz | 20.831.0001 |
| TWISTER | 110–120 V, 50/60 Hz | 20.831.0002 |
| Industrial vacuum cleaner | | |
| HDS 2000 | 230 V, 50/60 Hz | 22.748.0002 |
| HDS 2000 | 110 V, 50/60 Hz | 22.748.0003 |
| Filter bags for industrial vacuum cleaner HDS 2000, 5 pieces | | 32.524.0005 |
| HEPA filter for industrial vacuum cleaner HDS 2000, 1 piece | | 32.524.0006 |
| Spare parts TWISTER | | |
| Sieve insert | 1.0 mm | 03.647.0362 |
| Sieve insert | 2.0 mm | 03.647.0361 |
| Grinding ring | | 03.614.0004 |
| TWISTER rotor | | 03.608.0100 |
| Filter bag for cyclone | | 02.186.0004 |
| Sample bottles | 250 ml, 10 pcs. | 22.523.0001 |
| Sample bottles | 250 ml, 50 pcs. | 22.523.0006 |



Applications Rotor Beater Mills

The rotor beater mills are used to grind soft and medium-hard sample materials by impact and shearing. Due to their **robust design** and ability to process large amounts of sample they are ideal for small-scale production and suitable for **installation into automated preparation systems**.

Free test grinding

As part of RETSCH's professional customer support we offer our customers the individual advice required to find the optimum solution for their sample preparation task. To achieve this our application laboratories process and measure samples free-of-charge and provide a recommendation for the most suitable method and instrument.

For more information please visit our website www.retsch.com/testgrinding.



The main areas of application for rotor beater mills are:

Agriculture

Fertilizer, plant materials, seeds, soils

Chemicals and plastics

Plastics, powder coatings, resins

Construction materials

Gypsum

Food

Feed pellets, herbs, rice, spices, sugar

Geology and metallurgy

Bentonite, coal, coke, graphite

and many more...

Application examples

| Rotor Beater Mills | Model | Rotor | Retaining frame | Sieve aperture size | Feed size | Sample amount | Grinding time | Final fineness |
|--------------------|---------|----------------|-----------------|---------------------|-----------|---------------|---------------|----------------|
| Animal feed | SR 300* | Standard rotor | 360° | 1.5 mm | 10-12 mm | 1,500 g | 2.5 min. | 95% <1.5 mm |
| Bentonite | SR 300 | Standard rotor | 360° | 0.12 mm | 1-5 mm | 500 g | 5 min. | 95% <100 µm |
| Biochar | SR 300 | Standard rotor | 360° | 0.25 mm | 0-15 mm | 4,000 g | 10 min. | 99% <300 µm |
| Black Coal | SR 200* | Distance rotor | 180° | 0.25 mm | 1-5 mm | 1,800 g | 5 min. | 98% <200 µm |
| Coke | SR 300 | Standard rotor | 360° | 0.5 mm | 1-10 mm | 400 g | 2 min. | 99% <500 µm |
| Graphite | SR 300 | Distance rotor | 180° | 0.75 mm | 1-10 mm | 200 g | 15 s | 95% <600 µm |
| Gypsum | SR 200 | Distance rotor | 180° | 1.5 mm | 10 mm | 3,000 g | 3 min. | 95% <1 mm |
| Powder Coating | SR 300* | Distance rotor | 360° | 0.25 mm | 1-10 mm | 2,000 g | 13 min. | 95% <100 µm |
| Soil | SR 200 | Distance rotor | 180° | 3 mm | 0-15 mm | 100 g | 30 s | 98% <2 mm |
| Spices (goldenrod) | SR 300 | Standard rotor | 360° | 0.5 mm | 1-15 mm | 100 g | 2 min. | 90% <0.5 mm |
| Sugar | SR 300 | Distance rotor | 360° | 0.08 mm | 0-1 mm | 500 g | 5 min. | 95 % <30 µm |
| Wheat | SR 300* | Distance rotor | 360° | 1 mm | 0-5 mm | 1,500 g | 1 min. | 90% <0.75 mm |

*with Vibratory Feeder DR 100
This chart serves only for orientation purposes.

RETSCHE's application database contains more than 1,000 application reports. Please visit www.retsch.com/applicationdatabase.

Rotor Beater Mills

SR 200 and SR 300



High sample throughput

Size reduction, deagglomeration

RETSCH rotor beater mills are suitable for **coarse and fine size reduction**, either in batches or continuously, as well as for the **deagglomeration** of dry, soft and medium-hard organic and inorganic substances. Typical sample batches start with 0.5 liters. Therefore the mills can be used for sample preparation in the laboratory or in pilot plants for large sample quantities.

Grinding large volumes in no time

Rotor Beater Mills can process large sample amounts in a very short time due to the large open sieve area of the 360° ring sieves. Their range of applications is just as versatile as the wide range of accessories.

Benefits at a glance

- Suitable for batchwise operation of larger quantities
- Exchangeable grinding and sieve inserts
- Optional grinding inserts 180° for grinding of hard-brittle materials by additional impact
- Optional distance rotor to reduce frictional heat
- Quick-action door lock and motor brake
- Defined final fineness due to bottom sieves with aperture sizes from 0.08 - 10 mm

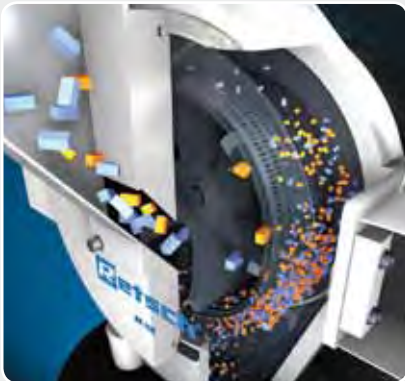
The SR 200 with a speed of 2,850 rpm (at 50 Hz) is available in gray cast iron. It has its primary uses for **medium-hard, brittle products** which can be perfectly ground with the standard rotor and the retaining frame that consists of a 180° sieve and a 180° impact insert, **without creating undesired fines**. The preparation of coal samples for calorimetric analyses is a typical application. The mill can be bench-mounted or installed on the optional base frame.

The SR 300 is the powerful comfort model. Due to the higher rotor speed (8,100 rpm at 50 Hz) and drive performance higher throughputs with a usually larger fine material fraction are obtained. For this reason the SR 300 provides **results comparable to the Ultra Centrifugal Mill ZM 200**, however, it is capable of handling larger batches. Grinding chamber, feed hopper and the material inlet and outlet are **completely made from stainless steel**. The hopper can be screwed off for easy cleaning. The mill is supplied complete with base frame.

SR 200, SR 300 technology

Size reduction and deagglomeration in rotor mills are achieved by hammering, impact and shear effects. The feed material passes from the hopper into the center of the grinding chamber where it is crushed between the rotor, sieve and grinding insert. As soon as the material is smaller than the aperture size of the sieve, it enters the collecting receptacle.

The quick-acting door lock ensures easy access to the grinding chamber for cleaning. With their motor brake, safety switch, splash-back and access barrier in the inlet and outlet areas, rotor beater mills offer the highest degree of operating safety.



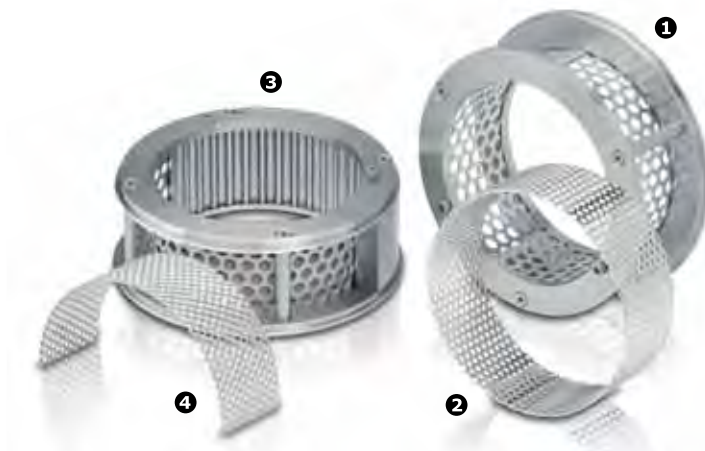
Ideal for laboratory and pilot plant

Selection of accessories

For soft, fibrous materials we recommend the **retaining frame with ring sieve 360°** (1)+(2). The **retaining frame with grinding insert 180°** (3) with the corresponding sieve (4) combines impact and shear effects and has proven itself with hard, brittle substances, especially on the low-speed SR 200.

The final fineness depends on the aperture size of the sieve, the breaking behavior of the feed material and the rotor speed. With many materials approx. 80% of the ground material is smaller than half the aperture size.

Both rotor mills include the **standard rotor** which provides good results with most products. For thermally sensitive, slightly fatty or oily or particularly soft sample materials, size reduction with the **distance rotor** is ideal. The larger grinding gap ensures a reduction in frictional heat, which prevents the sieve or the rotor from being blocked. This configuration is particularly efficient with the high-speed SR 300.



1. Retaining frame 360° (with ring sieve 360°)
2. Ring sieve 360°
3. Retaining frame with grinding insert 180° (with sieve 180°)
4. Sieve 180°

| Performance data | SR 200 | SR 300 |
|---------------------------|--|--|
| | www.retsch.com/sr200 | www.retsch.com/sr300 |
| Applications | size reduction, deagglomeration | |
| Field of application | agriculture, chemistry/plastics, construction materials, environment, food, medicine/pharmaceuticals | |
| Feed material | soft to medium-hard | |
| Feed size* | <15 mm | <15 mm |
| Final fineness* | <80 µm | <50 µm |
| Vessel capacity | 5 or 30 l | 5 or 30 l |
| Grinding chamber material | gray cast iron | stainless steel |

| Technical data | SR 200 | SR 300 |
|---|----------------------------|-----------------------|
| Drive | 3-phase and 1-phase motors | |
| Brake motor | yes | yes |
| Drive performance | 1.1 kW | 2.2 kW |
| Motor speed at 50 Hz (60 Hz) | 2,850 rpm (3,420 rpm) | 8,100 rpm (9,700 rpm) |
| Rotor peripheral speed at 50 Hz (60 Hz) | 20.5 m/s (24.5 m/s) | 58 m/s (69.5 m/s) |
| W x H x D (with base frame) | 560 x 1,150 x 700 mm | 560 x 1,200 x 890 mm |
| Weight (with base frame) | approx. 57 kg | approx. 95 kg |

| Noise values (noise measurement according to DIN 45635-31-01-KL3) | SR 200 | SR 300 |
|---|----------------------------|----------------------------|
| Emission value with regard to workplace | L _{pAeq} 81 dB(A) | L _{pAeq} 91 dB(A) |
| Measuring conditions: | | |
| Ring sieve | 0.5 mm trapezoid | 0.5 mm trapezoid |
| Feed material | rye, | artificial fertilizer |
| Feed size | up to 15 mm | up to 3 mm |

*depending on feed material and instrument configuration/settings



Rotor Beater Mills are supplied with a collecting receptacle (5 l) made from stainless steel and a textile filter hose. By using the **filter hose** between mill and collector the flow of air produced by the rotating rotor is discharged and back-pressure is avoided. It also **accelerates the material throughput** and ensures a gentle size reduction process.

Instead of the textile tube a **ring-type filter made of stainless steel** (aperture size 36 µm) can be installed to avoid cross contamination.

For additional convenience in cleaning, a dust filter unit is available.

For larger sample amounts we recommend the use of the **Vibratory Feeder DR 100** for uniform material feed and the **30 l collector** with the corresponding filter hose. The use of the vibratory feeder avoids overloads, improves the grinding result and allows for automatic processing of up to 3.5 liters of sample.

Order data for Rotor Beater Mills SR 200, SR 300

| Rotor Beater Mills SR 200, SR 300 | | Item No. |
|---|---|-------------|
| Rotor Beater Mill SR 200, supplied with standard rotor, filter hose (240 mm), collecting receptacle (5 l) (Please order retaining frame, sieves and, if required, base frame separately) | | |
| SR 200 | for 3/N-400 V, 50 Hz, rotor speed 2850 rpm, gray cast iron | 20.732.0001 |
| SR 200 | for 230 V, 50 Hz, rotor speed 2850 rpm, gray cast iron | 20.732.0003 |
| Rotor Beater Mill SR 300, supplied with standard rotor, filter hose (240 mm), collecting receptacle (5 l) and base frame (Please order retaining frame and sieves separately) | | |
| SR 300 | for 3/N-400 V, 50 Hz, rotor speed 8100 rpm, stainless steel | 20.733.1002 |
| other electrical versions available on request | | |

| Retaining frames and sieves for SR 200, SR 300 | | Item No. |
|---|---|-------------|
| Retaining frame for ring sieves 360° | | |
| Retaining frame for ring sieves 360°, stainless steel | | 22.642.0001 |
| Retaining frame for ring sieves 360°, chromium plated | | 22.642.0002 |
| Ring sieves 360°, stainless steel | Trapezoid holes | Round holes |
| Aperture sizes in mm | 0.08 0.12 0.20 0.25 0.50 0.75 1.00 1.25 1.50 2.00 3.00 4.00 10.00 | |
| Item No.: 02.407... | ... 0057 0026 0028 0029 0030 0031 0032 0058 0033 0034 0035 0036 | 0040 |
| Retaining frame with grinding insert for sieves 180° | | |
| Retaining frame with grinding insert for sieves 180°, stainless steel | | 02.143.0014 |
| Sieves 180°, stainless steel | Trapezoid holes | Round holes |
| Aperture sizes in mm | 0.08 0.12 0.20 0.25 0.50 0.75 1.00 1.25 1.50 2.00 3.00 4.00 10.00 | |
| Item No.: 03.647... | ... 0081 0039 0040 0041 0042 0043 0044 0045 0046 0047 0048 0049 | 0053 |

| Rotors for SR 200, SR 300 | Item No. | Item No. |
|---------------------------------|-------------|-------------|
| | for SR 200 | for SR 300 |
| Distance rotor, stainless steel | 22.717.0003 | 22.717.0004 |
| Standard rotor, stainless steel | 22.717.0001 | 22.717.0002 |

| Accessories for SR 200, SR 300 | | Item No. |
|---|--|-------------|
| Base frame | | |
| Base frame for SR 200 | | 01.824.0028 |
| Set of wheels for base frame | | 22.609.0003 |
| Vibratory Feeders* | | |
| Vibratory Feeder DR 100 for 220 -240 V, 50 Hz, complete with feeding kit, 75 mm feed chute, hopper and holder | | 70.937.0056 |
| Vibratory Feeder DR 100 for 110 -120 V, 60 Hz, complete with feeding kit, 75 mm feed chute, hopper and holder | | 70.937.0057 |
| Stand for using DR 100 with SR 200, SR 300 | | 22.742.0003 |
| Filter and collecting receptacles | | |
| Ring-type filter made of stainless steel for 5 liter collecting receptacle | | 22.187.0001 |
| Dust filter clamping rings for ring-type filter, with 5 dust filters | | 22.748.0001 |
| Dust filter for ring-type filter, 25 pieces | | 22.524.0002 |
| Stainless steel collecting receptacle, 5 liter | | 01.011.0023 |
| Filter hose for 5 liter collecting receptacle, length 240 mm, with comfort flange | | 22.187.0003 |
| Spare filter hose for 22.187.0003 | | 02.186.0027 |
| Plastic collecting receptacle, 30 liter, incl. filter hose and comfort flange | | 22.003.0011 |
| *accessories for vibratory feeders: please refer to "Assisting" brochure | | |

Applications

Cross Beater Mill

The cross beater mill SK 100 is suitable for coarse and fine size reduction, either in batches or continuously. It processes medium-hard and brittle materials with a hardness of up to approx. 6 on Mohs' scale. Cross Beater Mills are typically used in the **construction industry and metallurgical plants** due to their **rugged design** and simple operation.

Free test grinding

As part of RETSCH's professional customer support we offer our customers the individual advice required to find the optimum solution for their sample preparation task. To achieve this our application laboratories process and measure samples free-of-charge and provide a recommendation for the most suitable method and instrument.

For more information please visit our website www.retsch.com/testgrinding.



The main areas of application for cross beater mills are:

Ceramics and glass

Construction materials
cement clinker, gypsum, lime

Geology and metallurgy
coal, coke, chamotte, granite, ores, slag

and many more...

Application examples

| Cross Beater Mill | Mill version | Bottom sieve aperture size | Feed size | Sample amount | Grinding time | Final fineness |
|---------------------|-----------------|----------------------------|-----------|---------------|---------------|----------------|
| Cement clinker | Hardened steel | 4 mm | 2-15 mm | 500 g | 3 min. | 90% <1 mm |
| Coal | Gray cast iron | 0.5 mm | 1-15 mm | 450 g | 1 min. | 95% <300 µm |
| Copper phosphor | Stainless steel | 0.75 mm | 1-3 mm | 500 g | 3 min. | 90% <400 µm |
| Gravel | Stainless steel | 0.5 mm | 8 mm | 1,000 g | 5 min. | 80% <2 mm |
| Lime | Stainless steel | 0.75 mm | 5-15 mm | 170 g | 5 min. | 90% <250 µm |
| Magnesium carbonate | Stainless steel | 2 mm | 5-15 mm | 400 g | 3 min. | 98% <1 mm |
| Refractories | Stainless steel | 3 mm | 0-3 mm | 1,900 g | 2 min. | 90% <1 mm |
| Slag | Stainless steel | 0.5 mm | 1-15 mm | 150 g | 1 min. | 98% <315 µm |
| Sodium chlorite | Stainless steel | 2 mm | 1-15 mm | 850 g | 2 min. | 90% <1 mm |
| Tarmac | Stainless steel | 3 mm | 1-15 mm | 1,500 g | 2 min. | 90% <1 mm |

This chart serves only for orientation purposes.

RETSCHE's application database contains more than 1,000 application reports. Please visit www.retsch.com/applicationdatabase.

Cross Beater Mill

SK 100



SK 100
with
base frame

Robust and safe

Hard-to-beat size reduction

The RETSCH Cross Beater Mill SK 100 is intended for **universal use**: from sample preparation in laboratories and industrial plants, through pilot installations up to preparing sample batches in production facilities.

The maximum feed size for bulk goods is 15 mm, for single-piece feed 20 mm. The final fineness and throughput depend on the breaking behavior of the feed material and the aperture size of the bottom sieve. Due to the powerful drive it is possible to achieve a fineness $< 100 \mu\text{m}$ in a single working step in many cases.

Convenient and safe operation

Benefits at a glance

- Suitable for batchwise operation of larger quantities
- Defined final fineness due to bottom sieves with aperture sizes from 0.12 - 10 mm
- Exchangeable grinding and sieve inserts
- Easy cleaning
- Quick-action door lock and motor brake

The SK 100 offers the highest possible degree of **operating safety**. For example, if the off-switch is pressed or the door is opened, the motor brake ensures that the rotor will come to a standstill in less than 0.5 seconds. The feed hopper, like the optimized sample outlet, is equipped with an access barrier that also **prevents sample splash-back**. The SK 100 is easy to clean

which helps to reduce preparation time. The quick-action door lock allows rapid access to the grinding chamber and the high-quality sample outlet surface simplifies cleaning.

RETSCH cross beater mills are robust and maintenance-free. Their high-quality finish also guarantees that the mills will have a long working life.

SK 100 technology

Size reduction in cross beater mills takes place by hammering, impact and shearing effects. The feed material passes from the hopper directly into the center of the grinding chamber, where it is caught by the cross beater and ground between the baffle plates of the cross beater and the toothed grinding insert. As soon as the material is smaller than the

aperture size of the bottom sieve used, it passes through the sieve and enters the collecting receptacle. The air drawn in through the hopper by the cross beater accelerates the discharge of the ground material. The airborne fine fraction is separated off by a downstream filter system.



Robust and efficient

Bottom sieves

Bottom sieves made from trapezoid or round hole sheet are available in 14 aperture sizes. For heavy-metal-free grinding bottom sieves made from steel 1.0344 are available in 6 aperture sizes.



Accessories

The standard equipment supplied with the SK 100 includes a **5 l stainless steel collecting receptacle** and a **textile filter hose**. The **filter hose** is fixed between the mill and collecting receptacle and effects a discharge of the air flow produced by the rotating rotor. An accelerated material throughput and a gentle size reduction process are further advantages.

A **ring-type filter made of stainless steel** (aperture size 36 µm) can be used with or without a dust filter

Mill versions

The mill housing is made from cast aluminum. Depending on the application the grinding insert and grinding tools may be selected from various options. Because of its superior characteristics, **stainless steel** suits the vast majority of samples and is preferred for its ease-of-use. Grinding tools of **hardened steel** show the best resistance to abrasive materials while **gray cast iron** is considered as the inexpensive alternative. For grinding without heavy metals, a combination of **cast iron and steel 1.1740** is available. Details are shown in the table.

| Performance data | SK 100 |
|---|--|
| | www.retsch.com/sk100 |
| Application | size reduction |
| Field of application | agriculture, chemistry/plastics, construction materials, environment, geology/metallurgy, glass/ceramics |
| Feed material | medium-hard, brittle |
| Feed size* | <15 mm |
| Final fineness* | <100 µm |
| Collector volume | 5 or 30 l |
| Technical data | |
| Drive | 3-phase and 1-phase motors |
| Motor brake | yes |
| Drive performance | 1.1 kW |
| Motor speed at 50 Hz (60 Hz) | 2,850 rpm (3,420 rpm) |
| Rotor peripheral speed at 50 Hz (60 Hz) | 22 m/s (26 m/s) |
| W x H x D (with base frame) | 560 x 1,150 x 700 mm |
| Weight (with base frame) | approx. 57 kg |
| Noise values (noise measurement according to DIN 45635-31-01-KL3) | |
| Emission value with regard to workplace | L_{pAeq} 86 dB(A) |
| Measuring conditions: Feed material | quartz gravel, grain size <3 mm |
| *depending on feed material and instrument configuration/settings | |

unit instead of the textile tube; this is easier to clean, particularly with fine dusts.

For larger sample amounts we recommend the use of the **Vibratory Feeder DR 100** for uniform material feed and the **30 l collector** with corresponding filter hose.

The SK 100 can be bench-mounted or installed on the optional base frame.



| Versions | Grinding insert | Cross beater | Baffle plates |
|--------------------------|-----------------|-----------------|-----------------|
| SK 100, cast iron | cast iron | cast iron | hardened steel |
| SK 100, hardened steel | hardened steel | cast iron | hardened steel |
| SK 100, stainless steel | stainless steel | stainless steel | stainless steel |
| SK 100, heavy-metal-free | cast iron | cast iron | steel 1.1740 |

Order data for Cross Beater Mill SK 100

| Cross Beater Mill SK 100 | | | | | Item No. |
|---|----------------------|-------------|----------------|-----------------|------------------|
| Supplied with grinding insert, cross beater, baffle plates, filter hose (240 mm) and collecting receptacle (5 l) (Please order base frame and bottom sieve separately) | | | | | |
| | version: | cast iron | hardened steel | stainless steel | heavy-metal-free |
| SK 100 | for 3/N-400 V, 50 Hz | 20.735.0001 | 20.735.0002 | 20.735.0003 | 20.735.1001 |
| SK 100 | for 230 V, 50 Hz | 20.735.0007 | 20.735.0008 | 20.735.0009 | 20.735.1007 |
| SK 100 | for 110 V, 60 Hz | 20.735.0010 | 20.735.0011 | 20.735.0012 | 20.735.1010 |

| Bottom sieves for SK 100 | | | | | | | | | | | | | Item No. | |
|---|-----------------|------|------|------|------|------|-------------|------|------|------|------|------|----------|-------|
| Bottom sieves | Trapezoid holes | | | | | | Round holes | | | | | | | |
| Aperture sizes in mm | 0.12 | 0.20 | 0.25 | 0.50 | 0.75 | 1.00 | 1.50 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 8.00 | 10.00 |
| Bottom sieves, stainless steel | | | | | | | | | | | | | | |
| Item No.: 02.407... | ... 0059 | 0013 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0010 | 0011 | 0012 |
| Bottom sieves, steel 1.0344 for heavy-metal-free grinding | | | | | | | | | | | | | | |
| Item No.: 02.407... | ... 0083 | 0084 | 0085 | 0086 | - | 0087 | - | 0088 | - | - | - | - | - | - |

| Grinding tools for SK 100 | | | | Item No. |
|---------------------------|-------------|----------------|-----------------|--------------|
| | cast iron | hardened steel | stainless steel | steel 1.1740 |
| Grinding inserts | 22.443.0001 | 22.443.0002 | 22.443.0003 | - |
| Cross beater | 22.716.0001 | - | 22.716.0002 | - |
| Baffle plates (3 pieces) | - | 22.526.0001 | 22.526.0002 | 22.526.0006 |

| Accessories for SK 100 | | Item No. |
|--|--|-------------|
| Base frame | | |
| Base frame for SK 100 | | 01.824.0028 |
| Set of wheels for base frame | | 22.609.0003 |
| Vibratory Feeders* | | |
| Vibratory Feeder DR 100 for 220-240 V, 50 Hz, complete with feeding kit, 75 mm feed chute, hopper and holder | | 70.937.0056 |
| Vibratory Feeder DR 100 for 110-120 V, 60 Hz, complete with feeding kit, 75 mm feed chute, hopper and holder | | 70.937.0057 |
| Stand for using DR 100 with SK 100 | | 22.742.0003 |
| Filter and collecting receptacles | | |
| Ring-type filter made of stainless steel for 5 liter collecting receptacle | | 22.187.0001 |
| Dust filter clamping rings for ring-type filter, with 5 dust filters | | 22.748.0001 |
| Dust filter for ring-type filter, 25 pieces | | 22.524.0002 |
| Stainless steel collecting receptacle, 5 liter | | 01.011.0023 |
| Filter hose for 5 liter collecting receptacle, length 240 mm, with comfort flange | | 22.187.0003 |
| Spare filter hose for 22.187.0003 | | 02.186.0027 |
| Plastic collecting receptacle, 30 liter, incl. filter hose and comfort flange | | 22.003.0011 |
| *accessories for vibratory feeders: please refer to "Assisting" brochure | | |



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