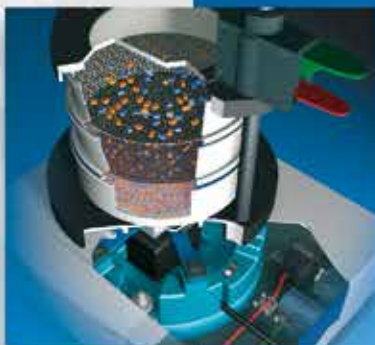


Sample Preparation & Quality Control



Milling

Including latest product news!



Sieving



Assisting

Retsch[®]
Solutions in Milling & Sieving

RETSCH Sets Standards

Almost 100 years of experience in the preparation and characterization of solids – quality “made in Germany”.

As the world-market leader in milling and sieving technology we are constantly striving for customer and market oriented solutions in our research and development activities and implement them systematically in our products and services. The RETSCH philosophy is based on customer orientation and leading edge technology. Based on the principle of the Greek philosopher Aristotle, “The whole is greater than the sum of its parts”, RETSCH develops instruments whose high-quality components are designed for perfect interaction. Thus, they not only guarantee representative and reproducible results for grinding and particle analysis but also allow for easy and comfortable operation.

With RETSCH you get

- **First-class product quality**
- **Comprehensive application support including free test grindings**
- **Excellent sales and service network throughout the world**



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1915

The company is founded by F. Kurt Retsch in Duesseldorf.

1923

F. Kurt Retsch develops and patents a mortar mill which becomes known as the RETSCH Mill and is synonymous with the concept of easier and better laboratory work.

1952

Engineer Dirk Sijlsing assumes management responsibility for F. Kurt Retsch KG. The production of laboratory equipment gains more and more importance.

1959

RETSCH extends the product line by sieve shakers, sample dividers and magnetic mixers. More space is required for production, and so the company moves to Haan.

1963

RETSCH intensifies its cooperation with universities and institutes to ensure their equipment is always up to the latest technological standards. By the end of the sixties, the export share has increased to 35%.

1976

The company moves to new offices in Haan.

1989

André Verder and Frans Bakker take over the F. Kurt Retsch GmbH shares in equal parts. Gradually RETSCH manages the transition from a family business to an internationally active company.

1993 - 2012

RETSCH establishes its own sales organizations in the United Kingdom, Japan, the US, China, Italy, Norway, South Korea, Russia and India.

1998

Foundation of Retsch Technology.

2012

RETSCH moves to new headquarters in Haan.

2014

Market launch of the revolutionary high energy ball mill E_{max}.

RETSCH – the company

RETSCH is active in the fields of neutral-to-analysis sample preparation as well as particle characterization of solids within the context of quality control, boasting the widest product portfolio of mills, grinders, sieve shakers and assisting tools in the market.

From the preparation of a representative sample, the contamination-free size reduction process in compliance with relevant standards to exact and reproducible sieve analyses – RETSCH provides essential tools for preparing samples prior to analyses. Our instruments are characterized by reliability, precision and durability. Almost 100 years of experience in this sector have made us the market leader in the manufacture of instruments and supply of solutions. Worldwide sales and marketing are carried out in cooperation with our own subsidiaries, authorized distributors and laboratory dealers in more than 85 countries as well as directly to the end customers.



Integrated Solutions

We see ourselves as solution providers. In addition to our extensive product program we offer competent application support and technical assistance.

Application Consulting

For us professional customer service is about offering individual and specific advice, by phone or in our application laboratory. Thus, we find the optimum solution for each sample preparation task.

Free-of-charge Test Grinding

Our application laboratory processes and measures your samples free-of-charge and provides a recommendation for the most suitable method and instrument.

All you have to do is fill in the questionnaire and send it to us together with your sample.

Mobile Application Laboratory

The RETSCH Bus is a laboratory on wheels which offers you the possibility of an individual, specific and free-of-charge application consultation at your doorstep.



Technical Service

RETSCH instruments are designed for a long working life and only require a minimum of maintenance. In case a technical problem does occur, our technical service hotline will help you to solve it quickly and professionally.

Seminars and Workshops

Alone or with renowned partners in the laboratory industry we regularly offer practical seminars and workshops about different aspects of sample preparation, particle measurement and analytics. The dates and places can be found on our website.

Customer Magazine "the sample"

RETSCH's popular customer magazine "the sample" provides readers with the latest information about products, applications, seminars and campaigns. Detailed articles give insight into the particularities of sample preparation and particle analysis and provide valuable tips and tricks.

Product Videos

With RETSCH's operation and application videos, no question is left unanswered. The viewer can take a look into the sieve or the grinding jar and see how the machine works. Realistic computer animations help to understand the working principle; operation and a range of applications are explained in detail.



RETSCH Online Services

As a global market leader, RETSCH strives to provide information to customers worldwide 24 hours a day, 7 days a week. The website www.retsch.com is the ideal tool to get first-hand details on products, applications, contact persons, dates and events. The site is available in 15 languages.

Product Pages

Each product is presented in great detail. In addition to features, technical data and order information, a whole range of useful documents and files can be downloaded.

Use the direct link www.retsch.com/product (e.g. www.retsch.com/rs200) for quick access to detailed product information.

Quote request via www.retsch.com

The RETSCH website offers a convenient functionality: It is possible to request a quote on each product and all the accessories listed on the website. Just mark the items you are interested in, confirm your inquiry and submit the request. You will receive an email with price information shortly afterwards.



Function & Features	Information & Downloads	Order data & Quote request
<ul style="list-style-type: none"> - Application examples - Product advantages - Technical features - Function principle 	<ul style="list-style-type: none"> - Videos - Brochures - Application reports - Tips & Tricks - Operating instructions and many more 	<ul style="list-style-type: none"> - Picture of each price list article - Order data - Request a free, non-binding quote!





Application Data Base

In order to find the best possible solution for your sample preparation task RETSCH offers free-of-charge test grindings and particle analyses which are carried out by our application specialists. The results are collected in a database which currently contains more than 1,000 test reports. For the online database we selected the most frequently occurring applications.

The application data base is an excellent tool to get a first orientation as to which instrument may be suitable for a particular application or sample material.

www.retsch.com/applicationdatabase

Test Grindings

The "application" menu offers the possibility to download the questionnaire for milling and sieving which you need to send in your sample for a free test grinding or particle size analysis.

www.retsch.com/testgrinding

What's New?

The "News" section of the website provides the latest press releases, a survey of the international trade shows in which RETSCH participates and details about seminars and workshops.

Those who are interested in receiving information on a regular basis can subscribe to our bimonthly newsletter or to the customer magazine "the sample" free-of-charge.

www.retsch.com/news

Milling

The Art of Homogenization

A reliable and accurate analysis can only be guaranteed by reproducible sample preparation. The "art of milling and homogenization" with regards to the subsequent analysis therefore consists in turning a laboratory sample into a representative part sample with homogeneous analytical fineness. For these tasks RETSCH offers a comprehensive range of the most modern mills and crushers for coarse, fine and ultra-fine size reduction of almost any material. The choice of grinding tools and accessories not only ensures contamination-free preparation of a wide range of materials but also the adaptation to the individual requirements of such different areas of application as construction materials, metallurgy, foodstuffs, pharmaceuticals or environment.



The matrix below demonstrates the interdependence of instrument, sample material and working principle.

Device	hard and brittle materials	soft, elastic and fibrous materials	Working Principle
Jaw Crusher	■		Pressure
Ultra Centrifugal Mill		●	Impact, Shearing
Cyclone Mill		●	Friction, Shearing
Cross Beater Mill	■		Impact, Shearing
Rotor Beater Mill	●	● ■	Impact, Shearing
Cutting Mill		■	Shearing, Cutting
Knife Mill		●	Cutting
Mortar Grinder	●		Pressure, Friction
Disc Mill	●		Pressure, Friction
Mixer Mill	●	●	Impact, Friction
CryoMill	●	●	Impact, Friction
Planetary Ball Mill	●	●	Impact, Friction
High Energy Ball Mill	●	●	Impact, Friction

- preliminary size reduction
- fine grinding

The Selection Guide gives you an overview of the RETSCH instruments which are, in principle, suitable for certain materials.

Selection Guide

	Jaw Crushers				Rotor Mills					Knife/Cutting Mills				Disc Mills		Mortar Grinders	Ball/Mixer Mills					E _{max}			
	BB 50	BB 100	BB 200	BB 300	ZM 200	TWISTER	SK 100	SR 200	SR 300	GM 200	GM 300	SM 100	SM 200	SM 300	RS 200	DM 200	RM 200	MM 200	MM 400	Cryo-Mill	PM 100		PM 200	PM 400	
Feed size* approx. (mm)	40	50	90	130	10	10	15	15	15	10-40	130	80x60			15	20	8	6	8	8	10	4	10	5	
Final fineness* approx. (mm)	0.5	4	2	5	0.04	0,5	0.1	0.08	0.05	0.3	0.3	0.25-20			0.04	0.1	0.01	0.01	0.005	0.005	0.0001	0.0001	0.0001	0.00005	
Chemicals products	○	○	○	○	✓		○	✓	✓	○	○	○	○	○	○	○	✓	✓	✓	✓	✓	✓	✓	✓	✓
Coal, coke	✓	✓	✓	✓	✓		✓	✓	○			○	○	○	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction materials	✓	✓	✓	✓			○								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Electronic scrap, circuit boards					✓		○					○	✓	✓	○			○	✓	✓	✓	✓	✓	✓	✓
Feed					✓	✓	○	✓	✓	✓	✓	✓	✓	✓		○		✓	✓	✓	○	○	○	○	○
Food					✓	✓		✓	✓	✓	✓	✓	✓	✓			✓	○	✓	✓	○	○	○	○	○
Glass, ceramics	✓	✓	✓	✓			○								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Leather, textiles					✓		○	○	○			✓	✓	✓				✓	✓	✓	○	○	○	○	○
Minerals, ores, stones	✓	✓	✓	✓	○		✓	○	○						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pharmaceutical products					✓	○	○	✓	✓	✓	✓	○	○	○	○		✓	○	✓	✓	✓	✓	✓	✓	✓
Plants, hay, straw					✓	✓		○	○	○	○	✓	✓	✓	✓		○	✓	✓	✓	✓	✓	✓	✓	✓
Plastics, cables, rubber					✓							○	✓	✓				○	✓	✓					
Secondary fuels					✓		○					✓	✓	✓				○	✓	✓	○	○	○	○	○
Soils, sewage sludge	○	○	○	○	○		○								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Wood, bones, paper	○				✓							○	✓	✓	○		○	✓	✓	✓	✓	✓	✓	✓	✓

✓ suitable ○ suitable to a limited extent

*depending on feed material and instrument configuration/settings

This chart serves only for orientation purposes. The selection of the appropriate mill depends on a variety of parameters of the actual application. Please contact us to discuss the best solution.



www.retsch.com/bb100
www.retsch.com/bb200
www.retsch.com/bb300

Main areas of application

Cement clinker, coal, construction materials, granite, metal alloys, quartz, ores, oxide ceramics, silicon, slag, tungsten alloys



Jaw Crushers

Jaw Crushers BB 100/BB 200/BB 300

The powerful RETSCH Jaw Crushers are designed for the rapid, gentle coarse and primary crushing of hard, brittle and tough materials. The breaking jaws are available in a variety of materials which include heavy-metal-free steel. Their efficiency and safety makes these pulverizers ideal for sample preparation in laboratories and industrial plants.

Four basic models are available: from the compact bench-top model BB 50 to the biggest floor model, BB 300 which allows for feed sizes up to 130 mm. RETSCH jaw crushers combine increased operating convenience with maximum working safety.



BB 100, BB 300

The robust floor models BB 100, BB 200 and BB 300 feature:

- **Powerful size reduction with high throughput**
- **High final fineness (down to $d_{90} < 2$ mm)**
- **Wear compensation due to zero point adjustment**
- **Batch-wise and continuous operation**
- **Wide selection of breaking jaw materials**
- **Safe and simple handling and cleaning**



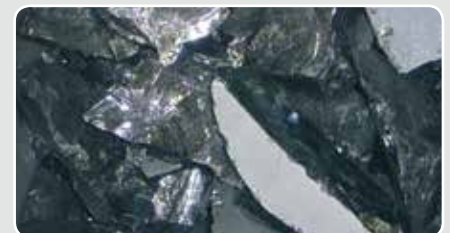
BB 200

RETSCH Jaw Crushers are primarily used in laboratories and pilot plants, often under rough conditions. For applications such as the quality control of raw materials the BB 200 and BB 300 can be integrated into the process line for continuous operation.



Main areas of application

Cement clinker, coal, construction materials, granite, metal alloys, quartz, ores, oxide ceramics, silicon, slag, tungsten alloys



Jaw Crusher BB 50

The BB 50 jaw crusher is particularly useful in reducing small sample volumes with large feed sizes down to <math><0.5\text{ mm}</math> in one easy step. Samples such as stone, minerals, ores, glass, synthetic resins and many other hard or brittle substances are ground without contamination, using grinding tools of manganese steel, stainless steel, wear-resistant tungsten carbide, zirconium oxide or heavy metal-free steel. The grind size is controlled through digital gap width setting. The BB 50 features a zero-point-adjustment to compensate for wear and assure reproducible samples at all times. With its small footprint and dust-tight housing, this unique jaw crusher easily fits on any laboratory bench.

- **High final fineness**
($d_{90} < 0.5\text{ mm}$)
- **Digital adjustment and memory for gap width setting**
- **Breaking jaws in 5 different materials**
- **Removable jaw for easy cleaning**
- **Dust-tight, no maintenance required**



BB 50

Performance data	BB 50	BB 100	BB 200	BB 300
Application:	coarse and pre-crushing			
Type of material:	medium-hard, hard, brittle, tough			
Feed size*:	<math><40\text{ mm}</math>	<math><50\text{ mm}</math>	<math><90\text{ mm}</math>	<math><130\text{ mm}</math>
Final fineness*:	<math><0.5\text{ mm}</math>	<math><4\text{ mm}</math>	<math><2\text{ mm}</math>	<math><5\text{ mm}</math>

* depending on feed material and instrument configuration/settings



www.retsch.com/zm200
www.retsch.com/twister

Main areas of application

Bones, cereals, chemicals, coal, drugs, fertilizers, food & feed, minerals, plastics, pharmaceutical products, plant materials, powder coatings, secondary fuels, spices



Performance Data ZM 200

Application:	<i>fine grinding</i>
Feed material:	<i>soft, medium-hard, brittle, fibrous</i>
Feed size*:	<i><10 mm</i>
Final fineness*:	<i><40 µm</i>

**depending on feed material and instrument configuration/settings*

Main areas of application

Feed and forage, grain, pharmaceuticals, tobacco



Performance Data TWISTER

Application:	<i>sample preparation for NIR analysis</i>
Feed material:	<i>fibrous, soft</i>
Feed size*:	<i><10 mm</i>
Final fineness*:	<i><500 µm</i>

**depending on feed material and instrument configuration/settings*

Rotor Mills

Ultra Centrifugal Mill ZM 200

The powerful and versatile ZM 200 offers the ultimate in performance and operating comfort. This widely used mill pulverizes a great variety of substances extremely fast, thus allowing for a high sample throughput without degradation of sample properties. The grinding sets can be cleaned easily without any tools which helps to avoid cross contamination from frequently changing samples.

ZM 200



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

- **Robust high torque motor with speed range from 6,000 to 18,000 rpm**
- **Rapid and gentle size reduction by 2-step rotor/screen system**
- **Easy to operate and clean**
- **Automatic feeding system for sample volumes of up to 4.5 liters**

Cyclone Mill TWISTER

The cyclone mill TWISTER is used for the sample preparation prior to NIR analysis. It is suitable for the quick and gentle grinding of fibrous and soft products down to analytical fineness. Typical applications include feeds, forage and grain. The high speed and the optimized form of the rotor and the grinding chamber generate an air jet which carries the sample through the cyclone into the sample bottle and also has a cooling effect on the material.

- **3 controlled speeds**
- **Cyclone separator with 250 ml collecting bottle for quick sample extraction**
- **No cross contamination thanks to easy cleaning**



TWISTER

www.retsch.com/sr200
www.retsch.com/sr300
www.retsch.com/sk100



Main areas of application

Chemicals, coal, construction materials, drugs, spices, feed pellets, fertilizers, grains, seeds, pharmaceuticals, soils



Rotor Beater Mills SR 200 and SR 300

Due to their robust design and their ability to process large amounts of sample, the Rotor Beater Mills SR 200 and SR 300 are ideal for small-scale production and are also suitable for installation into automated preparation systems. The SR 300 is the leader among the Rotor Beater Mills. Its high speed allows a high sample throughput. Grinding chamber, feed hopper and material inlet and outlet are completely made from high-quality stainless steel.



SR 300

- **High throughput**
- **Final fineness down to 50 µm**
- **Easy handling and cleaning**
- **Exchangeable grinding and sieve inserts**
- **Distance rotor for thermally sensitive samples**
- **Quick-action door lock and motor brake**

Performance Data SR 200 / SR 300

Application: size reduction, deagglomeration
Feed material: soft, medium-hard
Feed size:* <15 mm
Final fineness:* <80 µm / <50 µm

*depending on feed material and instrument configuration/settings

Main areas of application

Cement clinker, coke, glass, gravel, minerals, ores, oxide ceramics, slags, soils



Performance Data SK 100

Application: size reduction
Feed material: medium-hard, brittle
Feed size:* <15 mm
Final fineness:* <100 µm

*depending on feed material and instrument configuration/settings

Cross Beater Mill SK 100

Like the Rotor Beater Mills, the Cross Beater Mill SK 100 is suitable for coarse and fine size reduction, either in batches or continuously. This robust mill is used in the laboratory as well as under rough conditions in production facilities. Due to its powerful drive, it is often possible to achieve a fineness <100 µm in a single working step. Moreover, the SK 100 offers the highest possible degree of operating safety.

- **High throughput**
- **Final fineness down to 100 µm**
- **Easy handling and cleaning**
- **Wide range of accessories**



SK 100



www.retsch.com/sm100
www.retsch.com/sm200
www.retsch.com/sm300

Main areas of application

Bones, cables, cardboard, computer and electronic waste, drugs, feeds, foils, leather, light metal scrap, lignite, non-ferrous metals, organic and inorganic waste, paper, plant materials, plastics, rubber, spices, straw, secondary fuels, wood



Performance Data SM 100 / SM 200 / SM 300

Application: size reduction
 Feed material: soft, medium-hard, tough, elastic, fibrous
 Feed size*: max. 60 x 80 mm
 Final fineness*: 0.25 - 20 mm

*depending on feed material and instrument configuration/settings



SM 100



SM 200



SM 300

Cutting Mills

Cutting mills SM 100, SM 200 and SM 300

The cutting mill **SM 100** processes soft, medium-hard, elastic and fibrous products which can be comminuted without requiring extremely high forces. The mill is particularly suited for routine applications. It is easy to operate and can be mounted on a solid table or on the optional base frame.

The RETSCH Cutting Mills **SM 200** and **SM 300** excel especially in the tough jobs where other cutting mills fail. They provide highly efficient primary size reduction of such heterogeneous materials as waste or electronic components but are also suitable for many other types of samples. The mills offer a high level of operational safety and a long service life of the grinding tools. A wide selection of screens, hoppers, collection systems as well as a cyclone-suction-combination allow for easy adaptation to the individual application task. All units are also available in a special version for heavy-metal-free size reduction.

- **Powerful size reduction, even of heterogeneous materials**
- **SM 300 with variable speed**
- **Defined final fineness**
- **Low heat build-up**
- **Quick and easy cleaning**
- **Wide range of accessories**



Knife Mills

Knife Mills GRINDOMIX GM 200 and GM 300

The GRINDOMIX Knife Mills set new standards in food sample preparation. The cutting effect produced by the steel blades in conjunction with the patented gravity lid results in the size reduction and perfect homogenization of samples high in water or oil content. It is possible to take a random, yet representative sub-sample from any location in the grinding chamber and still obtain a meaningful analysis result.

The GM 200 and GM 300 produce representative samples with a minimum standard deviation in as little as 30 seconds. With its sturdy design, industrial motor, high safety standard and digital parameter settings including memory the GRINDOMIX mills are truly professional laboratory devices that easily outperform any household mixer or conventional knife mill. A wide range of containers and lids makes it easy to adapt the mill to various applications.

- Perfect homogenization
- Results with minimum standard deviation
- Variable speed
- For sample volumes up to 700 ml or 4,500 ml
- Autoclavable grinding tools
- Unique lids for volume adaptation of grinding chamber
- Accessories for heavy-metal-free grinding



GM 200

GM 300

The GM 300 is suitable for the fast and reproducible grinding and homogenizing of sample volumes up to 4,500 ml.

Main areas of application

Biscuits, bread, cereal bars, cocoa nibs, deep-frozen products, feed pellets, fish, fruit, meat, oilseeds, sausage, seafood, spices, vegetables



Performance Data GM 200 / GM 300

Application:	size reduction and homogenization
Feed material:	soft, medium-hard, elastic, high water, oil or fat content, dry
Feed size*:	<40 mm / <130 mm
Final fineness*:	<0.3 mm

*depending on feed material and instrument configuration/settings



www.retsch.com/rs200
www.retsch.com/dm200
www.retsch.com/dm400

Main areas of application

Cement, cement clinker, ceramics, coal, coke, concrete, corundum, glass, metal oxides, minerals, ores, silicates, slag, soils



Performance Data RS 200

Application: size reduction, mixing, trituration
Feed material: medium-hard, hard, brittle, fibrous
Feed size*: <15 mm
Final fineness*: <40 µm

**depending on feed material and instrument configuration/settings*

Main areas of application

Bauxite, clinker, coal, coke, dental ceramics, dried soil, glass, gypsum, ores, quartz, sewage, sintered ceramics, sludge slag, steatite



Performance Data DM 200 / DM 400

Application: size reduction, pre-crushing
Feed material: medium-hard, hard, brittle
Feed size*: <20 mm
Final fineness*: <100 µm

**depending on feed material and instrument configuration/settings*

Disc Mills

Vibratory Disc Mill RS 200

No grinder can beat the speed of a Vibratory Disc Mill when it comes to preparing samples for spectral analyses. The RETSCH RS 200 with its powerful stabilized plane drive achieves grind sizes between 40 and 100 microns within seconds and with excellent reproducibility. The powerful instrument runs steadily and smoothly, even with heavy grinding sets and at maximum speed. Thanks to grinding sets in various materials and sizes, this mill can be used for a wide range of sample materials.



RS 200

- Analytical fineness in seconds
- Excellent reproducibility
- Powerful stabilized-plane-drive
- Easy 1-button operation with graphics display
- Memory for 10 SOPs

Disc Mills DM 200 and DM 400

The Disc Mills allow for the fine grinding of larger batches of hard, abrasive substances. The rugged design permits use under rough conditions in laboratories and pilot plants as well as in-line for quality control of raw materials. The Disc Mills achieve an average final fineness of approximately 100 microns, often in a single grinding process. The comfort model DM 400 is particularly convenient and safe to handle.

- Short grinding times, high final fineness
- Accurate gap setting ensures reproducible grinding
- Grinding discs made of 4 different materials



DM 400



Mortar Grinders

Mortar Grinder RM 200

The RM 200 is the latest generation of the classic "RETSCH Mill" which replaced manual mortars and pestles more than 80 years ago. It is widely used for reproducible sample preparation in R&D, materials testing and especially in pharmaceuticals and homeopathy. Many different materials can be easily and efficiently processed in wet or dry condition. The grinding sets of the RM 200 can be selected out of 7 different materials which allows for neutral-to-analysis sample preparation. The new generation of mortar grinders is exceptionally powerful, safe and easy to operate.

- Reproducible dry and wet grinding
- Easy exchange of pestle and mortar without tools
- Closed, dust-tight grinding chamber with windows
- Grinding sets in 7 different materials
- High-performance drive with electronic control



RM 200

Main areas of application

Ashes, cement clinker, chemicals, cocoa beans, drugs, food, frozen yeast cells, oil seeds, salts, pharmaceutical and homeopathic raw materials and products, silicates, slag, soil, spices



Performance Data RM 200

Application: size reduction, mixing, trituration
 Feed material: soft, hard, brittle, pasty, dry and wet
 Feed size*: <8 mm
 Final fineness*: <10 μ m

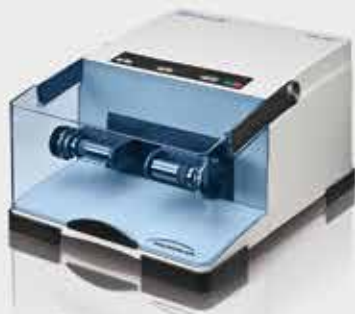
*depending on feed material and instrument configuration/settings



www.retsch.com/mm200
www.retsch.com/mm400

Main areas of application

Alloys, bones, cereal grains, ceramics, chemicals, drugs, glass, hair, minerals, oil seeds, ores, plant materials, plastics, sludge, soils, coated and uncoated tablets, textiles, tissue, waste samples, wool



MM 200

Mixer Mills

Mixer Mill MM 400

The RETSCH Mixer Mill MM 400 is a true laboratory "all-rounder". It has been developed specially for dry, wet and cryogenic grinding of small sample amounts. This high-performance ball mill usually grinds and homogenizes powders and suspensions in only a few seconds and achieves grind sizes down to the nano range. It is also perfectly suitable for the disruption of biological cells as well as for DNA/RNA recovery. Due to its great versatility, the MM 400 is used in many different industries ranging from pharmaceuticals and biology to mineralogy, environment or plastics.



MM 400

- **Rapid and efficient pulverization and homogenization**
- **Reproducible results due to digital parameter setting**
- **Grinding jars in various sizes and materials**
- **Memory for 9 SOPs**
- **Simultaneous preparation of up to 20 samples**

Mixer Mill MM 200

The Mixer Mill MM 200 is also used for efficient size reduction and homogenization of 2 samples simultaneously. It works with the same functional principle as the MM 400. This mill is highly suitable for grinding dry samples in small quantities and offers a favourably priced alternative to the MM 400 for routine applications. The grinding jars for the MM 200 have a push-fit lid.

<i>Performance data</i>	<i>MM 200</i>	<i>MM 400</i>	<i>CryoMill</i>
<i>Application:</i>	<i>Size reduction, mixing, homogenization, cell disruption</i>		
<i>Type of material:</i>	<i>soft, medium-hard, hard, brittle, elastic, fibrous</i>		
<i>Feed size*:</i>	<i><6 mm</i>	<i><8 mm</i>	<i><8 mm</i>
<i>Final fineness*:</i>	<i><10 µm</i>	<i><5 µm</i>	<i><5 µm</i>

* depending on feed material and instrument configuration/settings



Main areas of application

Animal feed, bones, chemical products, hair, oil seeds, paper, plant materials, plastics, sewage sludge, soils, tablets, textiles, tissue, waste samples, wood, wool



CryoMill

The CryoMill has been specially designed for cryogenic grinding. It features an integrated cooling system which continually cools the grinding jar with liquid nitrogen before and during the grinding process. Thus the sample is embrittled and volatile components are preserved. The liquid nitrogen circulates through the system and is continually replenished from an autofill system in the exact amount which is required to keep the temperature at $-196\text{ }^{\circ}\text{C}$. The user does not come into contact with LN_2 at any point which makes operation of the mill particularly safe. The automatic cooling system guarantees that the grinding process is not started before the sample is thoroughly cooled. This results in reduced consumption and guarantees reproducible grinding results.

The size reduction principle is the same as that of the MM 400. With a vibrational frequency of 30 Hz the CryoMill grinds most materials very effectively in a few minutes. The combination of impact and friction leads to substantially finer grind sizes compared to other cryogenic mills. The CryoMill is equipped with one grinding station for grinding jar volumes of 25 ml, 35 ml and 50 ml. It is also possible to use adapters for 4 grinding jars of 5 ml each as well as for up to 6 reaction vials.

- **Fast, efficient cryogenic grinding at $-196\text{ }^{\circ}\text{C}$**
- **Ideal for plastics, temperature-sensitive materials and samples with volatile components**
- **Particularly safe due to autofill system for liquid nitrogen**
- **Highly reproducible grinding results**
- **Memory for 9 SOPs**
- **Also suitable for dry and wet grinding**



LN₂ container

CryoMill



www.retsch.com/pm100
www.retsch.com/pm100cm

Main areas of application

Alloys, ceramics, chemicals, glass, minerals, ores, plant materials, sewage sludge, soils, household and industrial waste



Planetary Ball Mills

The innovative Planetary Ball Mills meet and exceed all requirements for fast and reproducible grinding down to the submicron range. They are used for the most demanding tasks, from routine sample processing to colloidal grinding and mechanical alloying. The grinding parameters are easily selected and stored with one single button. All planetary mills feature programmable starting time, power failure backup with storage of remaining grinding time and a built-in fan which cools the grinding jars during operation. The comfort grinding jars are dust-tight and unusually simple and safe to handle.

- Final fineness down to the submicron range
- Reproducible results due to energy and speed control
- 1-button operation with graphics display
- Memory for 10 SOPs
- Smooth and stable operation
- Automatic grinding chamber ventilation
- Suitable for long-term trials and continuous use





Main areas of application

Alloys, ceramics, chemicals, glass, minerals, ores, plant materials, soils, sewage sludge, household and industrial waste



Planetary Ball Mill PM 100

This single station ball mill pulverizes and mixes a wide range of materials and can be operated with grinding jars from 12 ml to 500 ml. It is especially safe to operate on a laboratory bench thanks to the new FFCS technology which helps to compensate vibrations.

Planetary Ball Mill PM 100 CM

This ball mill offers all the performance and convenience of the classic PM 100, only the speed ratio of sun wheel to grinding jar is 1:-1 instead of 1:-2. This results in a different ball movement so that the sample is not so much crushed by impact effects but more gently ground by pressure and friction. This not only leads to less abrasion but also reduces the heat build-up inside the jar.

Planetary Ball Mill PM 200

The PM 200 is equipped with two grinding stations and accepts grinding jars up to 125 ml. It is used for the pulverization and mixing of smaller sample volumes.



PM 200

Performance data	PM 100	PM 100 CM	PM 200	PM 400
Application:	Size reduction, mixing, homogenization, colloidal grinding, mechanical alloying			
Type of material:	soft, medium-hard, hard, brittle, fibrous, dry and wet			
Feed size*:	<10 mm	<10 mm	<4 mm	<10 mm
Final fineness*:	<0.1 µm	<0.1 µm	<0.1 µm	<0.1 µm

* depending on feed material and instrument configuration/settings

Main areas of application

Alloys, ceramics, chemicals, glass, minerals, ores, plant materials, sewage sludge, soils, household and industrial waste



Planetary Ball Mills

Planetary Ball Mill PM 400

The robust floor model features four grinding stations and accepts jars from 12 ml to 500 ml. It can grind up to 8 samples simultaneously down to the submicron range thus generating a high sample throughput. The PM 400 is also available with 2 grinding stations and different speed ratios.

To generate the high energy input required for mechanical alloying of hard-brittle materials, the PM 400 is available as "MA" type with speed ratios of 1:-2.5 or 1:-3.



PM 400

"comfort" Grinding Jars

The "comfort" range of grinding jars has been specially designed for extreme working conditions such as long-term trials, wet grinding, high mechanical loads, maximum speeds and mechanical alloying. They are available in six different materials and exceptionally simple and safe to handle.

- Available in sizes from 12 ml to 500 ml
- O-ring for gas-tight and dust-proof seal
- User-friendly gripping flanges on jar and lid



"comfort" grinding jars

High Energy Ball Mills

High Energy Ball Mill E_{max}

The E_{max} is an entirely new type of ball mill designed for high energy milling. The unique combination of high friction and impact results in extremely fine particles within the shortest amount of time. The high energy input is a result of an unrivaled speed of 2000 min⁻¹ and the optimized, lengthy jar design. Thanks to the revolutionary water cooling system, the high energy input is effectively used for the grinding process without overheating the sample. Due to the special grinding jar geometry, the sample is thoroughly mixed which results in a narrow particle size distribution.

- **Faster and finer grinding than with any other ball mills**
- **Unmatched speed of 2000 min⁻¹**
- **Innovative liquid cooling allows for continuous operation without cool down breaks**
- **Narrow particle size distribution thanks to special jar design**
- **Memory for 10 SOPs and additional information**
- **Easy operation via touch screen**

Main areas of application

Alloys, bones, carbon fibres, catalysts, cellulose, cement clinker, ceramics, chemical products, clay minerals, coal, coke, concrete, fibres, glass, gypsum, iron ore, kaolin, limestone, metal oxides, minerals, ores, paper, pigments, plant materials, polymers, quartz, semi-precious stones, sewage sludge, slag, soils, tea, tobacco, waste samples, wood

E_{max}

Performance data

E_{max}

Application:	Nano grinding, mechanical alloying, pulverizing, colloidal milling, high energy comminution
Type of material:	medium-hard, hard, brittle, fibrous - dry or wet
Feed size*:	<5 mm
Final fineness*:	<0.05 µm

* depending on feed material and instrument configuration/settings

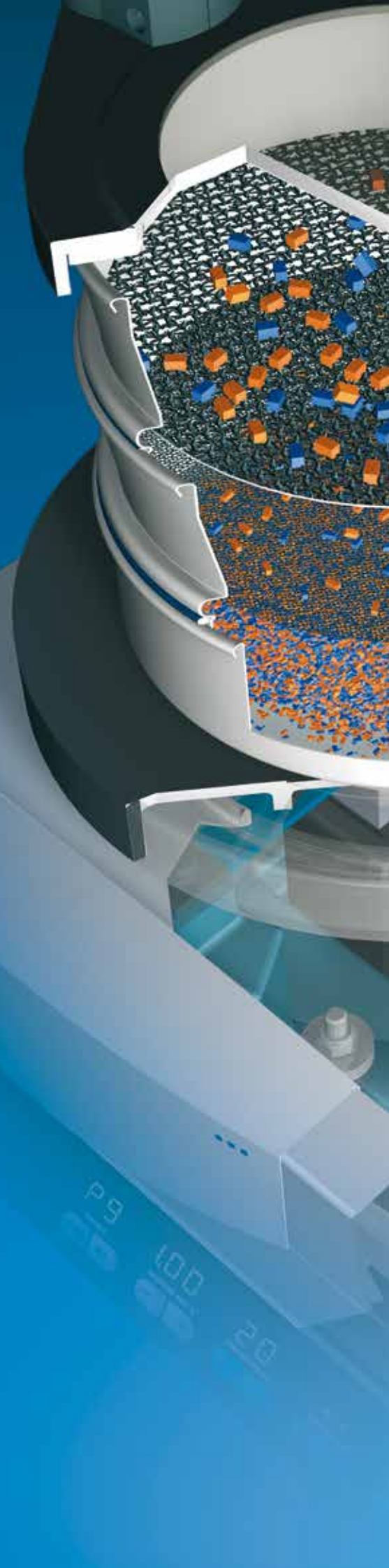
Particle Sizing

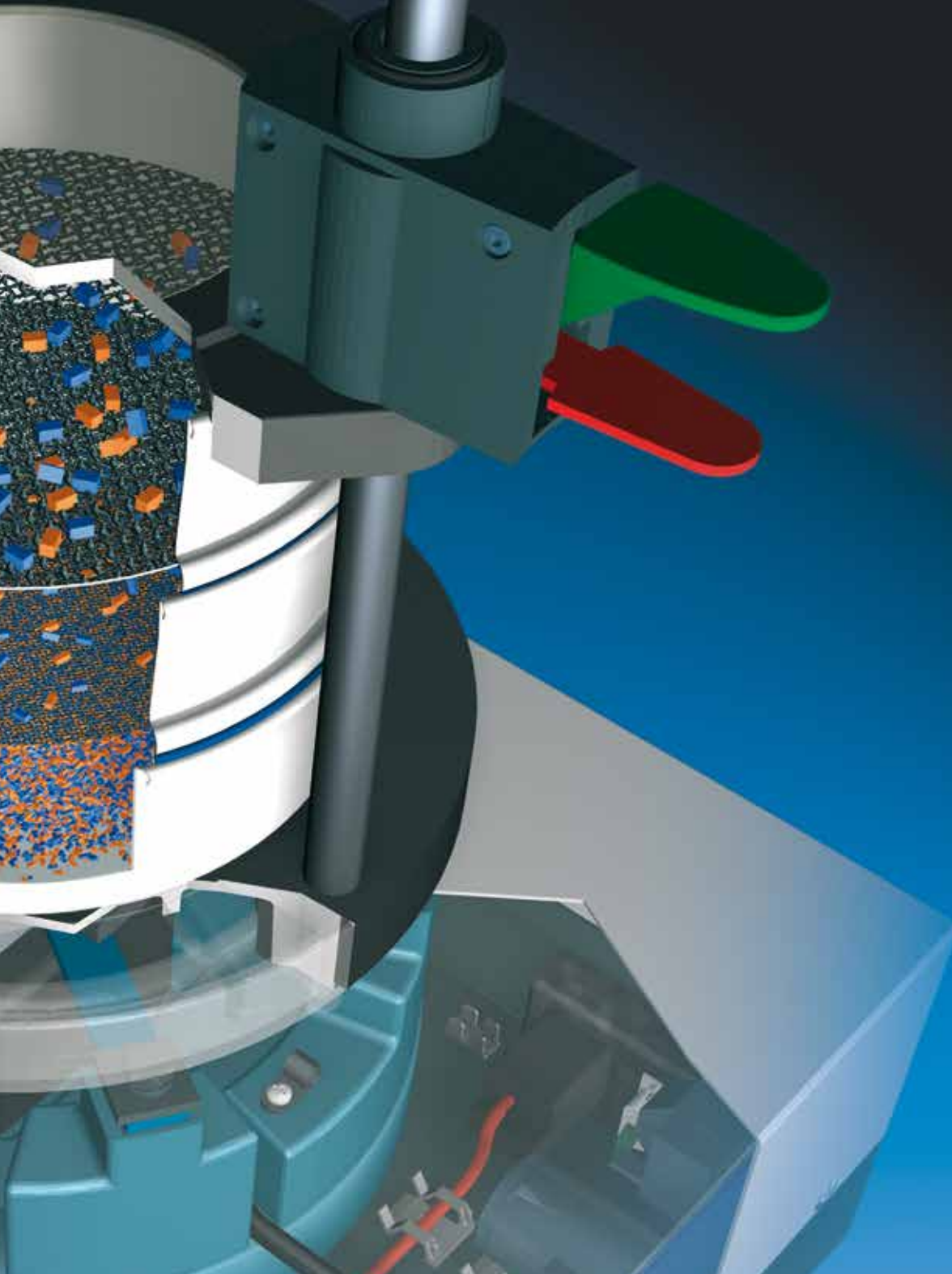
When Size Matters

Particle size distribution influences the physical and chemical properties of solids. Therefore this criterion is of highest importance in the context of quality control and monitoring of powders and granulates. A reliable product quality can only be guaranteed if the size distribution is maintained, as the following examples show:

- the strength of concrete
- the taste of chocolate
- the flow characteristics and solubility of washing powders
- the opacity of paint
- the release of active ingredients in pills

RETSCH sieve shakers and test sieves are the key to easy, rapid, reproducible and, above all, accurate analyses. The product line is completed by the optical particle analysis systems of Retsch Technology which operate with digital image processing.





The perfect solution for each measuring range

	1 μm	1 mm	1 m
Sieve Analysis			
AS 200		20 μm — 25 mm	
AS 300		20 μm — 40 mm	
AS 450		25 μm — 125 mm	
AS 400		45 μm — 63 mm	
AS 200 tap		20 μm — 25 mm	
AS 200 jet		10 μm — 4 mm	
Dynamic Image Analysis			
CAMSIZER®		30 μm — 30 mm	
CAMSIZER XT	1 μm	3 mm	

- dry measurement
- wet measurement



Main areas of application

Chemicals, coal, coffee, fertilizers, fillers, flour, metal powders, minerals, sand, seeds, soils, washing powder, cement clinker



Sieve Shakers

Sieving with a three-dimensional effect

RETSCH analytical sieve shakers are used in research and development, quality control and production monitoring.

The patented electromagnetic drive of the sieve shakers AS 200 control, AS 300 control and AS 450 control produces a 3-D throwing motion which ensures optimum use of the open sieve area and lets the sample move equally over the whole sieving surface. These instruments feature digital amplitude adjustment which allows for sharp fractionizing of the sample even after very short sieving times. All sieve shakers of the series "control" come with an inspection certificate and can be calibrated. They are suitable as measuring instruments according to DIN EN ISO 9000 ff.

- Sieving with 3-D effect
- For dry and wet sieving
- Memory for 9 SOPs
- All-digital controls
- Independent of power frequency, loading, age when working in sieve acceleration mode
- Comparable and reproducible sieving results worldwide
- Integrated interface
- Low noise, no maintenance required



AS 200 basic

AS 200 digit

Sieve Shaker AS 200 control

The AS 200 control is designed for sieves with a diameter up to 203 mm (8"). It covers a measuring range from 20 µm to 25 mm. The AS 200 control offers a decisive advantage: Instead of the vibration height, the sieve acceleration, which is independent of the power frequency, can be set. Thus, comparable and reproducible sieving results world-wide are guaranteed. The AS 200 is also available as "basic" version with analogue parameter setting and as "digit" version with digital time control and interval operation.



AS 200 control



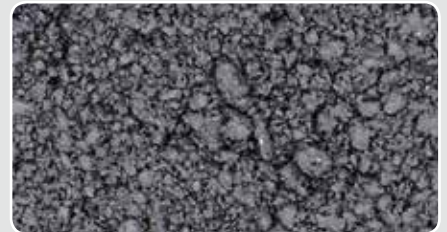
AS 300 control

Sieve Shaker AS 300 control

The AS 300 control accepts sieves with a diameter up to 315 mm (12"). The measurement range lies between 20 µm and 40 mm. Due to the greater sieving surface, the average sieving time can be considerably reduced with this model. Another advantage is the high feed quantity of 6 kg which can be separated in one working run. Just like the AS 200 control, this sieve allows for the setting of the sieve acceleration instead of the vibration height.

Main areas of application

AS 450 control:
Cement clinker, chemicals, coal, coke, construction materials, fillers, minerals, ores, plastics, sand, soils



Sieve Shaker AS 450 control

The AS 450 control is designed for 400 mm and 450 mm sieves. The measurement range lies between 25 µm and 125 mm. Due to the powerful electromagnetic drive, this sieve shaker achieves an amplitude of up to 2.2 mm which renders the separation process much more effective than with other sieve shakers of this type. The AS 450 control can separate sample amounts of up to 25 kg in one working run. The AS 450 is also available in a "basic" version which is suitable for dry sieving of up to 15 kg of sample material.

- **Excellent separation efficiency even with short sieving times**
- **For high sieve loads (up to 25 kg)**
- **Sieve stack up to 963 mm height, Ø 400 / 450 mm**
- **Mobile operation panel for comfortable handling**



AS 450 control

AS 450 basic

Performance data	AS 200 basic	AS 200 digit	AS 200 control	AS 300 control	AS 450 basic	AS 450 control
Applications:	separation, fractioning, particle size determination					
Feed material:	powders, bulk materials, suspensions					
Measuring range*:	20 µm to 25 mm	20 µm to 25 mm	20 µm to 25 mm	20 µm to 40 mm	25 µm to 125 mm	25 µm to 125 mm
Max. batch / feed capacity:	3 kg	3 kg	3 kg	6 kg	15 kg	25 kg
Adjustment of amplitude:	analog	analog	digital	digital	digital	digital
Suitable sieve diameters:	100 mm to 200 mm / 8"	100 mm to 200 mm / 8"	100 mm to 200 mm / 8"	100 mm to 315 mm	400 mm to 450 mm	400 mm to 450 mm

*depending on feed material and used sieve set



www.retsch.com/as400
www.retsch.com/as200tap

Main areas of application

AS 400:

Building materials, compost, flour, grained moulding materials, milled grain, seeds, wood chippings



Main areas of application

AS 200 tap:

Abrasives, activated carbon, cement, diamonds, metal powder, spices



Sieve Shakers

Horizontal circular sieving motion

The horizontal circular sieving motion is preferably used for long or fibrous, needle-shaped or flat materials. The horizontal orientation of the particles allows for better reproducibility of the sieving results.

Sieve Shaker AS 400 control

The AS 400 control accepts sieve stacks from 100 to 400 mm (4" - 16") diameter which allows for versatile use. The horizontal, circular sieving motion ensures exact separation of fine and coarse-grained products. The AS 400 is the only horizontal sieve shaker with all digital controls.

- Measuring range 45 µm to 63 mm
- All-digital controls
- Easy operation
- Low-noise, no maintenance required



AS 400 control

Sieve Shaker AS 200 tap

The AS 200 tap sieve shaker combines horizontal circular sieving with vertical tapping motions which reproduces the principle of hand sieving as is specified in various standards for particle size analysis. The uniform mechanical sieving motion produces reliable and reproducible measurement results.



- Measuring range 20 µm to 25 mm
- Robust, no maintenance required
- Digital timer
- Integrated interface

AS 200 tap

Main areas of application

Construction materials, spices, catalysts, plastics, flour, pharmaceuticals



Air Jet Sieving

The method of moving the sieving material solely by an air flow has proven itself for classifying fine powders which tend to agglomerate and therefore cannot be separated using conventional sieve shakers. The air jet disperses the powder and at the same time purges the sieve mesh continuously. Air jet sieving is considerably faster than vibration sieving, yet gentle on the material.

Sieving machine AS 200 jet

The air jet sieving machine AS 200 jet is particularly suitable for the sieving of light materials with particle sizes down to 10 microns. An industrial vacuum cleaner generates a jet of air which blows through a rotating slotted nozzle against the sieve mesh. The particles on the sieve are dispersed by impact on the lid and distributed all over the sieve surface. Each sieving process provides one fraction. The undersize particles can be collected in a cyclone for further treatment. A special feature of the AS 200 jet is the Open Mesh Function. This procedure greatly reduces the number of near-mesh particles allowing for optimum separation efficiency and reproducibility. The AS 200 jet is designed for operation with RETSCH's high quality sieves with 200 mm or 203 mm (8") diameter.

- Measuring range 10 µm to 4 mm
- Fast and efficient procedure
- Open Mesh function to reduce the number of near-mesh particles
- Digital parameter setting
- Optional cyclone and automatic vacuum control



AS 200 jet

Performance Data	AS 400 control	AS 200 tap	AS 200 jet
Applications:	separation, fractioning, particle size determination		
Feed material:	powders, bulk materials		
Measuring range*:	45 µm to 63 mm	20 µm to 25 mm	10 µm to 4 mm
Max. batch / feed capacity:	5 kg	3 kg	0.1 kg
Adjustment of Amplitude / speed:	digital, 50 - 300 rpm	fixed, 280 rpm, 150 taps	digital, 5 - 55 rpm
Suitable sieve diameters:	100 - 400 mm	200 mm / 8"	200 mm / 8"

*depending on feed material and used sieve set



Test Sieves

Highest precision for accurate results

The unique RETSCH manufacturing process ensures an optimum design for each sieve. Experience the increased quality of your analyses as well as improved handling and service life of the sieves.

RETSCH test sieves are available in many sizes and varieties, primarily in the four frame sizes most widely used in laboratory analytics:

200 x 50 mm • 200 x 25 mm • 203 x 50 mm (8" x 2") • 203 x 25 mm (8" x 1")



- One-piece sieve frame and fabric-transition without grooves prevent cross contamination (no sample residues etc.).
- No hollow spaces which need to be sealed (no epoxy).
- High degree of corrosion resistance and easy cleaning thanks to high-alloy stainless steels
- Innovative tensioning technology guarantees permanently tight sieve fabric.
- Excellent product quality due to extensive optical inspection.
- Maximum stability and optimum sealing when used in sieve stacks thanks to the o-ring which is placed in the recess designed for this purpose.
- Clear and precise labeling of the sieves with full traceability based on individualized laser engraving.

Quality control at the highest level

At RETSCH each sieve is subjected to a final quality check. This includes the optical measurement of the sieve mesh, recording of the data with a high tech measuring system and data analysis. The procedure and its results are displayed on a monitor. The instrument reads off the barcode on the sieve; this is programmed with the particular sieve standard which is valid for the sieve.

Depending on the customer's requirements, sieves can be supplied with a compliance certificate, inspection certificate or calibration certificate. The sieve and its accompanying documents are packed in an individually marked cardboard box, which is then sealed in plastic film to protect it against environmental influences.

Thanks to the high inventory level of our warehouse, RETSCH high-quality sieves are available worldwide at any time.



1. Manufacturing Process

RETSCH uses a one-piece sieve frame of stainless steel. The sieve fabric is precisely fitted into the frame taking into account product-specific parameters. The fabric is then tautened through a unique forming process which is only possible with RETSCH sieves. The result is a reliable sieve with maximum stability.

2. Laser Engraving

Individualized laser engraving of the sieve including all standard-related information.

3. 100% Inspection

Optical inspection of the sieve guarantees standard compliance.

4. Availability

A spacious warehouse ensures short-term availability of RETSCH sieves at all times.

Tested quality – with certificates

Every RETSCH high-quality sieve receives a **compliance certificate** before it is delivered.



On request, an **inspection certificate** according to DIN ISO 3310-1 or ASTM E11 is available, too, which documents the measuring results in tabular and graphical form. The **calibration certificate** provides even more statistical details.

As a special service RETSCH offers **recalibration** of the test sieves. After the standard measuring process of the sieves, all relevant data are recorded and confirmed in the certificate.

Evaluation Software EasySieve®

EasySieve®, the software for particle size analyses, exceeds manual evaluation in many aspects, due to the fact that the software is able to automatically control the necessary measurement and weighing procedures – from the registration of the weight of the sieve up to the evaluation of the data.



Main areas of application

Abrasives, carbon products, pelletized carbon black, coffee, catalysts, fertilizers, foodstuffs, glass, ceramics, metal powders, pharmaceuticals, plastics, polystyrene, refractory products, salt, sugar, sand



CAMSIZER®

Particle size and particle shape measurement with Dynamic Image Analysis

The CAMSIZER is a compact laboratory instrument for simultaneous measurement of particle size distribution and particle shape of powders and granules. Based on digital image processing by the unique, patented two-camera system pourable solids in a range from 30 µm to 30 mm can be measured. Thanks to the unique scanning of all particles and the newly developed fitting algorithms, measuring results are 100% compatible to those of sieve analysis. This makes the CAMSIZER the ideal time- and cost-saving alternative to sieving.

- **Digital image processing with patented two-camera-system (acc. to ISO 13322-2)**
- **Simultaneous analysis of particle size, shape, number and density**
- **Very short measuring time (2-3 min.)**
- **Results are 100% compatible to sieve analysis**
- **Greatest possible accuracy and reproducibility**



CAMSIZER® AutoSampler

The use of the optional AutoSampler maximizes the efficiency of the CAMSIZER. No matter whether varying sample materials are to be analyzed or series measurements need to be carried out, the AutoSampler adapts itself perfectly to the defined measuring routine.

CAMSIZER® Online

Due to its robust construction and interference-free measuring principle, the CAMSIZER is particularly suitable for integration in the production line in online operation. In such applications, the online version of the CAMSIZER is optimally matched to the specific "on-site" needs.

CAMSIZER XT

CAMSIZER XT - characterization of fine powders >1 micron

The CAMSIZER XT substantially improves the quality control of fine powders and suspensions in the range 1 µm to 3 mm. It is based on the same two-camera system as the CAMSIZER, but optimized for finer particles. With the modular X-Change system the CAMSIZER XT offers three options for sample feeding:

Pourable, not agglomerated particles are fed to the analysis area by the vibrating feeder of the "X-Fall" module. With the "X-Jet" module agglomerated particles can be accelerated and dispersed through a nozzle with adjustable overpressure. Finally, particles can be dispersed in liquids in the wet module "X-Flow" with ultra sound. Thus it is possible to choose the optimum method for each sample type.

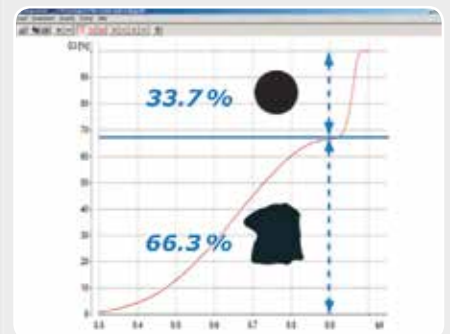
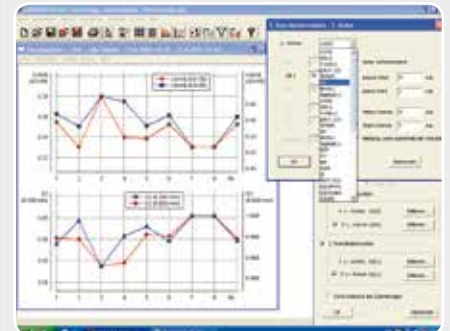
- Newly developed optical system with ultra-strong LEDs for highest resolution and excellent depth of focus
- Reliable detection of smallest amounts of "undersize" and "oversize"
- Modular system X-Change for dry and wet dispersion
- Very short measuring time (1-3 min.)



CAMSIZER XT

Main areas of application

Abrasives (medium-sized and small grit), cement, detergents and enzymes, metal and ore powders, plastic fibres and granules, pharmaceutical powders and granules, pulverized and granulated food, sand, wood fibres



Performance data	CAMSIZER®	CAMSIZER XT
Measuring range:	30 µm - 30 mm	1 µm - 3 mm
Measuring principle:	Dynamic digital image processing (ISO 13322-2)	
Measuring time:	approx. 2 - 3 min (depending on the desired measuring statistics)	approx. 1 - 3 min
Measurements:	60 images/sec >780.000 Pixel	>250 images/sec. approx. 1.3 MPixel
Options:	AutoSampler; Online-Version	X-Jet, X-Fall, X-Flow

Assisting

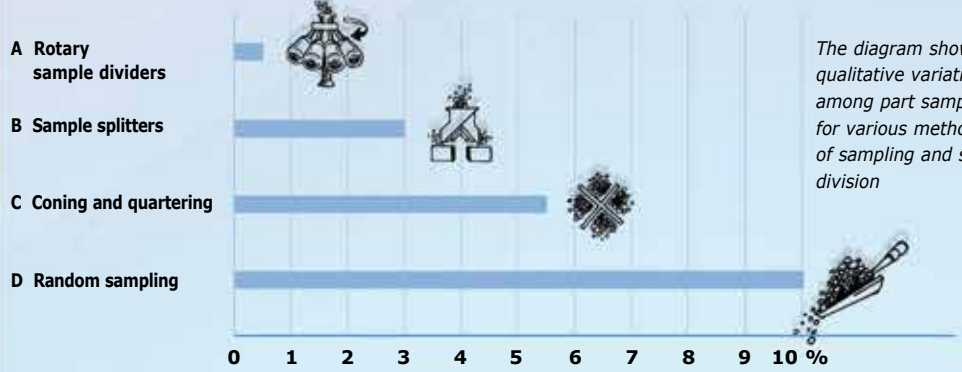
The Key to Greater Efficiency in the Laboratory

From representative, reproducible sampling and sample division to uniform, continuous material feed; from efficient preparation of solid pellets for XRF analysis to rapid cleaning of grinding tools and test sieves to gentle sample drying: RETSCH offers a comprehensive program of useful and cost-effective assistants which enhances the performance of our mills and sieve shakers even further.





Comparison of different sampling and sample division methods



The diagram shows qualitative variations among part samples for various methods of sampling and sample division

Example: Bulk material, feed size <5 mm



www.retsch.com/pt100
www.retsch.com/pt200
www.retsch.com/rt
www.retsch.com/dr100

Assisting



Sample Dividers PT 100, PT 200, RT 6.5 - RT 75

Sample dividers are essential for the exact and representative division of pourable bulk goods in the laboratory. The Rotary Sample Divider PT 100 uses the most exact division method which produces the smallest qualitative variations. In addition to the PT 200, which divides larger amounts up to 30 l per run, RETSCH offers the sample splitter RT for manual division.

Performance data	PT 100	PT 200	RT
<i>Application:</i>	<i>Sample division</i>	<i>Sampling, sample division</i>	<i>Sample division</i>
<i>Feed material:</i>	<i>Bulk materials</i>	<i>Bulk materials</i>	<i>Bulk materials</i>
<i>Number of part samples:</i>	<i>6, 8 or 10</i>	<i>1-3</i>	<i>2</i>
<i>Feed size:</i>	<i><10 mm</i>	<i><10 mm</i>	<i><4 - 50 mm</i>
<i>Collector volume:</i>	<i>100, 250, 500 ml</i>	<i>500 ml, 30 l</i>	<i>1.5 l, 8 l</i>



Vibratory Feeder DR 100

The Vibratory Feeder DR 100 is ideal for the uniform, continuous feed of pourable bulk materials and fine powders. It is used in combination with RETSCH mills and sample dividers and is also suitable for balances and particle measurement systems. Thanks to the wide range of accessories, the Vibratory Feeder DR 100 can be used for a variety of applications.

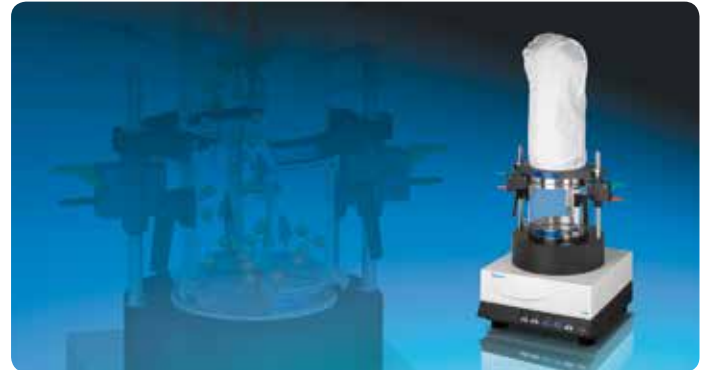
Performance data	DR 100
<i>Application:</i>	<i>Feeding, conveying</i>
<i>Feed material:</i>	<i>Bulk materials</i>
<i>Feed size:</i>	<i>2 - 12 mm</i>
<i>Time setting:</i>	<i>1-99 min. digital, continuous operation</i>
<i>Flow rate:</i>	<i>digital, continuously adjustable</i>

www.retsch.com/tg200
www.retsch.com/ur
www.retsch.com/pp25
www.retsch.com/pp40

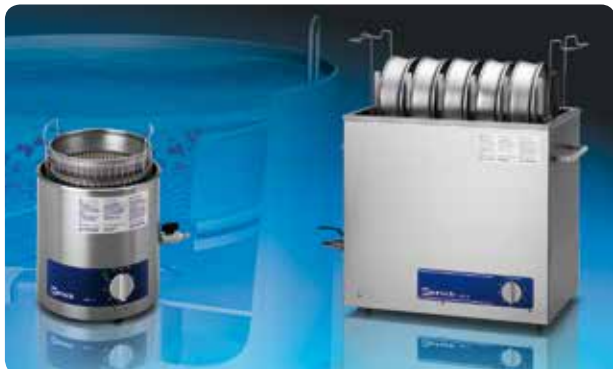


Fluid Bed Dryer TG 200

The Fluid Bed Dryer TG 200 is used in the laboratory for the gentle drying of bulk materials without localized overheating. The average drying time lies between 5 to 20 minutes which represents a substantial saving in time compared to other drying methods. Typical materials include coal, plastics, soils, pharmaceutical products or plant materials. The TG 200 can also be used for drying test sieves.



Performance data	TG 200
Application:	Drying
Feed material:	Bulk materials and solids, >63 µm
Temperature control:	40 - 150 °C, continuously adjustable
Time setting:	0 - 99 min. continuously adjustable
Container volume:	1 x 6 l or 3 x 0.3 l



Ultrasonic Baths UR 1, UR 2, UR 3

RETSCH ultrasonic baths are used for the gentle and efficient cleaning of test sieves, glass and metal parts, metallographic and geological samples and many others. Further areas of application are sample preparation of suspensions (e.g. for wet sieving), dispersions in chromatography or the degassing of solutions.

Performance data	UR 1	UR 2	UR 3
Application:	Cleaning, dispersion, degassing		
Feed material:	Test sieves, glass and metal components, suspensions		
Volume:	5.7 l	42 l	45 l

Pellet Presses PP 25, PP 40

For the preparation of solid samples for XRF analysis RETSCH offers 2 types of pellet presses. The automatic press PP 40 is a floor model which features an individual pressure force regulation of up to 40 t. The pellets are pressed into steel rings with an outer diameter of 40 and 51.5 mm. It is also possible to use aluminum cups. The manual hydraulic Pellet Press PP 25 is a compact bench-top model with pressing tools for 32 mm and 40 mm pellets.



Performance data	PP 25	PP 40
Application:	Preparation of pellets for spectral analyses	
Feed material:	Minerals, slag, ores, cement, raw materials etc.	
Max. pressure:	25 t	40 t
Pellet diameters:	32 mm, 40 mm	40 mm, 51.5 mm
Parameter combinations:	-	32

2012

ELTRA and CARBOLITE enter the division. Their range of instruments provides a perfect match to the laboratory and analytical product portfolio. Cooperation for the mutual benefit of the companies under the VERDER SCIENTIFIC umbrella is established.

2011

Due to the continuous growth of VERDER SCIENTIFIC new and bigger facilities for R&D, production, shipping and administration are built in the city of Haan near Duesseldorf (Germany).

1998

RETSCH TECHNOLOGY is founded. The new member of the VERDER SCIENTIFIC Division rapidly develops into one of the world's leading companies for optical particle analyzers with Dynamic Image Analysis. The focus of the SCIENTIFIC Division is set on developing new products and improving existing product lines.

1989

RETSCH — a world-renowned company for laboratory mills and sieve shakers — becomes part of the VERDER family, extending the business activities towards scientific equipment. The first cornerstone of VERDER SCIENTIFIC is set. The following years are characterized by global expansion, improving local service and reaction times for customers all over the world.

1959

The young Dutch salesman André Verder starts trading pumps and semi-finished plastic products. André continuously expands the activities by acquiring and setting up new members for the VERDER "family of companies" ..

VERDER SCIENTIFIC Division

Science for Solids

The SCIENTIFIC Division of the VERDER Group sets standards in high-tech equipment for quality control, research and development of solid matter. The fields of activity cover sample preparation of solids as well as analyzing technologies.

With more than 500 employees the companies of the division develop and manufacture laboratory instruments for disintegration and homogenization, for heat treatment, for analyzing samples through particle characterization and for elemental analysis by combustion.

In addition to RETSCH GmbH the VERDER SCIENTIFIC Division comprises the following companies:

CARBOLITE Ltd.

The UK-based company is an expert in designing and manufacturing high-temperature ovens and furnaces up to 3,000°C, including standard, vacuum and special atmosphere applications. CARBOLITE products are exported worldwide for use in industries such as aerospace, ceramics, metals, mining, pharmaceuticals, electronics, composites and materials science.
www.carbolite.com

ELTRA GmbH

ELTRA is specialized in elemental analyzers for the accurate and rapid analysis of C, H, N, O, S concentrations in solid materials. ELTRA equipment is a standard for elemental analysis in industries such as mining, steel, energy, cement and metal working.
www.eltra.org

RETSCH TECHNOLOGY GmbH

RETSCH TECHNOLOGY develops and sells state-of-the-art optical measuring systems for particle characterization (size and shape) in suspensions, emulsions, colloidal systems, powders and granules, based on Dynamic Image Analysis and Laser Light Scattering.
www.retsch-technology.com



CARBOLITE
Leading Heat Technology

ELTRA
ELEMENTAL ANALYZERS

Retsch
Solutions in Milling & Sieving

Retsch
TECHNOLOGY
Solutions in Particle Sizing



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MILLING



Jaw Crusher
BB 50/BB 100/BB 200/BB 300



Ultra Centrifugal Mill
ZM 200



Rotor Beater Mills
SR 200/SR 300



Cross Beater Mill
SK 100



Cyclone Mill
TWISTER



Knife Mills
GRINDOMIX GM 200/GM 300



Heavy-Duty Cutting Mills
SM 100/SM 200/SM 300



Mortar Grinder
RM 200



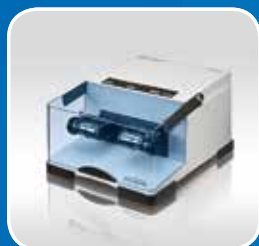
Disc Mill
DM 200/DM 400



Vibratory Disc Mill
RS 200



CryoMill



Mixer Mills
MM 200/MM 400



Planetary Ball Mills
PM 100 CM/PM 100/PM 200



Planetary Ball Mill
PM 400



High Energy Ball Mill
E_{max}

SIEVING



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AS 200 tap



Air Jet Sieving Machine
AS 200 jet



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ASSISTING



Sample Dividers
PT 100/PT 200



Vibratory Feeder
DR 100



Rapid Dryer
TG 200



Ultrasonic Baths
UR 1/UR 2/UR 3



Pellet Presses
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