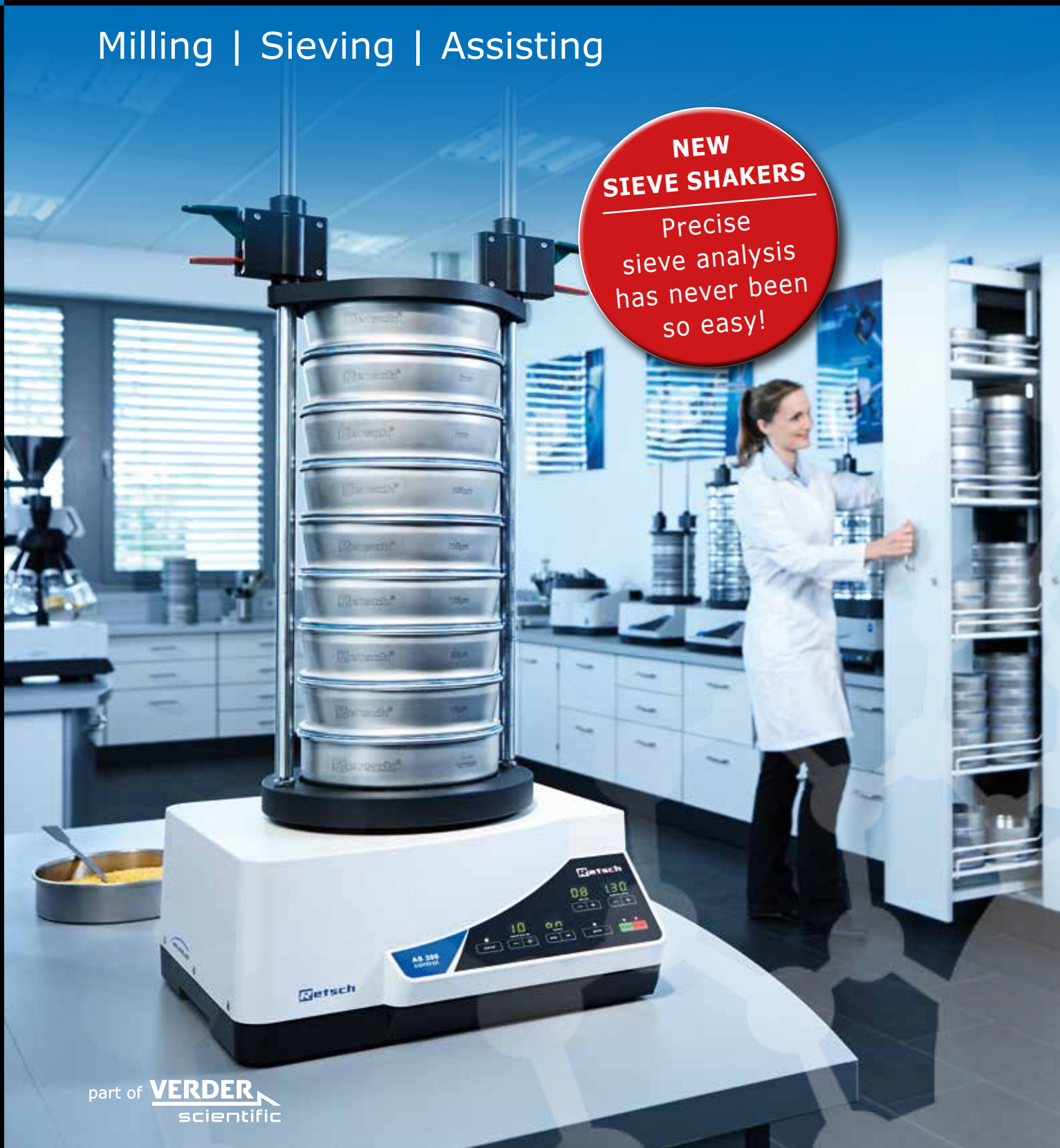
Retsch®

MILLING SIEVING ASSISTING

Product Overview

Milling | Sieving | Assisting



part of VERDER scientific

RETSCH – More than 100 Years of Innovation

Global market leader in the preparation and characterization of solids – quality „made in Germany".

The company was founded in 1915 by F. Kurt Retsch. A few years later he registered his first patent in grinding technology: a mortar grinder that became famous worldwide as the "RETSCH Mill". This innovation replaced tiresome manual grinding with hand mortars which was the standard in laboratories at the time and earned RETSCH an excellent reputation in the international science and research community.

Today RETSCH is the leading solution provider for size reduction and particle sizing technology with subsidiaries in the US, China, Japan, India, France, Italy, Benelux, Russia, UK and Thailand and an export share of 80%.

RETSCH's philosophy is based on customer orientation and leading edge technology. This is reflected in instruments whose high-quality components are designed for perfect interaction. RETSCH products 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 thanks to advanced manufacturing methods**
- **Comprehensive application support including free test grindings and product trainings**
- **Excellent sales and service network throughout the world**

www.retsch.com

PREMIUM QUALITY

MADE IN GERMANY

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 on-site in our application laboratories worldwide. Our application experts process and measure your samples free-of-charge and provide a recommendation for the most suitable method and instrument. Finally, we offer free application consultations at your doorstep with our fully equipped laboratory bus

Application Database

Our application specialists process and characterize a large number of customer samples every day. The most interesting results are collected in an online database which currently contains more than 2,000 test reports. The application database is an excellent tool for a first impression as to which instrument may be suitable for a particular application or sample material.

Test Grinding

The „Applications" menu offers the possibility to download the questionnaires for "milling" and "sieving". These can be sent together with the sample material to our lab team for free test grinding or sieving. Use this direct link **www.retsch.com/testgrinding.**

Seminars and Workshops

Alone or with renowned partners in the laboratory industry we regularly offer seminars and workshops about different aspects of sample preparation, particle measurement and analytics. Dates and places are published on our website.

1915

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

1923

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

1952

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

1959

RETSCH extends the product line with sieve shakers, sample dividers and magnetic stirrers. More space is required for production, leading to the move of the company into larger premises in 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 a new expanded location in Haan.

1989

RETSCH becomes part of the Dutch VERDER group and gradually manages the transition from a family business to an international company.

as of 1993

Subsidiaries in the US, China, Japan, India, France, Italy, Benelux, Russia, UK and Thailand ensure RETSCH's direct presence in the major economies of the world.

1998

Foundation of RETSCH TECHNOLOGY.

2012

RETSCH moves to new premises in Haan (headquarter of the Verder Scientific division).

2014

Market launch of the revolutionary High Energy Ball Mill E_{max}.

2015

RETSCH celebrates its 100th anniversary.

Reproducible Sample Preparation for Reliable Analysis Results

A reliable and accurate analysis can only be guaranteed by reproducible sample preparation. The "art of milling and homogenization" is 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.

Jaw Crushers

RETSCH's range of jaw crushers comprises four different models for coarse and primary size reduction of hard, brittle materials – from compact bench-top units to robust floor models with high throughput rates which can be integrated into automatic installations. Breaking jaws of different materials ensure neutral-to-analysis size reduction.

Jaw Crusher
BB 50

Jaw Crusher
BB 100

Jaw Crusher
BB 200

Jaw Crusher
BB 300

Rotor Mills

Four different types of rotor mills are available for the pulverization of granular, soft, medium-hard or fibrous sample materials. All mills can be equipped with a cyclone for improved sample discharge and cooling. Depending on the model, the mills are suitable for the preparation of very small amounts but also for use in pilot plants.

Ultra Centrifugal Mill
ZM 200

Rotor Beater Mill
SR 300

Cross Beater Mill
SK 300

Cyclone Mill
TWISTER

Cutting Mills

RETSCH offers a whole family of cutting mills – from the budget-priced basic model to the powerful high performance unit with high torque and RES technology – for primary size reduction of soft, medium-hard, elastic, tough and fibrous sample materials. The wide range of accessories allows for perfect adaptation to a variety of applications.

Cutting Mill
SM 100

Cutting Mill
SM 200

Cutting Mill
SM 300

Knife Mills

The GRINDOMIX Knife Mills are perfectly suited for the quick and thorough homogenization of solid samples with high liquid, oil or fat content. Thanks to interval and reverse mode and a wide selection of accessories even difficult samples are completely homogenized in the GRINDOMIX mills.

Knife Mill
GRINDOMIX GM 200

Knife Mill
GRINDOMIX GM 300

Disc Mills and Mortar Grinders

The RETSCH portfolio comprises the ergonomic Vibratory Disc Mill RS 200 – the standard mill for sample preparation to spectral analysis within seconds – as well as two disc mill models for primary and fine size reduction of hard and abrasive materials up to 8 Mohs. All disc mills can be equipped with grinding tools made of different materials to ensure neutral-to-analysis sample preparation. The RETSCH mortar grinder mixes and homogenizes powders, suspensions and pastes, also with high viscosity.

Vibratory Disc Mill
RS 200

Disc Mill
DM 200

Disc Mill
DM 400

Mortar Grinder
RM 200

 |

6 Product Overview Milling

Ball Mills

RETSCH's ball mill range is the widest in the world, offering optimum solutions for the pulverization of medium-hard, hard, brittle and fibrous samples with high energy input. The High Energy Ball Mill Emax and the Planetary Ball Mills pulverize samples down to the nanometer range with impact and friction in dry and wet mode. These mills are also ideally suited for mechanical alloying.

High Energy Ball Mill
E_{max}

Planetary Ball Mill
PM 100 & PM 100 CM

Planetary Ball Mill
PM 200

Planetary Ball Mill
PM 400 & PM 400 MA

The mixer mills are specially designed for quick grinding, mixing and homogenization of small sample volumes, as well as for cell disruption. The CryoMill is the perfect choice for efficient pulverization and homogenization of elastic and temperature-sensitive sample materials under continuous embrittlement with liquid nitrogen at -196 °C. The compact XRD-Mill McCrone is used for sample preparation to X-Ray diffraction.

CryoMill

Mixer Mill
MM 200

Mixer Mill
MM 400

XRD-Mill McCrone

Icons used in this catalogue

NEW

PRODUCT NEWS
This icon marks products which appear in the RETSCH catalogue for the first time

MILLING

130 mm / 5 mm* — Maximum feed size and final fineness

This mill is suitable for cryogenic grinding

Cyclone for improved material discharge and additional cooling

SIEVING

25 mm / 20 µm — Measuring range of sieve shakers / particle analyzers

Suitable for wet sieving / for measuring suspensions

Suitable for dry sieving / for measuring dry samples

Selection Guide for Size Reduction Tools

The following selection guide gives an overview of the application areas of RETSCH mills and crushers. The selection of a suitable mill depends on the individual application. This table only serves as a first orientation. **Contact us to find the optimum solution for your application!**

- ● suitable
- ◒ suitable to a limited extent
- \- not suitable

Jaw Crushers	Model	Feed size* approx.		Final fineness* approx		Applications													
						Construction materials	Soil, sewage sludge	Chemical products	Electronic waste	Feed stuff	Glass, ceramics	Wood, bones, paper	Coal, coke	Plastics, cable, rubber	Food	Leather, textiles	Minerals, ores, rocks	Pharmaceutical products	Plants, hay, straw	Secondary fuels
Jaw Crusher	**BB 50**	40	mm	500	µm	●	◒	◒	-	-	●	◒	●	-	-	-	●	-	-	-
Jaw Crusher	**BB 100**	50	mm	4	mm	●	◒	◒	-	-	●	-	●	-	-	-	●	-	-	-
Jaw Crusher	**BB 200**	90	mm	2	mm	●	◒	◒	-	-	●	-	●	-	-	-	●	-	-	-
Jaw Crusher	**BB 300**	130	mm	5	mm	●	◒	◒	-	-	●	-	●	-	-	-	●	-	-	-
Rotor Mills																			
Ultra Centrifugal Mill	**ZM 200**	10	mm	40	µm	◒	◒	●	●	●	-	●	●	●	●	●	◒	●	●	●
Rotor Beater Mill	**SR 300**	25	mm	50	µm	◒	◒	●	-	●	-	◒	◒	◒	●	◒	◒	●	◒	-
Cross Beater Mill	**SK 300**	25	mm	100	µm	◒	◒	◒	◒	◒	◒	-	●	-	-	◒	●	◒	-	◒
Cyclone Mill	**TWISTER**	10	mm	250	µm	-	-	-	-	●	-	-	-	-	●	-	-	◒	●	-
Knife Mills																			
Knife Mill	**GRINDOMIX GM 200**	40	mm	300	µm	-	-	◒	-	●	-	-	-	-	●	-	-	●	◒	-
Knife Mill	**GRINDOMIX GM 300**	130	mm	300	µm	-	-	◒	-	●	-	-	-	-	●	-	-	●	◒	-
Cutting Mills																			
Cutting Mill	**SM 100**	80x60	mm	250	µm	-	-	◒	◒	●	-	◒	◒	◒	●	●	-	◒	●	◒
Cutting Mill	**SM 200**	80x60	mm	250	µm	-	-	◒	●	●	-	●	◒	●	●	●	-	◒	●	●
Cutting Mill	**SM 300**	80x60	mm	250	µm	-	-	◒	●	●	-	●	◒	●	●	●	-	◒	●	●
Mortar Grinders/Disc Mills																			
Mortar Grinder	**RM 200**	8	mm	10	µm	●	●	●	-	-	●	◒	●	-	●	-	●	●	◒	-
Disc Mill	**DM 200**	20	mm	100	µm	●	●	◒	◒	◒	●	-	●	-	-	-	●	-	-	-
Disc Mill	**DM 400**	20	mm	50	µm	●	●	◒	◒	◒	●	-	●	-	-	-	●	-	-	-
Vibratory Disc Mill	**RS 200**	15	mm	20	µm	●	●	◒	◒	-	●	◒	●	-	-	-	●	◒	●	◒
Ball Mills																			
XRD-Mill	**McCrone**	500	µm	1	µm	●	◒	●	-	-	●	-	◒	-	-	-	●	◒	◒	-
Mixer Mill	**CryoMill**	8	mm	5	µm	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Mixer Mill	**MM 200**	6	mm	10	µm	●	●	●	◒	●	●	●	●	◒	◒	●	●	◒	●	◒
Mixer Mill	**MM 400**	8	mm	5	µm	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
High Energy Ball Mill	**E_{max}**	5	mm	80	nm	●	●	●	●	◒	●	●	●	-	◒	◒	●	●	●	◒
Planetary Ball Mill	**PM 100**	10	mm	100	nm	●	●	●	●	◒	●	●	●	-	◒	◒	●	●	●	◒
Planetary Ball Mill	**PM 100 CM**	10	mm	100	nm	●	●	●	●	◒	●	●	●	-	◒	◒	●	●	●	◒
Planetary Ball Mill	**PM 200**	4	mm	100	nm	●	●	●	●	◒	●	●	●	-	◒	◒	●	●	●	◒
Planetary Ball Mill	**PM 400**	10	mm	100	nm	●	●	●	●	◒	●	●	●	-	◒	◒	●	●	●	◒

Please note:
The achieved final fineness depends on the sample material and instrument configurations which means that different results may be obtained with apparently similar samples.

Innovative Technology Sets Standards Worldwide

RETSCH's range of sieving machines not only covers a very wide measuring range, it also provides a suitable model for virtually any bulk material thanks to different sieving motions and sieve diameters. The instruments are used in research & development, quality control of raw materials, semi-finished and finished products as well as in production monitoring and comply with the requirements of DIN EN ISO 9000 ff.

All "control" sieve shakers can be calibrated and provide reproducible, globally comparable results thanks to the possibility to set the sieve acceleration which is independent of the power frequency.

Vibratory Sieve Shakers

The patented electromagnetic drive of the vibratory sieve shakers 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. The AS 200 series provides a suitable instrument for every requirement and budget. The AS 300 control is designed for large feed quantities up to 6 kg.

Vibratory Sieve Shaker
AS 200 basic

Vibratory Sieve Shaker
AS 200 digit cA

Vibratory Sieve Shaker
AS 200 control

Vibratory Sieve Shaker
AS 300 control

The two AS 450 models fractionate up to 15, respectively 25, kg of sample in one working run and achieve high separation efficiency.

Vibratory Sieve Shaker
AS 450 basic

Vibratory Sieve Shaker
AS 450 control

Horizontal Sieve Shaker, Tap Sieve Shaker and Air Jet Sieving Machine

Horizontal sieving (AS 400), tap sieving (AS 200 tap) and air jet sieving (AS 200 jet) are used for the particle size determination of materials which are not suitable for vibratory sieving and whenever these separation methods are stipulated by certain standards.

Horizontal Sieve Shaker
AS 400 control

Tap Sieve Shaker
AS 200 tap

Air Jet Sieving Machine
AS 200 jet

Particle Size and Particle Shape Analysis with Dynamic Image Analysis

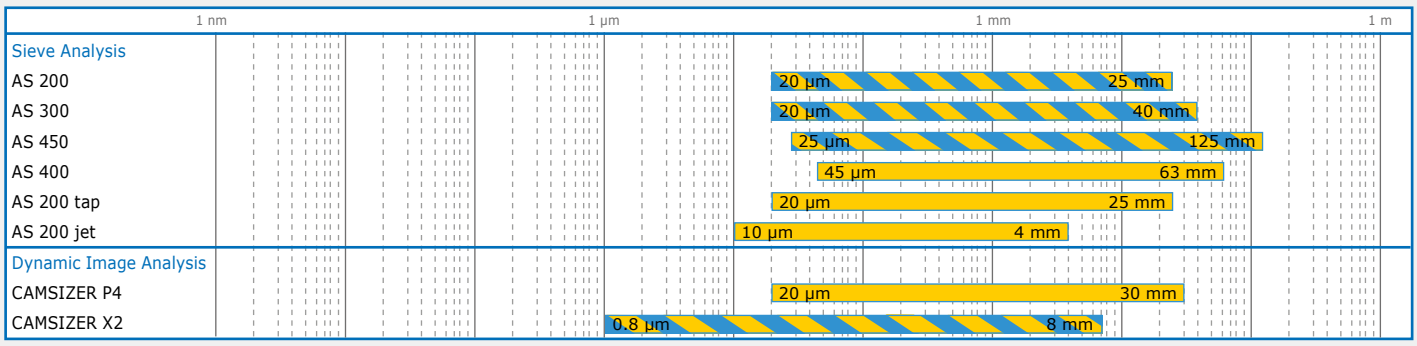
Dynamic Image Analysis is one of the most accurate methods when it comes to measuring the particle size and particle shape. It is an established alternative to sieve analysis and laser diffraction and is greatly superior to these with regard to precision, reproducibility and information content in a size range from 0.8 µm to 30 mm. The particle analyzer CAMSIZER P4 measures pourable bulk goods and granulates with a maximum particle size of 30 mm. The CAMSIZER X2 is ideally suited for analyzing fine powders and suspensions up to 8 mm.

CAMSIZER® P4

CAMSIZER® X2

RETSCH TECHNOLOGY
PARTICLE CHARACTERIZATION

The perfect solution for each measuring range



Dry measurement Wet measurement

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 range of useful assistants which enhance the performance of our mills and sieve shakers even further and ensure reliable analysis results.

Sample Divider
PT 100

Sample Divider
PT 200

Sample Divider
RT 6.5-75

Vibratory Feeder
DR 100

Pellet Press
PP 25

Pellet Press
PP 35

Pellet Press
PP 40

Fluid Bed Dryer
TG 200

Ultrasonic Baths
UR 1/2/3

Expert Guides

Would you like to learn more about Milling and Sieving?
Please visit our website and download our expert guides:

- "The Art of Milling"
  with comprehensive material overview
- "Sieve Analysis – Taking a close look at quality"
  with sieve comparison table

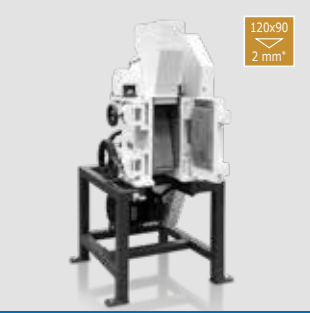
www.retsch.com/downloads

We are happy to send you a printed copy on request.

Product Range „X-Large“

In addition to the instruments for size reduction on a laboratory scale RETSCH now offers a complete range of products for applications with large feed sizes and high throughputs. The jaw crushers, vibratory disc mills and drum mills of the “X-Large” portfolio are mainly used in application areas such as construction materials, mining and energy in a pilot plant environment.

The line also comprises a number of testing instruments for the determination of the Bond Work Index as well as flotation and abrasion testers.



Jaw Crusher
BB 250 XL

Jaw Crusher
BB 400 XL

Jaw Crusher
BB 500 XL

Jaw Crusher
BB 600 XL

Vibratory Disc Mill
RS 300 XL

Drum Mill
TM 300 XL

Cutting Mill
SM 400 XL

Sample Divider
PT 600 XL

Bond Index Tester
BT 100 XL

Impact Tester
IT 100 XL

Abrasion Tester
AT 100 XL

VERDER scientific

Science for Solids

Materialography
Hardness Testing
Heat Treatment
Elemental Analysis
Milling & Sieving
Particle Analysis

As part of the VERDER Group, the business division VERDER SCIENTIFIC sets standards in the development, manufacture and sales of laboratory and analytical equipment. The instruments are used in the areas of quality control, research and development for sample preparation and analysis of solids.

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