Dry Mill POLYMIX® PX-MFC 90 D

KINEMATICA

The PX-MFC 90 D is suitable for dry sample grinding in the laboratory. It's possible to change the hammer and cutting mill sets.
- The blade grinding attachment is used for processing of dried, stringy and fibrous and grease-free materials.
  Application: Wood, straw, dried grease-free meat, leather, paper, carbon, synthetics etc.
- The hammer grinding attachment is used for processing of dried, brittle and grease-free materials.
  Application: Dried grain, dried beans, bones, rock, ceramics etc.
- Sieves 0.2 mm up to 6 mm diameter
- Safety system prevents start when lid is open
- Powerful three-phase motor
- Milling chamber with interchangeable inserts
- LED display
- Working volume of 300 ml (Funnel volume)
- 1000 Watt, 3-phase motor provides a low noise level during operation, with 230 Volt connection
- Sieves from 0.2 to 6 mm mesh size
- Integrated speed control with LED display for speed and status messages
- Speeds from 50 to 6.000 rpm for maximum grinding efficiency
- The motor cannot be operated when the chamber door is open
- Integrated overheating, overload and rotor blocking protection
- Safety stopper for certain grinding materials

Scope of supply: Mill with Hammer or Cutting Mill sets, 2 mm sieve, tool set and wooden stand with 12 collection tubes.

Specifications

Application volume:	Hopper 300 ml
Sieves:	0.2, 0.5, 0.8, 1.0, 1.5, 2.0, 3.0, 4.0, 5.0, 6.0 mm
Motor input power:	1000W
Speed range:	speeds up to 6000 min^{-1}
Drive Dimensions (L x W x H):	251 x 325 x 480 mm
Tested to:	IEC/EN 61000-6-2/EN 61000-6-3 IEC/EN 61010-2-51

Type	With	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	Plug type	PK	Cat. No.
POLYMIX® PX-MFC 90 D	Hammer grinding attachment	50	6000	300	EU	1	**6.241 371** 1
POLYMIX® PX-MFC 90 D	Hammer grinding attachment	50	6000	300	CH	1	**6.258 266**
POLYMIX® PX-MFC 90 D	Hammer grinding attachment	50	6000	300	UK	1	**6.312 152**
POLYMIX® PX-MFC 90 D	Blade grinding attachment	50	6000	300	EU	1	**6.252 048**
POLYMIX® PX-MFC 90 D	Blade grinding attachment	50	6000	300	CH	1	**6.258 267**
POLYMIX® PX-MFC 90 D	Blade grinding attachment	50	6000	300	UK	1	**6.312 153**

Sieves 0.2 to 6.0 mm also available.

Suitable accessories can be found in our online shop.

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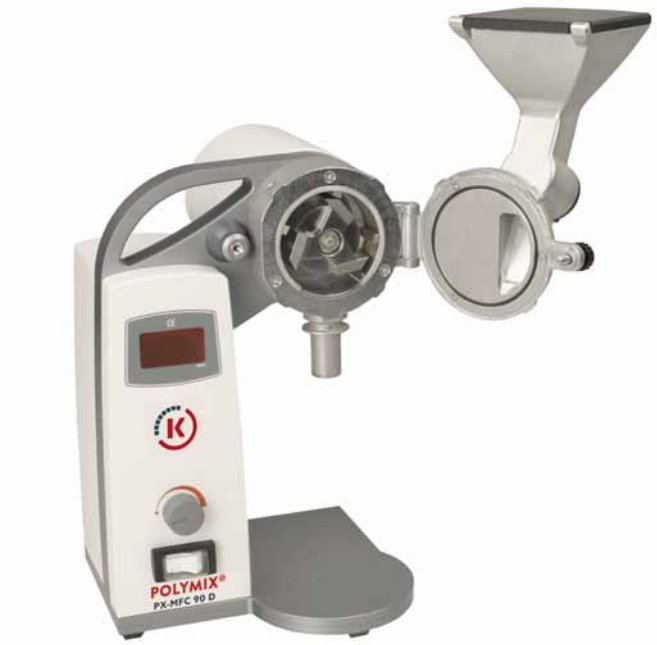

6.241 371

E & OE.

1 Planetary Ball Mill BM40

NEW

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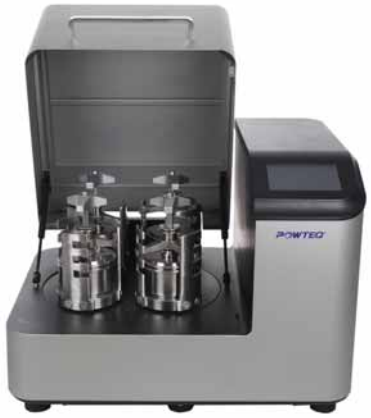
For rapid grinding of soft, hard, brittle and fibrous materials down to a final fineness of less than 1 µm in laboratories and pilot plants. Also suitable for colloid grinding. Suitable for use in geology, mineralogy, metallurgy, ceramics, materials research, mechanical alloying, pharmacy, chemistry, biology and analysis preparation.



- Grinding platform with 4 stations for up to 8 grinding bowls
- Suitable for continuous operation
- Grinding time digitally adjustable from 0 to 999 minutes
- Variable speed of the sun wheel from 30 to 400 min^{-1}
- For dry and wet grinding
- Programmable grinding parameters
- Automatic reversal of direction to avoid agglomerations
- Ventilated grinding chamber for cooling the grinding bowl
- Control via 7" LCD display with one-button operation
- Safety interlock
- Grinding bowls made of different materials and with different capacities available as accessories

Grinding bowls and balls are not included in the scope of supply and must be ordered separately.

Specifications

Feed size:	<10 mm
Final fineness:	<1 µm, <0.1 µm (colloidal grinding)
Speed range:	30 ... 400 min^{-1} (sun wheel)
Effective sun wheel diameter:	360 mm
Performance:	1500 W
Dimensions (W x D x H):	645 x 768 x 621 mm
Weight:	170 kg
Power supply:	220 V, 50 Hz

Type	PK	Cat. No.
Planetary Ball Mill BM40	1	**4.669 543**

2 Grinding jars and accessories for Planetary Ball Mill BM40

NEW

Grinding jars made of agate, sintered aluminium oxide, zirconium oxide and tungsten carbide have a stainless steel casing for safety reasons.

Type	PK	Cat. No.
Grinding jar 50 ml, stainless steel	1	**4.669 544**
Grinding jar 125 ml, stainless steel	1	**4.669 545**
Grinding jar 250 ml, stainless steel	1	**4.669 546**
Grinding jar 500 ml, stainless steel	1	**4.669 547**
Grinding jar 50 ml, agate	1	**4.669 548**
Grinding jar 80 ml, agate	1	**4.669 549**
Grinding jar 125 ml, agate	1	**4.669 550**
Grinding jar 250 ml, agate	1	**4.669 551**
Grinding jar 500 ml, agate	1	**4.669 552**
Grinding jar 50 ml, zirconium oxide	1	**4.669 553**
Grinding jar 125 ml, zirconium oxide	1	**4.669 554**
Grinding jar 250 ml, zirconium oxide	1	**4.669 555**
Grinding jar 500 ml, zirconium oxide	1	**4.669 556**
Grinding jar 50 ml, sintered aluminium oxide	1	**4.669 557**
Grinding jar 125 ml, sintered aluminium oxide	1	**4.669 558**
Grinding jar 250 ml, sintered aluminium oxide	1	**4.669 559**
Grinding jar 500 ml, sintered aluminium oxide	1	**4.669 560**
Safety closure device for 80 ml jars made of stainless steel	1	**4.669 567**
Safety closure device for 125 ml jars made of stainless steel	1	**4.669 565**
Safety closure device for 250 ml jars made of stainless steel	1	**4.669 563**
Safety closure device for 500 ml jars made of stainless steel	1	**4.669 561**
Safety closure device for 125 ml jars made of stainless steel, zirconium oxide, agate, tungsten carbide and aluminium oxide	1	**4.669 566**
Safety closure device for 250 ml jars made of stainless steel, zirconium oxide, agate and aluminium oxide	1	**4.669 564**
Safety closure device for 500 ml jars made of zirconium oxide	1	**4.669 562**
O-ring for 500 ml jars made of agate, aluminium oxide and zirconium oxide (big)	1	**4.669 586**

2

1 Centrifugal Mill FM200

NEW

For fine grinding, homogenising and mixing of soft, brittle, fibrous and hard samples in the laboratory and pilot plant.
The high grinding efficiency is ensured by the high speed rotor and the ring sieve used.
A final fineness of less than 100 µm can be achieved.
The mill guarantees a high sample throughput and low-noise operation.

- Exchangeable ring sieves
- Variable speed control from 6000 to 18000 min^{-1}
- Simple operation via touch control panel
- Efficient sample cooling
- Ground samples are collected in a pan
- Feed hopper with anti-blocking device
- Motor with overload protection
- Easy cleaning
- No tools required to dismantle the parts in contact with the sample
- Electronic and mechanical safety interlocks
- Comprehensive range of ring sieves and rotors available

Ring sieves and rotors are not included in the scope of supply and must be ordered separately.

Specifications

Feed size:	<10 mm
Final fineness:	<100 µm
Speed range:	6000 ... 18000 min^{-1}
Rotor diameter:	95 mm
Performance:	760 W
Dimensions (W x D x H):	400 x 456 x 490 mm
Weight:	33 kg
Power supply:	220 V, 50 Hz

Type	PK	Cat. No.
Centrifugal Mill FM200	1	**4.669 533**

2 Accessories for centrifugal mill FM200

NEW

Type	PK	Cat. No.
Rotor with 6 teeth, stainless steel	1	**4.669 534**
Rotor with 12 teeth, stainless steel	1	**4.669 535**
Rotor with 24 teeth, stainless steel	1	**4.669 536**
Collecting pan, stainless steel	1	**4.669 537**
Ring sieve with trapezoid holes 0.12 mm, stainless steel	1	**4.669 538**
Ring sieve with trapezoid holes 0.2 mm, stainless steel	1	**4.669 539**
Ring sieve with trapezoid holes 0.5 mm, stainless steel	1	**4.669 540**
Ring sieve with trapezoid holes 1.0 mm, stainless steel	1	**4.669 541**
Ring sieve with trapezoid holes 2.0 mm, stainless steel	1	**4.669 542**

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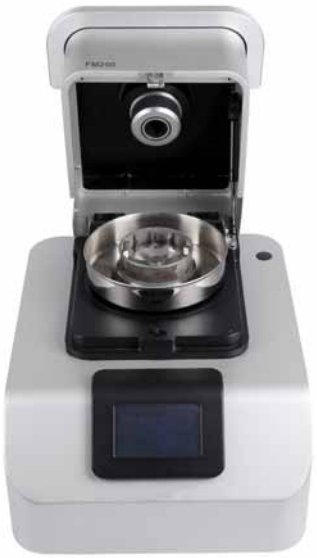

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1 Ultra Centrifugal Mill ZM 200

Retsch

Application:
Extremely rapid and gentle size reduction of soft to medium-hard and fibrous materials.
Ideal for grinding, e.g., chemicals, foods and feeds, washing powder, plastics, fertilizers, pharmaceutical raw materials and finished products.
Also suitable for cryogenic grinding.

Features:
- gentle on the material thanks to 2-step rotor/screen system
- wide speed range, adjustable from 6 000 to 18 000 min^{-1}
- patented cassette system for maximum sample recovery and easy cleaning
- defined final fineness due to ring sieves with aperture sizes from 0.08 to 10 mm
- comfortable safety housing with automatic cover closure
- motor compartment and electronics protected against dust and material penetration
- wide range of accessories with different rotors, ring sieves and cassettes

Specifications:
- Feed size: up to 10 mm
- Final fineness: down to 40 µm
- Batch: up to 300/4500 ml (with cyclone)
- Size (W x D x H): 410 x 365 x 515 mm
- Weight: approx. 38 kg
- Mains connection: 230 V, 50/60 Hz

Supplied with:
ZM 200 with cassette 900 ml.
Rotors and ring sieves have to be ordered separately.

Further rotors and ring sieves on request (e.g. for grinding without heavy metal contamination).

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
ZM 200	6000	18000	5000	1	**9.738 970**

2 Accessories for Ultra Centrifugal Mill ZM 200

Retsch

Description	PK	Cat. No.
Rotor, stainless steel, 6 teeth	1	**9.739 064**
Rotor, stainless steel, 12 teeth	1	**9.739 065**
Rotor, stainless steel, 24 teeth	1	**9.739 066**
Ring sieve, trapezoid holes 0.20 mm	1	**9.738 974**
Ring sieve, trapezoid holes 0.50 mm	1	**9.738 976**
Ring sieve, trapezoid holes 0.75 mm	1	**9.738 977**
Ring sieve, trapezoid holes 1.00 mm	1	**9.738 978**
Ring sieve, trapezoid holes 2.00 mm	1	**9.738 980**
Feeder kit, DR 100, drive unit for 220-240 V, 50 Hz, with feed attachment, with 40 mm push-fit feed chute, funnel and stand	1	**9.738 971**

Further Ring sieves and rotors available on request.

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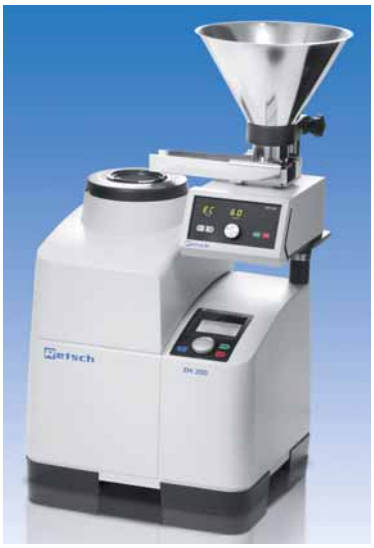

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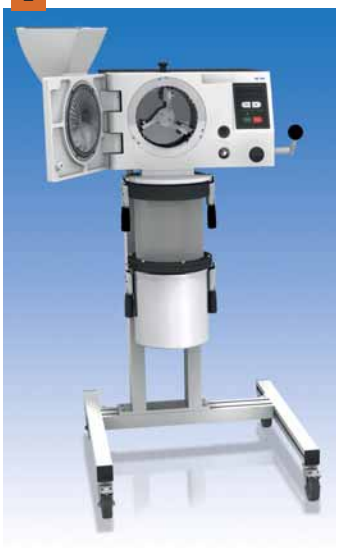


1 Cross beater mill SK 300

Retsch

The cross beater mill SK 300 is used for batch-wise or continuous preliminary and fine size reduction. This robust mill is suited for laboratories as well as for the rough conditions of a production environment. Thanks to the powerful drive and rotor speed up to 4000 rpm it is often possible to achieve a final fineness <100 microns in one process.

Features:
- High throughput for batch-wise size reduction of large sample volumes
- Suitable for feed sizes up to 25 mm
- Adjustable speed from 2000 to 4000 rpm
- Defined final fineness due to bottom sieves with aperture sizes from 0.12 to 10 mm
- Rapid cleaning thanks to easily removable cassette, hopper and push fit rotor
- Ring filter and collecting vessel with convenient, dust-tight bayonet catch
- Quick-action door lock safety lock and electric brake

Function principle:
Size reduction in the SK 300 takes place by impact and shearing effects. 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.

Supplied with: Cross Beater Mill with grinding insert, cross beater, baffle plates, filter hose and 5 l collecting vessel.

Bottom sieves and base frame, please order separately.
Feeders and bottom sieves in furrther sizes are available on request.

Specifications

Feed size:	up to 25 mm
Final fineness:	approx. 0.1 mm
Speed range:	2000 to 4000 rpm
Dimensions (W x D x H) with base frame:	600 x 700 x 1200 mm
Weight:	approx. 57 kg
Power supply:	220-240 V, 50/60 HZ

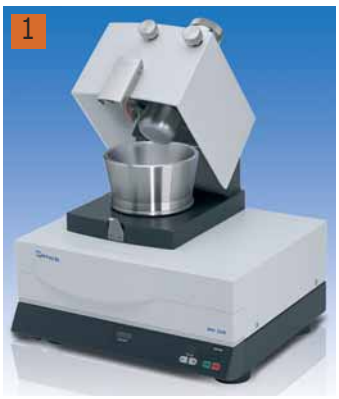
Type	Material	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
SK 300	hardened steel	2000	4000	5000	1	**6.268 112**
SK 300	cast iron	2000	4000	5000	1	**6.268 113**
SK 300	stainless steel	2000	4000	5000	1	**6.268 114**

Accessories for Cross Beater Mill SK 300

Retsch

Description	PK	Cat. No.
Bottom sieve trapezoid holes 0.12 mm	1	**6.268 116**
Bottom sieve trapezoid holes 0.20 mm	1	**6.268 117**
Bottom sieve trapezoid holes 0.25 mm	1	**6.268 118**
Bottom sieve trapezoid holes 0.50 mm	1	**6.268 119**
Bottom sieve trapezoid holes 0.75 mm	1	**6.268 120**
Bottom sieve trapezoid holes 1.00 mm	1	**6.268 121**
Bottom sieve trapezoid holes 1.50 mm	1	**6.268 122**
Bottom sieve trapezoid holes 2.00 mm	1	**6.268 123**
Bottom sieve round holes 3.00 mm	1	**6.268 124**
Bottom sieve round holes 4.00 mm	1	**6.268 125**
Bottom sieve round holes 5.00 mm	1	**6.268 126**
Bottom sieve round holes 6.00 mm	1	**6.268 127**
Bottom sieve round holes 8.00 mm	1	**6.268 128**
Bottom sieve round holes 10.00 mm	1	**6.268 129**
Ring filter for 5 l collecting vessel	1	**6.268 130**

1 Mortar Grinder RM 200



Retsch

Suitable for dry and wet grinding of soft, brittle, hard and paste-like samples.
Depending on the sample, amounts from approx. 10 ml up to 190 ml can be reduced in size, triturated and homogenised. With beech wood scraper (special accessory) for pharmaceutical and homeopathic applications. The RM 200 is exceptionally easy to operate and clean. With digital time control and performance display, scale for reproducible pestle setting, built-in automatic switch-off and rapid motor-stop.
Please order mortar and pestle separately.

Specifications

Feed size*:	max. 8 mm
Batch size/Feed volume:	10 to 190 ml
Final fineness*:	approx. 10µm
Dimensions (W x D x H):	400 x 370 x 480 mm
Weight: approx:	approx. 24 kg (without grinding set)
Supply requirements:	220 - 240 V 50 HZ

Type	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
RM 200	100	190	1	**9.738 170**

*depending on feed material

Accessories for Mortar Grinder RM 200

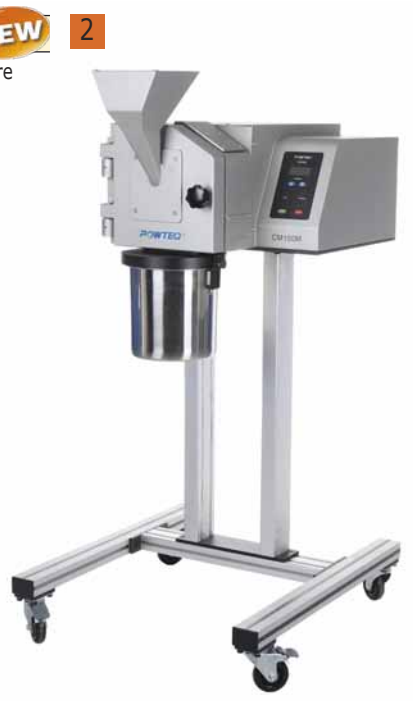
Retsch

Description	PK	Cat. No.
Mortar, hard porcelain	1	**9.738 151**
Mortar, agate	1	**9.738 172**
Pestle, hard porcelain	1	**9.738 173**
Pestle, agate	1	**9.738 174**

Mortars and pestles made from zirconium oxide, sintered corundum, steel and tungsten carbide are available on request.

2 Cutting Mill CM100M1

NEW



For crushing soft, tough, fibrous and hard grinding materials. The mill guarantees a high sample throughput of more than 30 kg/h and can be operated batchwise or continuously. The samples are crushed by the strong cutting and shearing forces. The crushed sample passes through a bottom sieve into the collection bucket.

- Variable speed control from 500 to 3000 min^{-1}
- Simple operation
- Rotor chamber can be quickly locked and easily cleaned
- Low sample heating due to rapid grinding process
- Various bottom sieves and rotors available as accessories
- High work safety due to motor protection switch and motor brake
- Electric safety switch to prevent the mill from starting when rotor chamber is open
- Extensive range of rotors, bottom sieves and further accessories available

Bottom sieves and rotors are not included in the scope of supply and must be ordered separately.

Specifications

Feed size:	<25 mm
Final fineness:	<100 µm
Speed range:	500 ... 3000 min^{-1}
Throughput:	>30 kg/h
Perfdormance:	1500 W
Dimensions (W x D x H):	590 x 705 x 1400 mm
Weight:	120 kg
Power supply:	220 V, 50/60 Hz

Type	PK	Cat. No.
Cutting Mill CM100M1	1	**4.669 630**

Suitable accessories can be found in our online shop.

1 Cutting Mill SM 100/200/300

Retsch

Rapid and gentle size reduction of bulky, soft, medium-hard, fibrous, elastic and thermally sensitive materials.
The most powerful model, the SM 300, is especially suitable for cutting heterogeneous mixtures such as household waste, plastic materials, computer and electronic scrap. The mills are also used for organic materials like wood, roots, bones, plants and feed pellets. They can be equipped with various rotors and hoppers. The SM 300 features a variable speed which makes it perfectly adaptable to the particular application requirements.

Features:
- powerful size reduction thanks to 3kW drive with high torque and RES technology (SM 300)
- perfect adaptation to application requirements by variable speed from 100 rpm to 3000 rpm (SM 300)
- optimum cutting effects thanks to double acting cutting bars (SM 200, SM 300)
- quick and easy cleaning without tools due to fold-back housing with smooth surfaces and push-fit rotor and sieves (SM 200, SM 300)
- defined final fineness due to bottom sieves with aperture sizes from 0.25 mm to 20 mm
- wide range of accessories including various hoppers, collection systems, rotors and sieves

Supplied with:
SM 100 with 5 L collecting receptacle (Please order rotor, hopper, bottom sieve and base frame separately)
SM 200/SM 300 with 5 L collecting receptacle, base frame (Please order rotor, hopper and bottom sieve separately)
Accessories available on request.

Specifications	**SM 100/200/300**
Feed size:	up to 60 x 80 mm
Final fineness:	0.25 to 20 mm
Retractable hopper:	-/ yes/yes
Push-fit rotor:	yes/ yes/yes
Speed at 50 Hz:	1500 rpm (SM 300) variable 100 to 3000 rpm
Drive power:	1.5/2.2/3kW
Mains connection:	3/N~ 400 V, 50 HZ (SM 300) 220-230 V, 50/60 HZ

Type	Min. speed	Max. speed	Max. Feed quantity/ Flow rate	PK	Cat. No.
	rpm	rpm	ml		
SM 100	1500	1500	30000	1	**9.739 069**
SM 200	1500	1500	30000	1	**9.739 067**
SM 300	100	3000	30000	1	**9.739 083**

Further voltages and versions for heavy-metal free grinding on request.

Suitable accessories can be found in our online shop.

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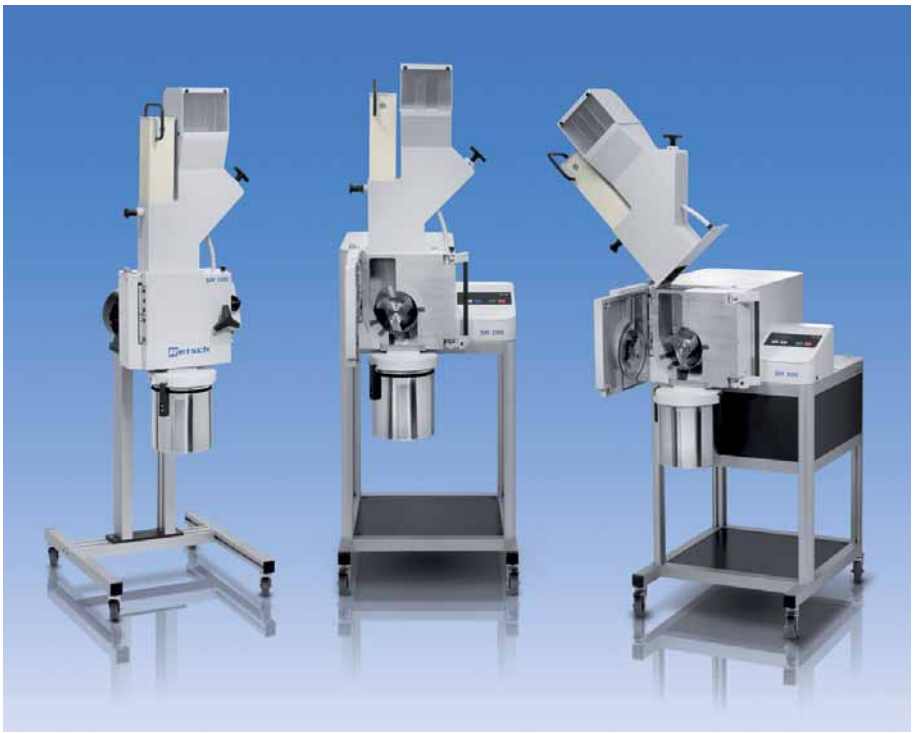

Batch mills Tube Mill control/Tube Mill 100 control

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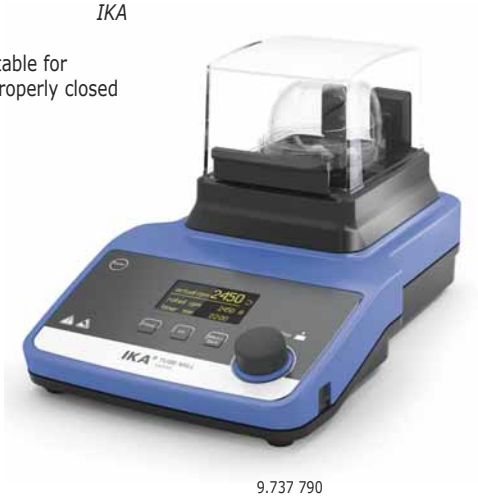
IKA

Suitable for disposable and reusable grinding chambers. By using the disposable grinding chambers the possibility of cross-contamination and the effort of cleaning is eliminated.
The mills can be used for hard (Mohs hardness up to 5), dry and brittle materials. They are especially suitable for grinding seeds, such as corn and wheat. Increased safety, the operation of the mill is only possible with properly closed grinding chamber and closed lid.
- Clearly arranged, multilingual OLED-display
- USB interface for control and documentation of all the parameters
- Interval operation available
- Stepless adjustable speed
- Adjustable safety speed and time
- Programmable and storable test conditions
- Reproducible test results
- Timer
- Easy operation with touch keypad
- Dust proof sealed housing
- Quiet operation



9.737 790

Scope of supply:
Tube Mill control: incl. 1 x grinding chamber MT 40 and MMT 40.1 each
Tube Mill 100 control: incl. 1 x grinding chamber MT 40, MT 100 and MMT 40.1 each

Specifications	**Tube Mill control // Tube Mill 100 control**
Operating principle:	cutting/impact
Motor rating input/output:	100/80 W
Speed:	5000 to 25000 rpm
Chamber volume:	40 ml // 100 ml
Timer:	5 s to 3 min
Interval timer:	5 s to 60 s
Overload protection:	yes
Circumferential speed:	65 m/s
Max. feed hardness:	5 Mohs
Dimensions (W x D x H):	180 x 300 x 170 mm // 180 x 300 x 212 mm
Weight:	2.7 kg // 2.8 kg
IP code:	IP 30
Power supply:	220-240 V, 50/60 Hz

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
Tube Mill control	5000	25000	40	1	**9.737 790** 1
Tube Mill 100 control	5000	25000	100	1	**7.644 727**

Accessories for batch mill Tube Mill control/Tube Mill 100 control

IKA

Description	For	PK	Cat. No.
Disposable grinding chamber, 40 ml	Tube Mill control, Tube Mill 100 control	10	**9.737 791**
Disposable grinding chamber, 40 ml, sterile	Tube Mill control, Tube Mill 100 control	10	**4.652 716**
Disposable grinding chamber, 40 ml, big pack	Tube Mill control, Tube Mill 100 control	100	**6.260 495**
Disposable grinding chamber, 100 ml	Tube Mill 100 control	10	**6.285 802**
Disposable grinding chamber, 100 ml, sterile	Tube Mill 100 control	10	**6.310 247**
Disposable grinding chamber, 100 ml, big pack	Tube Mill 100 control	50	**7.644 728**
Grinding chamber, multi use, 40 ml	Tube Mill control, Tube Mill 100 control	1	**7.639 994**
Grinding chamber, multi use, 100 ml	Tube Mill 100 control	1	**6.273 032**
Spare parts set for grinding chambers, multi use*	Tube Mill control, Tube Mill 100 control	1	**4.653 944**
Disposable grinding chamber, 40 ml, 45° bended beater	Tube Mill control, Tube Mill 100 control	10	**4.668 552**
Disposable grinding chamber, 40 ml, 45° bended beater, big pack	Tube Mill control, Tube Mill 100 control	100	**6.274 501**

*Supplied with: 100 x sealing, 10 x beater, 10 x coupling

1 Grinding mill, A 10 basic

IKA

Newly designed batch mill for grinding of hard, brittle, soft and fibrous materials for volumes up to 50 ml.
Because samples may be embrittled directly in the grinding chamber; tough, oily and aqueous samples can also be grinded.
During development of the mill, particular emphasis was placed on safety.
The mill will only start when the lid is closed and it can only be opened at standstill.
A quick stop feature further increases the safety of user.

- Digital timer
- Counter: Display of grinding time
- Interval operation
- Brushless motor for long life and low noise
- Integrated cooling connections
- Error Code Display
- Easy handling with keypads
- Easy exchangeable beater/cutter for a variety of applications
- Grinding chamber reduction for small sample amounts (included with delivery)
- Easy opening and closing of the lid with a bayonet lock

Specifications

Motor rating input/output:	300/240 W
Speed:	25 000 rpm
Chamber vol.:	50 ml
Power-on time ON/OFF:	5/10 min
Auto power off:	yes
Tangential speed:	73m/s
Max. sample granule size:	6 mm
Dimensions (W x D x H):	130 x 145 x 250 mm
Weight:	2.9 kg
IP code:	IP 41
Supply requirements:	220 - 240 V 50/60 Hz

Type	Max. speed rpm	Max. Feed quantity/ Flow rate ml	Plug type	PK	Cat. No.
A 10 basic	25000	50	EU	1	**4.653 943**
A 10 basic S2	25000	50	UK	1	**6.265 902**
A 10 basic S3	25000	50	CH	1	**6.265 903**

2 Accessories for Grinding mill, A10 basic

IKA

A 10.1 Cutter, stainless steel: For most brittle materials with a Mohs hardness up to 5.
A 10.3 Cutter, hard metal: Made from tungsten carbide for hard materials with a Mohs hardness up to 9.
A 10.2 Star-shaped Cutter, stainless steel: For specific lightweight materials like paper, dried plant parts, plastics and for smooth-elastic materials.
A 10.4 Grinding chamber reduction: For small grinding volumes.

Type	Description	PK	Cat. No.
A 10.1	Cutter, stainless steel	1	**6.265 588**
A 10.3	Cutter, hard metal	1	**6.265 589**
A 10.2	Star-shaped cutter, stainless steel	1	**6.265 590**
A 10.4	Grinding chamber reduction	1	**6.265 591**

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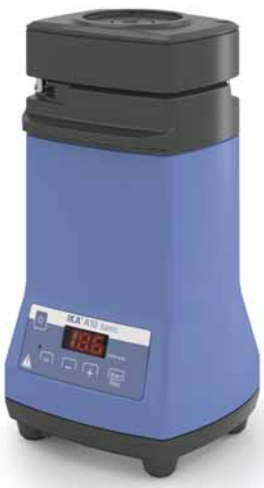

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1 Grinding mill, A11 basic

IKA

Batch mill for 2 different grinding procedures:
Impact grinding of hard, brittle or non-elastic grinding materials with high-grade stainless steel beater. This beater can be used for a Mohs hardness up to 6 (incl. with delivery). Cutting grinding for pulverizing soft, fibrous materials with a cutting blade (not incl. with delivery).
- Moist and gluey materials can be pulverized by adding water
- Grinding chamber made of Tefcel (PTFE, glass fibre-reinforced) with stainless steel inlet (1.4571), useful volume 80 ml (incl. with delivery). For embrittlement of grinding materials with liquid nitrogen in the grinding chamber
- Optionally, a 250 ml grinding chamber is available

Specifications

Motor rating input/output:	160/100 W
Speed:	28000 rpm (off load)
Chamber vol.:	80 ml
Power-on time ON/OFF:	1/10 min
Auto power off:	yes
Tangential speed:	53 m/sec.
Max. sample granule size:	10 mm
Dimensions (W x D x H):	85 x 85 x 240 mm
Weight:	1.5 kg
IP code:	IP 43
Supply requirements:	230 V 50/60 HZ

Tested to DIN EN IEC 61010-1.

Type	Max. speed rpm	Max. Feed quantity/ Flow rate ml	Plug type	PK	Cat. No.
A 11 basic	28000	80	EU	1	**9.737 801**
A 11 basic	28000	80	UK	1	**6.202 305**

Accessories please order separately.

Accessories for Grinding mill, A11 basic

IKA

A 11.1 Spare beater: For pulverising substances with a Mohs hardness up to 6.
A 11.2 Cutter: For pulverising soft, fibrous grinding materials.
A 11.3 Beater, hard metal: For pulverising substances with a Mohs hardness up to 9, chrome-carbide coated
A 11.4 Grinding container, 250 ml: Made of polycarbonate with stainless steel inlet. Not suitable for cooling with N_2, only applicable with double beater A 11.6.
A 11.5 Spare grinding container, 80 ml: Made of Tefcel (PTFE, glass faser-reinforced) with stainless steel inlet. Excellent resistance to chemicals and low temperatures (- 200 °C).
A 11.6 Dubbel beater: For use up to Mohs hardness 3. Only applicable with grinding chamber A 11.4.
A 11.7 Funnel: Prevents splashing by pouring in liquid nitrogen in the grinding chamber A 11.5.

Type	Description	PK	Cat. No.
A 11.1	Spare beater	1	**9.737 815** 2
A 11.2	Cutter	1	**9.737 806**
A 11.3	Beater	1	**9.737 807**
A 11.4	Grinding container, 250 ml	1	**9.737 805**
A 11.5	Spare grinding container, 80 ml	1	**9.737 816** 3
A 11.6	Double beater	1	**9.737 817**
A 11.7	Funnel	1	**9.737 818**

1

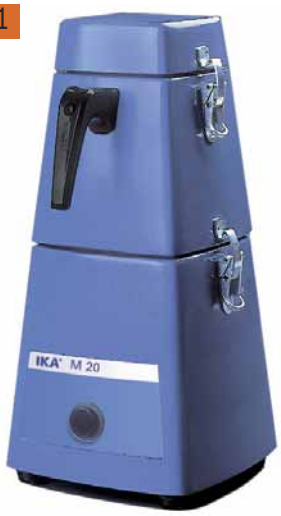
2

9.737 815

3

9.737 816

1



1 Universal mill M20

IKA

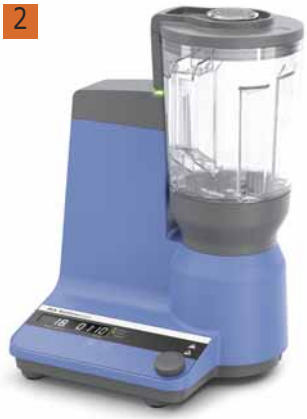
Batch mill suitable for dry grinding of hard and brittle substances.
- Double-walled grinding chamber can be cooled with water through two hose adapters
- Removable grinding chamber, easy to clean
- Two grinding chambers can be alternately operated using one drive
- M 21 blade incl. with delivery

Specifications

Motor rating input/output:	440/225W
Speed:	max. 20000 rpm. off load
Overload protection:	current limiter
Throughput/Charge max:	250 ml
Material:	stainless steel (AISI 304)
Feed size:	max. 5 to 7 mm
Dimensions (W x D x H):	170 x 170 x 350 mm
Weight:	6.6 kg
Supply requirements:	230 V 50/60 HZ
IP code:	IP 21
Tested to DIN EN IEC 61010-1.	

Type	Max. speed rpm	Max. Feed quantity/ Flow rate ml	Plug type	PK	Cat. No.
M 20	20000	250	EU	1	**9.737 828**
M 20	20000	250	UK	1	**4.007 942**

2



4.664 746

Universal mill MultiDrive basic/control

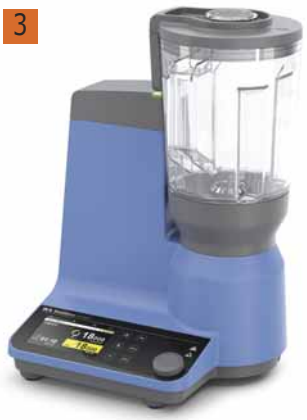
IKA

Universal mill for the pre- and fine comminution of hard, soft or fibrous samples.
- Adjustable interval operation
- Integrated cooling in the grinding bowl
- Ground product and coolant remain disconnected
- USB interface

MultiDrive control additionally with:
- Temperature measurement and vessel recognition using RFID
- Temperature limit can be set for temperature-sensitive materials, or for specific planned reactions
- Integrated weighing function for weighing without transferring the material
- Dispersion vessel and a disposable tube are available as accessories

Please order vessels separately.

3



4.664 747

Specifications

Motor rating input/output:	1.000/800 W
Speed:	3.000 ... 20.000 rpm
Throughput/Charge max:	250 ... 2000 ml
Feed size:	7 mm
Feed material hardness:	5 Mohs
Feed material hardness with hard metal beater:	9 Mohs
Dimensions (W x D x H):	300 x 250 x 450 mm
Weight:	10 kg
Power supply:	220 ... 240 V
IP code:	IP 31

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
MultiDrive basic	3000	20000	2000	1	**4.664 746** 2
MultiDrive control	3000	20000	2000	1	**4.664 747** 3

Vessels for Universal mill MultiDrive basic/control

IKA

1

4.664 751

2

4.664 754

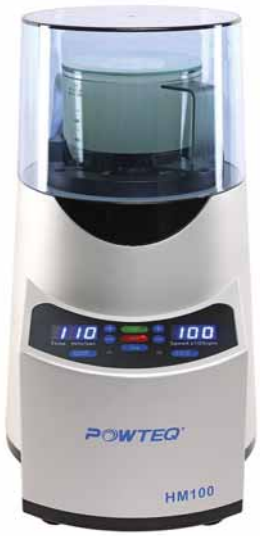
Type	Description	Nominal capacity ml	Material feed size mm	Material	For	PK	Cat. No.
BL 2000	Blender vessel with knife	2000	50.0	PCTG	basic/control	1	**4.664 748**
BL 2000 T	Blender vessel with knife*	2000	10.0	PCTG	control	1	**4.664 749**
MI 250	Milling chamber with beater	250	7.0	stainless steel	basic/control	1	**4.664 750**
MI 400	Milling chamber with beater	400	7.0	stainless steel	basic/control	1	**4.664 751** 1
MI 250 T	Milling chamber with beater*	250	10.0	PCTG	control	1	**4.664 752**
MI 400 T	Milling chamber with beater*	400	10.0	PCTG	control	1	**4.664 753**
DI 2000 T	Dispersing vessel*	2000		PCTG	control	1	**4.664 754** 2

*temperature sensor

3 Knife mill HM100

NEW

3



The HM100 knife mill is used for grinding soft, medium-hard, brittle and fibrous materials. Especially suitable for samples with a high water, oil or fat content. The 2 knives are driven by a 900 W motor to achieve a reliable grinding result. Suitable for applications in agriculture, biology, medicine and food technology.

- For soft, elastic, fibrous, aqueous, oily or fatty samples
- Electronically controlled speed
- Samples are grinded in only 10 to 30 seconds
- Up to 700 ml sample volume
- Autoclavable grinding vessels
- Grinding vessels available in various materials
- Cutting knives with 2 stainless steel and titanium blades available
- Easy operation
- Quick start
- Coarse and fine grinding in one step
- Interval, reverse and manual mode available

Scope of supply: Knife mill, 1 l grinding vessel made of plastic (autoclavable), lid, stainless steel knife

Specifications

Feed size:	40 mm
Feed quantity:	50 ... 700 ml
Ult. fineness:	<300 µm
Timer:	1 s ... 10 min
Motor speed:	2000 ... 10000 min^{-1}
Power consumption:	900 W
Dimensions (W x D x H):	260 x 343 x 454 mm
Weight:	16 kg
Power supply:	220 V, 50 Hz

Type	PK	Cat. No.
HM100	1	**4.669 516**

Accessories for knife mill HM100

NEW

Grinding vessels, lids, blades and scrapers for use with knife mill HM100.

Description	PK	Cat. No.
Grinding vessel 1 l, transparent plastic, autoclavable	1	**4.669 517**
Grinding vessel 1 l, stainless steel	1	**4.669 518**
Grinding vessel 1 l, PP	1	**4.669 519**
Grinding vessel 1 l, PP	10	**4.669 520**
Grinding vessel 1 l, glass	1	**4.669 521**
Standard lid for all grinding vessels 1 l, PP	1	**4.669 522**
Gravity lid for PP/plastic grinding vessel 1 l, PP	1	**4.669 523**
Gravity lid for PP/plastic grinding vessel 1 l, with overflow channels, PP	1	**4.669 524**
Reduction lid for chamber reduction of PP/plastic vessels to 0.3 l, polycarbonate	1	**4.669 525**
Reduction lid for chamber reduction of PP/plastic vessels to 0.5 l, polycarbonate	1	**4.669 526**
Gravity lid for stainless steel grinding vessels, PP	1	**4.669 527**
Gravity lid for stainless steel grinding vessels, with overflow channels, PP	1	**4.669 528**
Stainless steel knife	1	**4.669 529**
Titanium knife	1	**4.669 530**
Stainless steel knife with serrated blades	1	**4.669 531**
Scraper	1	**4.669 532**

1 Knife mill PULVERISETTE 11

NEW

Fritsch

For reproducible homogenisation of all common samples in food or feed testing, pharmaceuticals, chemicals and many other applications. The quietly operating knife mill is ideal for gentle grinding and homogenisation of moisty, oily and greasy as well as dry, soft, medium-hard and fibrous samples within seconds.

- Motor power up to 1250 Watt
- Variable speed setting with turbo function
- Standard, reverse and interval operation
- Knife blades with 4 cutting edges, up to 56000 cuts per minute
- Feed quantity up to 1400 ml (depending on material)
- Average grinding time only 30 seconds (depending on material)
- Fast cryogenic grinding
- 20 SOPs can be stored, USB interface for SOP management and generation of grinding reports
- Easy cleaning
- Sample-contacting parts such as grinding containers, lids and knives can be autoclaved

Scope of supply: Knife mill, grinding container 1.4 l made of polycarbonate, standard lid, standard knife made of stainless steel

Specifications

Max. feed size:	40 mm
Final fineness:	<300 µm
Speed range:	2000 ... 10000 min^{-1}, turbo function up to 14000 min^{-1} for 6 s
Performance:	1250 W
Dimensions (W x D x H):	320 x 430 x 480 mm
Weight:	17.6 kg
Power supply:	200 ... 240 V, 50/60 Hz

Type	PK	Cat. No.
PULVERISETTE 11	1	**6.275 093**

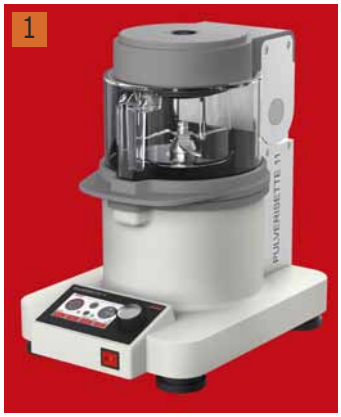
2 Accessories for knife mill PULVERISETTE 11

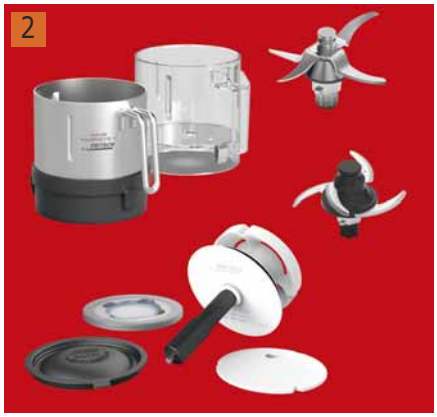
NEW

Fritsch

Type	PK	Cat. No.
Standard grinding vessel, polycarbonate, 1.4 l, autoclavable	1	**4.671 954**
Grinding vessel, stainless steel, 1.4 l, autoclavable	1	**4.671 955**
Standard lid for grinding vessel, silicone, autoclavable	1	**4.671 956**
Vario-Lid system for moist, liquid and viscous samples, incl. plunger and reduction sample pusher, autoclavable	1	**4.671 957**
Reduction sample pusher for dry, solid samples for Vario-Lid system, incl. plunger, autoclavable	1	**4.671 958**
Special lid, for cryogenic comminution with single-use sieve insert for grinding vessel made of stainless steel, autoclavable	1	**4.671 959**
Single use sieve inserts for special lid, set of 10	1	**4.671 960**
Standard knife, stainless steel, autoclavable	1	**4.671 961**
Sickle knife with serrated blades, stainless steel, autoclavable	1	**4.671 962**

Grinding vessels in further materials, sickle knives with different cutting edges and various materials, single-use grinding vessel as well as further accessories are available.

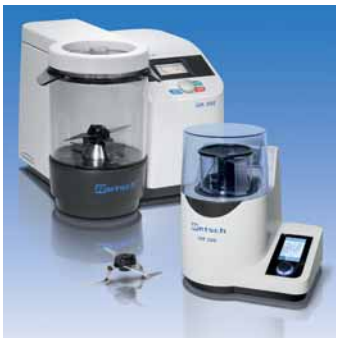




1 Knife Mills GRINDOMIX GM 200/GM 300

1

Retsch



A 121 °C

The Knife Mills Grindomix GM 200 and GM 300 are suitable for the rapid and reproducible size reduction and homogenisation of food and feed materials. They can process substances with a high water, oil or fat content just as quickly and reliably as dry, soft and medium-hard products.

Features:
- Very fast and reproducible grinding and homogenisation of foodstuffs, final fineness < 300 µm
- Speed-controlled industrial motor
- Autoclavable grinding tools
- Boost function allows short-term increase of speed up to 14.000 rpm (GM 200)
- For sample volumes up to 700 ml (GM 200) or 4500 ml (GM 300)
- Digital display of grinding time and speed
- Interval operation possible
- Optional gravity lid for automatic adjustment of grinding chamber volume
- Storage of 4 program sequences possible (GM 200)
- 8 or 10 parameter combinations can be stored (GM 200/GM 300)
- Drive power: ~ 1000 W (GM 200); continuous 1.1 kW, short term peak 3 kW (GM 300)
- Electrical supply data: 220-240 V, 50-60 Hz

Supplied with:
GM 200 complete with 1 L plastic container, standard lid and stainless steel knife.
GM 300 complete with 5 L plastic container, standard lid, stainless steel knife and scraper.

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
GM 300	500	4000	5000	1	**9.738 500**
GM 200	2000	14000	700	1	**6.310 086**

2 Disc Mill DM 200

2

Retsch

For preliminary and fine grinding of medium-hard and hard-brittle substances in batches. Grinding discs are available in 4 different materials. **Please order grinding discs separately.**

- Accurate gap width setting
- Connector for dust extraction

Specifications

Feed size:	up to 20 mm
Ultimate fineness:	up to 0.1 mm
Capacity:	2.5 l
Dimensions (W x D x H):	440 x 400 x 870 mm
Weight:	140 kg
Power supply:	3/N~ 400 V, 50/60 Hz

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
DM 200	440	528	2500	1	**9.739 030**

Accessories for Disc Mill DM 200

Retsch

Type	PK	Cat. No.
Grinding discs - hardened steel	1	**9.739 031**
Grinding discs - manganese steel	1	**9.739 032**
Grinding discs - tungsten carbide	1	**9.739 033**
Grinding discs - zirconium oxide	1	**9.739 034**

1 Micro Ball Mill GT300

NEW

For grinding and mixing of hard, medium-hard, soft, elastic and fibrous samples. Also suitable for cell disruption and DNA/RNA extraction. The mill is designed for very short processing times and high sample throughput. The grinding containers carry out horizontal, circular-arc-shaped oscillations and the grinding balls ensure effective grinding and mixing of the sample.

- Only 30 seconds average processing time
- 2 grinding stations for bowls with a volume of 5 to 50 ml
- Multifunctional clamping device, which also holds adapters for reaction vessels
- Grinding time digitally adjustable from 1 second to 100 minutes
- Variable speed from 180 to 1800 min^{-1}
- Control via LCD display
- Programmable grinding parameters, up to 10 programs can be stored
- Transparent cover
- Safety interlock
- Grinding chamber, clamping system and swivel arm made of stainless steel
- Maintenance-free direct drive
- Grinding bowls made of different materials with volumes up to 50 ml available as accessories

Grinding bowls and balls are not included in the scope of supply and must be ordered separately.

Specifications

Feed size:	<10 mm
Sample volume:	0.2 ... 50 ml
Final fineness:	<5 µm
Timer:	1 s ... 99:59 min
Grinding programs:	10
Vibration frequency:	180 ... 1800 min^{-1}
Number of grinding stations:	2
Performance:	200 W
Dimensions (W x D x H):	380 x 480 x 281 mm
Weight:	34 kg
Power supply:	220 V, 50 Hz

Type	PK	Cat. No.
Micro Ball Mill GT300	1	**4.669 587**

2 Accessories for Micro Ball Mill GT300

NEW

Type	PK	Cat. No.
Grinding jar 25 ml, hardened steel	1	**4.669 588**
Grinding jar 5 ml, stainless steel	1	**4.669 589**
Grinding jar 10 ml, stainless steel	1	**4.669 590**
Grinding jar 25 ml, stainless steel	1	**4.669 591**
Grinding jar 35 ml, stainless steel	1	**4.669 592**
Grinding jar 50 ml, stainless steel	1	**4.669 593**
Grinding jar 10 ml, agate	1	**4.669 594**
Grinding jar 10 ml, zirconium oxide	1	**4.669 595**
Grinding jar 25 ml, zirconium oxide	1	**4.669 596**
Grinding jar 35 ml, zirconium oxide	1	**4.669 597**
Jar wrench	1	**4.669 598**
Gasket for 25 ml grindig jars made of stainless steel	1	**4.669 599**
Gasket for 35 ml grindig jars made of stainless steel	1	**4.669 600**
Gasket for 50 ml grindig jars made of stainless steel	1	**4.669 601**
Gasket for 25 ml grindig jars made of zirconium oxide	1	**4.669 602**
Gasket for 35 ml grindig jars made of zirconium oxide	1	**4.669 603**

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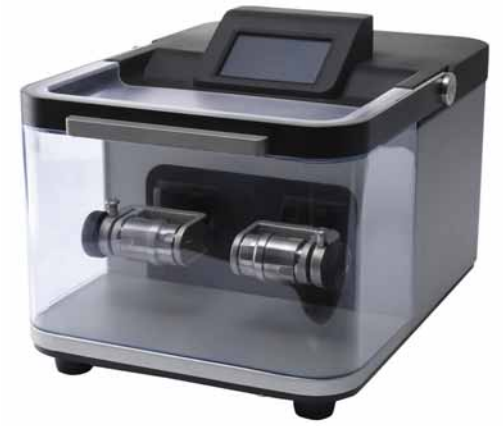


2

Mixer Mills MM 400/500

The mixer mills are true laboratory "all-rounders". They have been developed specially for grinding, homogenising and mixing of small amounts of sample in only a few seconds.
They are also perfectly suitable for the disruption of biological cells as well as for DNA/RNA recovery.

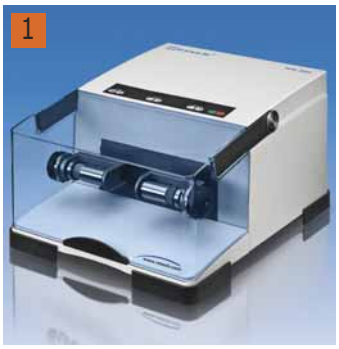
Retsch

1 Mixer Mills MM 400

NEW

The MM 400 can also be used for cryogenic and wet grinding.

Retsch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- Grinding by impact and friction, for up to 20 samples per run
- 3 different grinding modes: dry, wet or cryogenic (MM 400)
- Screw-top grinding jars for leak-proof grinding (MM 400)
- 9 Standard Operating Procedures can be stored

Specifications

Feed size:	≤ 8 mm
Ultimate fineness:	approx. 5 µm
Charge:	max. 2 x 20 ml
Digital preselection of vibrational frequency:	3 ... 30 Hz (180 ... 1800 rpm.)
Power supply:	100 ... 240 V, 50/60 Hz

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	No. of grinding stations	PK	Cat. No.
MM 400	180	1500	40	2	1	**9.739 091**

2 Grinding Jars for Mixer Mill MM 400

With screw cap.

Retsch


2

Advantages:
- simple and safe handling
- dust and air-tight
- Suitable for wet and cryogenic grinding

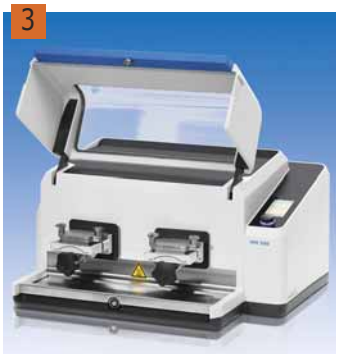
Material	Capacity ml	PK	Cat. No.
Stainless steel	1.5	1	**9.738 848**
Stainless steel	5.0	1	**9.738 849**
Stainless steel	10.0	1	**9.738 960**
Stainless steel	35.0	1	**9.738 875**
Stainless steel	50.0	1	**9.738 885**
Agate	5.0	1	**9.738 852**
Agate	10.0	1	**9.738 961**
Zirconium oxide	10.0	1	**9.738 962**
Zirconium oxide	25.0	1	**9.738 965**
Zirconium oxide	35.0	1	**9.738 880**
Tungsten carbide	10.0	1	**9.738 963**
Tungsten carbide	25.0	1	**9.738 864**
Hardened steel	25.0	1	**9.738 869**
PTFE	25.0	1	**9.738 874**
PTFE	35.0	1	**9.738 966**

3 Mixer Mills MM 500

NEW

The MM 500 is suitable for efficiently wet-mill samples to nanosized particles with only minor warming effects.

Retsch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- Suitable for long-term grinding processes up to 99 h
- Memory for 12 SOPs
- 4 program cycles with up to 99 repetitions
- 4.3" touch display

Specifications

Feed size:	≤ 10 mm
Ultimate fineness:	approx. 0.1 µm
Charge:	max. 2 x 45 ml
Digital preselection of vibrational frequency:	3 ... 35 Hz (180 ... 2100 min^{-1})
Power supply:	100 ... 230 V, 50/60 Hz

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	No. of grinding stations	PK	Cat. No.
MM 500	180	2100	90	2	1	**6.313 123**

Grinding Jars for Mixer Mill MM 500

NEW

Retsch

- With screw cap
- Screw-Lock jars in sizes up to 125 ml, pressure-tight up to 5 bar

Material	Capacity ml	PK	Cat. No.
Hardened steel	50	1	**6.313 125**
Hardened steel	80	1	**6.313 126**
Hardened steel	125	1	**6.313 127**
Stainless steel	50	1	**6.313 128**
Stainless steel	80	1	**6.313 129**
Stainless steel	125	1	**6.313 130**
Tungsten carbide	50	1	**6.313 131**
Tungsten carbide	80	1	**6.313 132**
Zirconium oxide	50	1	**4.669 258**
Zirconium oxide	80	1	**6.313 133**
Zirconium oxide	125	1	**6.313 134**

1 Mixer Mill CryoMill

Retsch

The CryoMill is designed for the cryogenic size reduction of materials which cannot be ground at room temperature or whose composition would be changed by it. The grinding jar is cooled before and during the grinding process with liquid nitrogen through an integrated cooling system. Thus the sample is embrittled and its volatile components are preserved. The size reduction principle is the same as that of the well-proven Mixer Mill MM 400. The CryoMill can also be operated without the cooling system which makes it suitable for a wide range of applications.

- Powerful cryogenic grinding by impact and friction, up to 30 Hz
- Closed LN2-system (autofill) for enhanced safety, avoids any contact of the user with LN_2
- Screw-top grinding jars for convenient, leak-proof operation
- Clearly structured user interface, memory for 9 SOPs
- Wide range of accessories including LN_2 feeding systems, various jar and ball sizes, adapter racks, materials

Specifications

Feed size	up to 8 mm
Ultimate fineness	< 5µm
Charge	max. 1 x 20 ml
Adjustable frequency range	5 to 30 HZ (300 to 1800 rpm.)
Dimensions (W x D x H)	385 x 675 x 370 mm
Weight	40 kg
Power supply:	100 - 240 V, 50/60 HZ

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
CryoMill	300	1800	20	1	**9.739 299**

Please order Autofill, grinding jars and grinding balls separately.

2 Grinding Jars for CryoMill

Retsch

Material	Capacity ml	PK	Cat. No.
Stainless steel (to be used with adapter)	5	1	**9.739 281**
Stainless steel	10	1	**9.739 609**
Stainless steel	25	1	**9.739 611**
Stainless steel	35	1	**9.739 612**
Stainless steel	50	1	**9.739 613**
Hardened steel (to be used with adapter)	5	1	**9.739 287**
Hardened steel	25	1	**9.739 614**
Hardened steel	35	1	**9.739 615**
Hardened steel	50	1	**9.739 616**
Zirconium oxide	25	1	**9.739 610**
PTFE	25	1	**9.739 617**

1 Planetary Ball Mills PM 100/100 CM/200/400

Retsch

Planetary Ball Mills are suitable for mixing and grinding soft, medium-hard, extremely hard, brittle and fibrous materials.
They are used whenever high degrees of fineness down to the submicron range are to be achieved in a very short time.
In addition to dry and wet grinding, they are also suitable for colloidal grinding and mechanical alloying.
Typical materials are minerals, ores, chemicals, ceramics, soils, household and industrial waste etc.

Features:
- extremely high ultimate fineness down to submicron range
- 1, 2 or 4 grinding stations
- grinding jar volumes from 12 ml to 500 ml
- suitable for long-term trials and continuous use
- programmable starting time
- power failure back-up ensures storage of remaining grinding time
- reproducible results due to digital parameter setting
- 10 parameter combinations can be stored
- single button operation with graphic display
- automatic grinding chamber ventilation for cooling the grinding jars
- grinding jars in 7 sizes and 8 different materials available

Supplied with: Planetary Ball Mill only. Grinding jars and grinding balls have to be ordered separately.
The PM 100 CM is a Planetary Ball Mill with a speed ratio of 1:-1.
Size reduction is not so much achieved by impact but by pressure and friction which is more gentle on the material.

Specifications

Ultimate fineness:	< 1µm
Dimensions (WxDxH):	630 x 415 x 468 mm
PM 400	836 x 780 x 1220 mm
Supply requirements:	230 V, 50-60 HZ

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	No. of grinding stations	PK	Cat. No.
PM 100	100	650	220	1	1	**9.739 270**
PM 100 CM	100	650	220	1	1	**9.739 275**
PM 200	100	650	100	2	1	**9.739 271**
PM 400	30	400	880	4	1	**9.739 274**

Please order grinding jars and grinding balls separately.

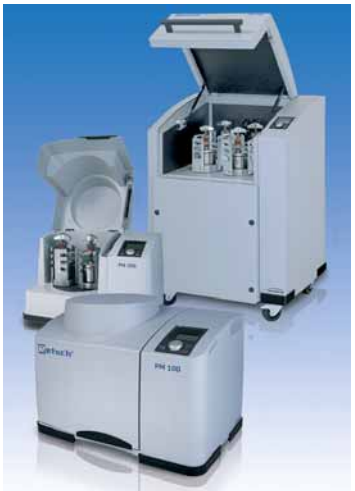
2 Grinding Jars for Planetary Ball Mills PM 100/100 CM/200/400

Retsch

Material	Capacity ml	PK	Cat. No.
Hardened steel*	500	1	**9.738 222**
Stainless steel	125	1	**9.738 340**
Stainless steel*	500	1	**9.738 223**
Tungsten carbide	50	1	**9.738 311**
Tungsten carbide*	250	1	**9.738 218**
Agate	125	1	**9.738 345**
Sintered aluminium oxide	50	1	**9.738 327**
Sintered aluminium oxide*	500	1	**9.738 226**
Zirconium oxide	50	1	**9.738 325**
Zirconium oxide*	250	1	**9.738 221**
Zirconium oxide*	500	1	**9.738 227**
Silicon nitride	125	1	**9.738 343**
Silicon nitride	250	1	**9.738 354**
Silicon nitride	500	1	**6.267 315**

*not suitable for PM 200.
Further grinding jars on request

1



2

1

1 Mortar grinder PULVERISETTE 2

Fritsch

For wet and dry grinding of hard, medium-hard, soft, brittle and temperature-sensitive samples for analysis, quality control and materials testing. It even grinds difficult samples with a moist, fibrous or elastic structures using liquid nitrogen.
And it's also excellently suited for mixing or homogenisation of organic and inorganic solids or liquids.

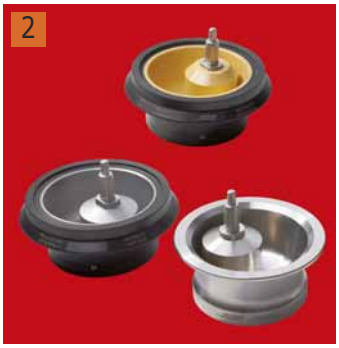
- Reproducible and accurate grinding results
- Precise adjustment and readout of the pestle pressure
- Short grinding and mixing times
- Loss and dust free

Max. feed size:	8 mm
Max. sample quantity:	up to 190 ml
Final fineness:	10 ... 20 µm
Supply requirements:	100-120/200-240 V/1~, 50/60 Hz, 300 W
Dimensions (W x D x H):	310 x 460 x 410 mm
Net weight:	24 kg

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	PK	Cat. No.
PULVERISETTE 2	70	80	190	1	**9.738 200**

Mortar and pestle must be ordered additionally.

2



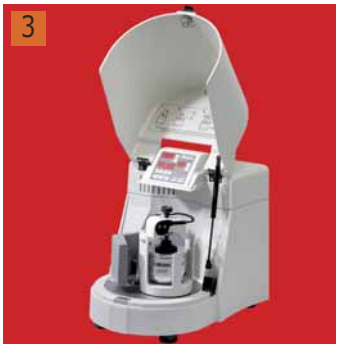
2 Accessories for mortar grinder PULVERISETTE 2

Fritsch

Material	PK	Cat. No.
Grinding set agate	1	**9.738 211**
Grinding set stainless steel	1	**9.738 235**
Grinding set hard porcelain	1	**9.738 240**

Mortars and pestles are also available in sintered corundum, hardmetal tungsten carbide and zirconium oxide.

3



9.738 300

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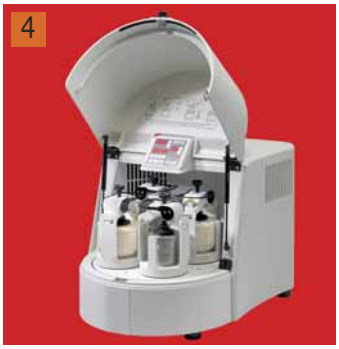


9.738 255

Planetary ball mills PULVERISETTE 5/6 *classic line*

Fritsch

Ideal for fast, loss-free fine grinding of hard, medium-hard, brittle and fibrous materials - dry or in suspension in the areas of geology, mineralogy, metallurgy, ceramics, materials research, mechanical alloying, pharmaceuticals, chemistry, biology, sample preparation for analysis.
Sample can be processed from a few mg to several kg at a wide range of fineness levels down to less than 1 µm.
They are especially easy to operate and fast and easy to clean. Suitable for continuous, heavy duty usage and guarantee safe clamping of the grinding bowls.
Matching grinding parts of 7 different materials are available to provide max. protection against undesired contamination. In addition to size-reduction, planetary ball mills can also be used for mixing and homogenising of emulsions and pastes or for mechanical alloying and activation.

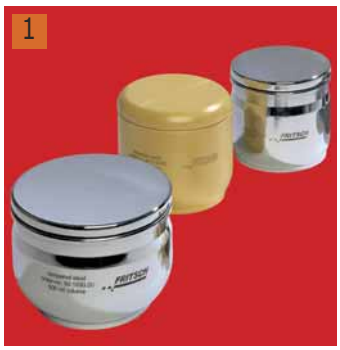
FRITSCH also offers a Planetary Mill Generation *premium line*, for fast high-tech grinding down to the nano range, worldwide unique in operation, performance and safety, a new reference class. Information on the Planetary Mill PULVERISETTE 5 *premium line* and Planetary Micro Mill PULVERISETTE 7 *premium line* can be found in the LLG Online Shop.

Max. feed size:	10 mm
Final fineness:	< 1 µm
Grinding bowl sizes:	80, 250, 500 ml
Supply requirements:	100-120/200-240 V/1~, 50-60 Hz
Dimensions (W x D x H):	370 x 530 x 500 mm PULVERISETTE 6 *classic line* 580 x 670 x 570 mm PULVERISETTE 5 *classic line*

Type	Min. speed rpm	Max. speed rpm	Max. Feed quantity/ Flow rate ml	No. of grinding stations	PK	Cat. No.
Planetary Mill PULVERISETTE 5 *classic line* - Model I	50	400	900	4	1	**9.738 255** 4
Planetary Mill PULVERISETTE 5 *classic line* - Model II	50	400	450	2	1	**9.738 257**
Planetary Mono Mill PULVERISETTE 6 *classic line*	100	650	225	1	1	**9.738 300** 3

Grinding bowls and grinding balls must be ordered additionally.
Further models of planetary mills on request.

1 Grinding bowls for planetary ball mills PULVERISETTE 5/6 *classic line*



Fritsch

Material	Volume ml	PK	Cat. No.
Hardened, stainless steel	80*	1	**9.738 515**
Hardened, stainless steel	250	1	**9.738 525**
Hardened, stainless steel	500	1	**9.738 535**
Sintered corundum	80*	1	**9.738 512**
Sintered corundum	250	1	**9.738 522**
Sintered corundum	500	1	**9.738 532**
Zirconium oxide	80*	1	**9.738 518**
Zirconium oxide	250	1	**9.738 528**
Zirconium oxide	500	1	**9.738 538**
Hardmetal tungsten carbide**	80*	1	**9.738 514**
Hardmetal tungsten carbide**	250	1	**9.738 524**
Adapter for grinding bowls	80	1	**9.738 315**

* One grinding bowl holder can hold either 2 x 80 ml bowls or 1 x 80 ml bowl together with a grinding bowl adapter mounted one on top of the other.
** Grinding bowl in a steel casing.
Grinding bowls are also available in agate and silicon nitride. Special gassing lids for grinding in an inert atmosphere and for mechanical alloying as well as the GTM-system (Gas pressure and temperature measuring system) for continuous measurment of gas pressure and temperature are available.

2 Grinding balls for grinding bowls PULVERISETTE 5/6 *classic line*

Fritsch

Material	Ball diam. mm	PK	Cat. No.
Hardened, stainless steel	10	1	**9.738 555**
Hardened, stainless steel	20	1	**9.738 565**
Hardened, stainless steel	30	1	**9.738 575**
Hardened, stainless steel	40	1	**9.738 585**
Sintered corundum	10	1	**9.738 552**
Sintered corundum	20	1	**9.738 562**
Sintered corundum	30	1	**9.738 572**
Sintered corundum	40	1	**9.738 582**
Zirconium oxide	10	1	**9.738 558**
Zirconium oxide	20	1	**9.738 568**
Zirconium oxide	30	1	**9.738 578**
Zirconium oxide	40	1	**9.738 588**
Hardmetal tungsten carbide	10	1	**9.738 554**
Hardmetal tungsten carbide	20	1	**9.738 564**
Hardmetal tungsten carbide	30	1	**9.738 574**
Hardmetal tungsten carbide	40	1	**9.738 584**

Grinding bowls are also available in agate and silicon nitride.
Grinding balls are also offered in the diameters 0.1 mm to 3 mm (to achieve a fineness down to the nanometer-range) as well as in 5 mm and 15 mm.

3 Disk mill PULVERISETTE 13 *classic line*

Fritsch

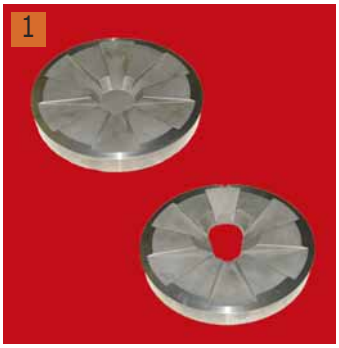
Ideal for intermittent and continuous fine grinding within the medium particle size range of soft to hard, tough and temperature-sensitive solids in the areas of mining and metallurgy, glass industry, ceramics industry, soil research, rocks and soils.

Max. feed size:	20 mm
Throughput:	up to 150 kg/h
Final fineness:	0.1 to 12 mm
Supply requirements:	400 V/3~, 50 Hz, 1790 W
Dimensions (W x D x H):	440 x 870 x 400 mm
Net weight:	140 kg

Type	Min. speed rpm	Max. speed rpm	Max. throughput kg/h	PK	Cat. No.
PULVERISETTE 13 *classic line*	440	440	150	1	**9.739 001**

Instrument also available in other voltages.
Fixed and movable grinding disks must be ordered additionally.
The Disk Mill is also available as *premium line* model: even more powerful, safer and easier to operate due to easy reproducible gap width setting via display.

1



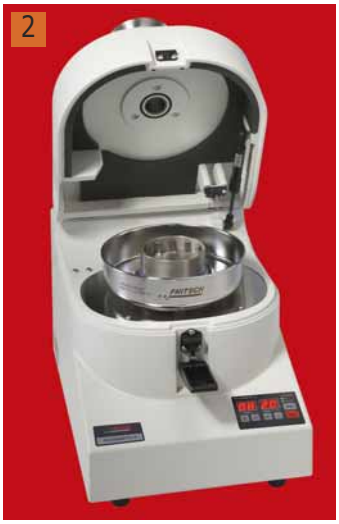
1 Accessories for disk mill PULVERISETTE 13 *classic line*

Fritsch

Type	Description	PK	Cat. No.
Fixed grinding disk	hardened steel cast	1	**9.739 002**
Mobile grinding disk	hardened steel cast	1	**9.739 003**
Fixed grinding disk	zirconium oxide	1	**9.739 006**
Mobile grinding disk	zirconium oxide	1	**9.739 007**

Grinding disks are also in manganese steel and hardmetal tungsten carbide available.

2



2 Variable Speed Rotor Mill PULVERISETTE 14 *classic line*

Fritsch

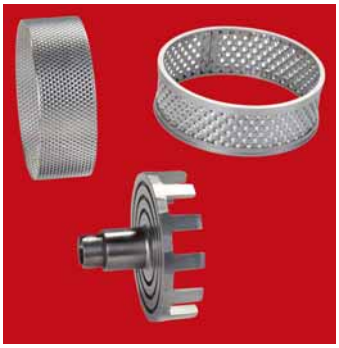
Ideal for fast, effective comminution of soft to medium-hard, brittle, fibrous materials, as well as difficult-to-mill and temperature-sensitive samples. Cryogenic grinding, dispersion and homogenisation are also one of the areas of operation. The variable speed rotor mill is an ultra-centrifugal mill with variable speed settings between 6.000 rpm and 20.000 rpm and automatic speed regulation for constant milling in the areas of analytic, biology, chemistry, agriculture and forestry, foodstuffs, plastics and textiles, pharmaceuticals, environment, RoHS. For optimal material feeding the Vibratory Feeder LABORETTE 24 (optional) is recommended.

Max. feed size:	10 mm
Throughput:	up to 5 L/h
Sieve inserts:	0.08 to 6 mm
Final fineness (d_{50}):	40 µm
Rotor speed:	6.000 to 20.000 rpm
Dimensions (W x D x H):	310 x 480 x 470 mm
Net weight:	23 kg

Type	Min. speed rpm	Max. speed rpm	Max. throughput l/h	Rated capacity kW	Type of auxiliary energy	PK	Cat. No.
PULVERISETTE 14 *classic line*	6000	20000	5	1.1	200 ... 240 V, 50-60 Hz	1	**9.738 277**
PULVERISETTE 14 *classic line*	6000	20000	5	1.1	100 ... 120 V, 50-60 Hz	1	**9.738 276**

Impact rotor and sieve ring must be ordered additionally.
FRITSCH also offers a Variable Speed Rotor Mill PULVERISETTE 14 *premium line* with impact, shearing and cutting comminution in one instrument. The *premium line* version is especially powerful with up to 22.000 rpm, a max. feed size of up to 15 mm and a sample throughput of up to 15 l/h and more. This mill offers significantly better cooling, absolutely safe operation and fast, residue-free cleaning.

3



3 Accessories for variable speed rotor mill PULVERISETTE 14 *classic line*

Fritsch

Type	Material	PK	Cat. No.
Impact rotor with 8 ribs	Stainless steel	1	**9.738 282**
Impact rotor with 12 ribs	Stainless steel	1	**9.738 283**
Impact rotor with 24 ribs	Stainless steel	1	**9.738 284**
Sieve ring, trapezoidal perforation 0.08 mm	Stainless steel 316 L	1	**9.738 286**
Sieve ring, trapezoidal perforation 0.12 mm	Stainless steel 316 L	1	**9.738 287**
Sieve ring, trapezoidal perforation 0.2 mm	Stainless steel 316 L	1	**9.738 288**
Sieve ring, trapezoidal perforation 0.5 mm	Stainless steel 316 L	1	**9.738 289**
Sieve ring, trapezoidal perforation 0.75 mm	Stainless steel 316 L	1	**9.738 285**
Sieve ring, trapezoidal perforation 1 mm	Stainless steel 316 L	1	**9.738 290**
Sieve ring, trapezoidal perforation 1.5 mm	Stainless steel 316 L	1	**9.738 278**
Sieve ring, trapezoidal perforation 2 mm	Stainless steel 316 L	1	**9.738 279**
Sieve ring, square perforation 2 mm	Stainless steel 316 L	1	**4.671 963**
Sieve ring, square perforation 4 mm	Stainless steel 316 L	1	**4.671 964**
Sieve ring, square perforation 6 mm	Stainless steel 316 L	1	**4.671 965**
Conversion kit for large quantities	-	1	**9.738 329**
Vibratory feeder LABORETTE 24 for continuous feeding	-	1	**9.738 299**
Stand for vibratory feeder LABORETTE 24	-	1	**9.738 298**

Rotors and sieve rings are also available in others designs and materials. An extensive accessory programme with impact bar, pin insert, sample exhauster with Cyclone separators and much more is available for your specific application.

Cutting mills PULVERISETTE 15 and Universal Cutting mills PULVERISETTE 19

Fritsch

Ideal for pre and fine comminution of soft to medium-hard as well as fibrous or brittle, tough materials. They are essential for the areas of plastics, textiles, agriculture and forestry, environmental, construction materials, chemistry and foodstuffs. All cutting parts can be removed for cleaning in just a few seconds without tools, unbeatable fast, simple and efficient. Variable rotational speeds, different rotors, various knife geometries and replaceable blades ensure maximum flexibility and durability. For controlling the abrasion properties, the cutting tools are offered in different materials. The optimum airflow ensures fast comminution and secure protection against clogging. The FRITSCH Cyclone seperators (optional) for sample exhaustion enable simple feeding due to the strong airflow, increase throughput, and reduce the thermal load of the samples.

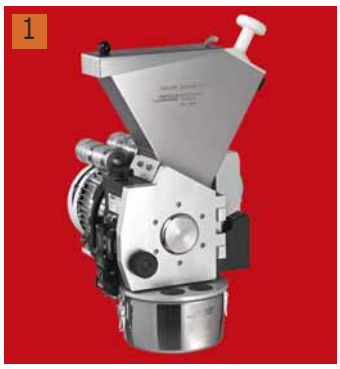
Instruments also available in other voltages.
Funnels, rotors, sieve inserts/sieve cassettes and collecting vessels must be ordered separately.
FRITSCH also offers a Cutting Mill Combination which consists of the Universal Cutting Mill PULVERISETTE 19 and Power Cutting Mill PULVERISETTE 25.
The important effect is that samples with feed particle size of 120 mm max. can be ground to a few 100 µm within a short time and in a single operation. Ordering data on request.
The Universal Cutting Mills PULVERISETTE 19 are also available completely in stainless steel.

NEW: Universal Cutting Mill PULVERISETTE 19 now with variable rotational speed for optimal adjustment of the cutting speed to your sample material
Variable 300-3000 rpm is ideal for fine comminution of dry soft to medium-hard sample materials as well as fibrous materials and plastics.
Variable 50-700 rpm for powerful comminution of hard, tough-elastic and temperature-sensitive samples or an excessively high fine share need to be avoided.

Specifications

Max. feed size:	70 x 80 mm*
Rotation speed:	50 ... 3400 min^{-1}
Sieve inserts:	0.2 ... 20 mm*

1



9.738 421

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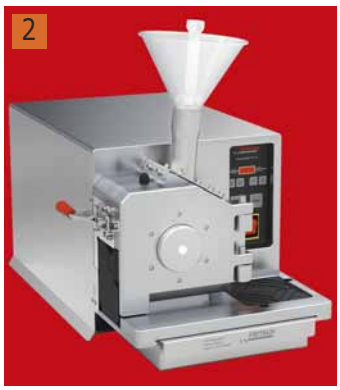


4.671 967

Type	Min. speed rpm	Max. speed rpm	Max. throughput l/h	Feed size mm	Type of auxiliary energy	Dimensions (W x D x H) mm	PK	Cat. No.	
PULVERISETTE 15	2800	3400	50	70	400 V, 50 Hz	420 x 480 x 690	1	**9.738 421**	1
PULVERISETTE 19	50	700	60	80	380 ... 460 V, 50/60 Hz	440 x 790 x 560	1	**4.671 967**	2
PULVERISETTE 19	300	3000	60	80	380 ... 460 V, 50/60 Hz	440 x 790 x 560	1	**6.314 060**	

* depending on the instrument type

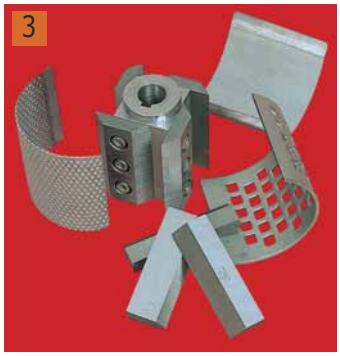
3 Accessories for cutting mill PULVERISETTE 15

Fritsch

Type	PK	Cat. No.
Rotor with straight cutting edges and fixed knives made of tool steel	1	**9.738 424**
Protected funnel with sample pusher	1	**7.900 140**
Collecting vessel, 3.5 L	1	**6.231 269**
Collecting vessel, 60 L with filter hose	1	**9.738 449**
Universal support stand for the free mounting of the cutting mills	1	**9.738 429**
Sieve insert*, trapezoidal perforation 0.25 mm	1	**9.738 432**
Sieve insert*, trapezoidal perforation 0.5 mm	1	**9.738 433**
Sieve insert*, trapezoidal perforation 1 mm	1	**9.738 435**
Sieve insert*, trapezoidal perforation 2 mm	1	**9.738 437**
Sieve insert*, square perforation 4 mm	1	**9.738 441**
Sieve insert*, square perforation 6 mm	1	**9.738 442**

*made of stainless steel
Alternative funnels as well as sieve inserts are also available in other perforations. Rotors as well as the sieve inserts are also offered in chromium-free steel.

3



4 Accessories for Universal Cutting mills PULVERISETTE 19

Fritsch

Type	PK	Cat. No.
Standard cutting tool with V-cutting edges and fixed knives made of hardened stainless steel	1	**9.739 321**
Standard funnel for long and bulk solids	1	**6.510 319**
Collecting vessel, 3 L	1	**9.739 350**
Large collecting vessel, 10 L	1	**9.739 351**
Universal support stand for the free mounting of the cutting mills	1	**9.738 429**
Sieve cassette*, trapezoidal perforation 0.5 mm	1	**9.739 331**
Sieve cassette*, trapezoidal perforation 1 mm	1	**9.739 333**
Sieve cassette*, trapezoidal perforation 2 mm	1	**9.739 335**
Sieve cassette*, square perforation 4 mm	1	**9.739 340**
Sieve cassette*, square perforation 6 mm	1	**9.739 341**

*made of stainless steel
Alternative funnels, cutting tools in other materials and designs, sieve cassettes in other perforations and materials as well as further stands and Cyclone separators in various configurations for sample exhaustion are available.

4