

Mixer Mills

MM 200, MM 301



Grinding

RETSCH mixer mills have been specifically developed for dry and wet grinding of small sample quantities.

Mixing

RETSCH mixer mills are the perfect universal products for mixing and homogenizing powders and suspensions.

Cell Disruption

RETSCH mixer mills are excellently suitable for disrupting biological cells as well as for the isolation of DNA and RNA.

Advantages that help you on a daily basis

- Quick and efficient size reduction with a homogenizing effect.
- Higher grinding energy due to enlarged swinging radius.
- Easy grinding jar replacement.
- High sample throughput due to short grinding times and two grinding sites.
- 20 samples can be processed for DNA/RNA analysis in one single operation.
- Grinding time and oscillation frequency are digitally preset.
- Memory keys for 3 standard working programs.
- Screw-top jars guarantee full material recovery with dry and wet grinding (standard feature of the MM 301).
- Setable parameter lock.
- Reliable wet grinding without loss of material.
- Automatic centering of grinding jars (MM 301) for easier, quicker and safer handling.

Performance Features

Application	size reduction (dry and wet grinding), mixing, homogenizing, and cell disruption
Areas of application	agronomy, biology, biotechnology, chemistry, ceramics, glass, medicine, pharmaceuticals, criminology, environment, mineralogy, metallurgy
Feed material	hard, medium-hard, soft, brittle, elastic, and fibrous
Feed particle size	up to 6 mm for the MM 200, up to 8 mm for the MM 301
Final fineness	approx. 5 μm (depending on material)
Sample volume	MM 200: max. 2 x 10 ml, MM 301: max. 2 x 20 ml

Mixer Mills MM 200, MM 301

The RETSCH mixer mills MM 200 and MM 301 serve the purpose of fine and ultra-fine grinding of not only hard, medium-hard, and brittle samples, but also elastic and fibrous ones. With our mills you can grind:

- Tissues, bones and hair
- Chemicals, drugs, coated and uncoated tablets
- Minerals, ores, and alloys
- Glass and ceramics
- Soils and slurries
- Plant materials, conifers, grains, and oil-containing seeds
- Synthetic materials
- Waste samples
- Wool, textiles, and much more

These mixer mills grind, mix, or homogenize 2 samples from 0.2 ml up to 20 ml in a single operation or process up to 20 samples for cell disruption.

The grinding efficiency is very high resulting in extremely short grinding times.

With the efficient mixer mills MM 200 and MM 301, a fineness up to 5 μm is possible (depending on the material).

In addition, the mixer mill MM 301 features an automatic lock/self-locking clamping device for the grinding jars. The resulting secure and well-defined positioning of the grinding jars ensures maximum reproducibility in sample preparation and simplifies handling during clamping and removing of the grinding jars.

Due to the screwable grinding jars of the MM 301, the sample is even more securely closed, so that wet grinding can be executed simply and without any sample loss.



Grinding jars and balls

The grinding results are greatly influenced by the choice of grinding accessories. Jar volumes, ball charges, as well as their materials should be selected according to the nature and quantity of the sample to be ground. In order to avoid interference with the results of the subsequent analysis, choose an analytically neutral material.

The grinding energy is determined by the mass and material density of the grinding balls. The greater the density and mass of the balls, the higher the grinding energy will be. The jars and balls should always be chosen of the same materials. The opposite tables will assist you in selecting the appropriate grinding accessories.

	MM 200	MM 301
Sample volume max.	2 x 10 ml	2 x 20 ml
Feed grain size max.	6 mm	8 mm
Final fineness up to	< 10 μm	< 5 μm
normal grinding times	\varnothing 2 minutes	\varnothing 2 minutes
Wet grinding	Grinding jars 25 ml, special steel	All grinding jars
Cell disruption with Eppendorf vials (more options on request)	<ul style="list-style-type: none"> ■ Adapter rack for 5 vials up to 2 ml ■ Adapter rack for 10 vials up to 0,4 ml 	<ul style="list-style-type: none"> ■ Adapter rack for 5 vials up to 2 ml ■ Adapter rack for 10 vials up to 0,4 ml ■ Adapter rack for 10 vials up to 2 ml
Clamping device	Basic	Comfort
Automatic centering	No	Yes
Memory keys	Yes	Yes
Re-set lock	Yes	Yes
Digital pre-selection of the milling duration	Yes	Yes
Tandem grinding containers	Yes	Yes



Mixer Mill MM 200



Range of grinding jars



Mixer Mill MM 301

Grinding, mixing and cell disruption with maximum reproducibility

Wet grinding

Screw-top grinding jars offer the ideal prerequisite for wet grinding. An additional Teflon gasket prevents leakage of liquids and materials, even at maximum mixing power.



Cell disruption

For breaking open microorganisms and bacteria, a 12.5 ml stainless steel jar with a special filling and discharge opening for cell suspensions is available. Smaller sample volumes, as commonly used for the isolation of DNA and RNA, are preferably prepared in disposable reaction vials (e.g. Eppendorf). For this purpose, adapter racks are available that hold up to 5 or 10 reaction vials. Through the use of glass beads, cell disruption is effected in an extremely short time, which makes additional cooling unnecessary.

Cold grinding

The mixer mills MM 200 and MM 301 work so efficiently that the duration of the grinding process is very short with minimum temperature rise. Thus, most materials can be ground and mixed without cooling.

Temperature-sensitive and elastic materials can be successfully processed by pre-cooling the grinding materials and jar. Agate and ceramic jars should not be cooled excessively, in order to prevent damage during the size reduction process.

Grinding jars– recommendations for material volume and balls

Mixer Mill MM 200

Grinding jar nominal volume	Sample volume	Max. feed particle size	Recommended ball charge				
			Ø 20 mm	Ø 12 mm	Ø 9/10 mm	Ø 7 mm	Ø 5 mm
1,5 ml	0,2 – 0,5 ml	1 mm	-	-	-	-	1 to 2 pcs.
5,0 ml	0,5 – 2,0 ml	2 mm	-	-	-	1 to 2 pcs.	-
10,0 ml	2,0 – 4,0 ml	4 mm	-	1 to 2 pcs.	1 to 2 pcs.	-	-
25,0 ml	4,0 – 10,0 ml	6 mm	1 pc.	2 pcs.	-	-	-

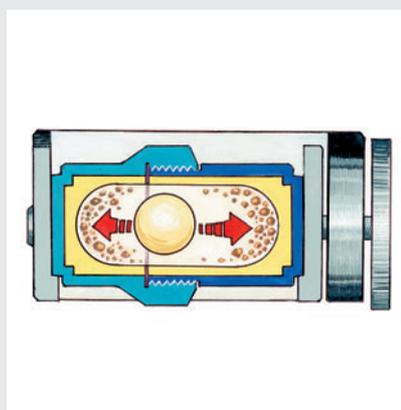
Mixer Mill MM 301

Grinding jar nominal volume	Sample volume	Max. feed particle size	Recommended ball charge		
			Ø 20 mm	Ø 25 mm	Ø 30 mm
25 ml	up to 10,0 ml	6 mm	1 pc.	-	-
35 ml	up to 15,0 ml	6 mm	1 pc.	1 pc.	-
50 ml	up to 20,0 ml	8 mm	-	1 pc.	1 pc.

Technical details

The grinding container performs radial vibrations in a horizontal position. Thus, the material is hit alternately from various sides by the grinding balls. The intensity can be set precisely between 3 and 30 vibrations per second. A speed control keeps this value constant during the grinding process.

The grinding and mixing time can be digitally preset from 10 seconds up to 99 minutes. In stand-by mode, all parameters are maintained for subsequent trials. With 3 memory functions, different standard settings can be programmed. This guarantees maximum reproducibility for the preparation of samples.



Order data

Mixer mill MM 200						Item No.
Type MM 200, 220 – 240 V, 50/60 Hz						20.738.0001
Type MM 200, 120 V, 50/60 Hz						20.738.0005
Grinding jars for MM 200		1,5 ml	5 ml	10 ml	25 ml	
Material	Agate	01.462.0112	01.462.0113	01.462.0008	-	
	Sintered alumina	01.462.0110	01.462.0111	01.462.0007	-	
	Zirconium oxide	-	-	01.462.0194	01.462.0195	
	Stainless steel	02.462.0057	02.462.0059	02.462.0061	02.462.0119	
	Screwable stainless steel	-	-	-	02.462.0213	
	Chrome steel 2	02.462.0056	02.462.0058	02.462.0060	02.462.0052	
	Tungsten carbide	01.462.0114	01.462.0115	01.462.0009	-	
	Polytetrafluoroethylene (PTFE)	-	-	-	02.462.0051	
	Plastic (polystyrene) mixing jars, 28 ml/100 units					22.462.0003
Grinding balls for MM 200		5 mm Ø	7 mm Ø	9/10 mm Ø	12 mm Ø	20 mm Ø
Material	Agate	05.368.0024	05.368.0025	05.368.0026	05.368.0027	-
	Hard porcelain	05.368.0019	05.368.0020	-	-	-
	Sintered alumina I	-	-	05.368.0021	05.368.0022	-
	Zirconium oxide	-	-	-	05.368.0096	05.368.0093
	Stainless steel	05.368.0034	05.368.0035	05.368.0036	05.368.0037	05.368.0062
	Chrome steel 4	05.368.0029	05.368.0030	05.368.0031	05.368.0032	05.368.0033
	Tungsten carbide	05.368.0038	05.368.0039	05.368.0040	05.368.0041	05.368.0047
	PTFE with steel core	-	-	05.368.0045	05.368.0046	05.368.0047
	Polyamide for mixing container	05.368.0042	05.368.0043	05.368.0044	05.368.0003	-
Mixer mill 301						Item No.
Type MM 301, 220 – 240 V, 50/60 Hz						20.741.0001
Type MM 301, 120 V, 50/60 Hz						20.741.0005
Grinding jars with screwable lid for MM 301				25 ml	35 ml	50 ml
Material	Stainless steel			02.462.0213	01.462.0214	01.462.0216
	Zirconium oxide			01.462.0201	01.462.0215	-
Grinding balls for MM 301				20 mm Ø	25 mm Ø	30 mm Ø
Material	Zirconium oxide			05.368.0093	05.368.0106	05.368.0092
	Stainless steel			05.368.0062	05.368.0105	05.368.0061

Accessories for cell disruption	Item No.
Adapter rack MM 301 for 10 standard reaction vials with and without screwable lid	22.001.0013
Holder for 5 reaction vials 2 – 1.5 – 0.7 ml	22.008.0001
Holder for 5 reaction vials 2 – 1.5 – 0.7 ml with screwable lid	22.008.0004
Safe-Lock reaction vials 2 ml, 1000 units	22.749.0001
Safe-Lock reaction vials 1.5 ml, 1000 units	22.749.0002
Safe-Lock reaction vials 0.5 ml, 500 units	22.749.0003
Safe-Lock reaction vials 0.2 ml, 1000 units	22.749.0006

Grinding balls for reaction vials	Item No.
Grinding balls 5 mm, stainless steel, approx. 200 units	22.455.0003
Grinding balls 5 mm, tungsten carbide, approx. 200 units	22.455.0004
Grinding balls 4 mm, tungsten carbide, approx. 200 units	22.455.0005
Grinding balls 3 mm, tungsten carbide, approx. 200 units	22.455.0006

Technical data	
MM 200	W x H x D: 300 x 182 x 465 mm
MM 301	W x H x D: 300 x 225 x 470 mm
Weight: approx. 20 kg, without grinding jars	
Characteristic noise values: L _{pAeq} 60-65 dB(A)	

RETSCH – Your specialist for sample preparation offers you a comprehensive range of equipment. Please request information on our crushers, mills, sample dividers, sieving machines, feeders, as well as cleaning and drying machines.

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