



## MIXER MILL MM 500 VARIO

Variability redefined

## PROCESSING 2 TO 50 SAMPLES IN ONE BATCH

**The new Mixer Mill MM 500 vario is a versatile bench-top unit which provides ultimate performance with maximum flexibility for your sample preparation process.**

It is used for dry, wet and cryogenic grinding of small sample amounts with high throughput. The MM 500 vario can be equipped with screw-top grinding jars from 1.5 ml to 50 ml. Available materials include hardened steel, stainless steel, tungsten carbide, agate, zirconium oxide, PTFE.

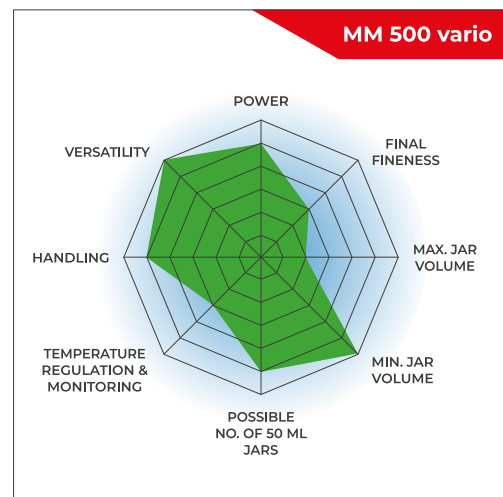
For biological applications such as homogenization of plant materials, tissues or for cell disruption via bead beating, the MM 500 vario can be equipped with different adapters for single-use vials from 0.2 - 5 ml.



[Click to view video](#)

## THE STRONG MIXER MILL FOR HIGH THROUGHPUT APPLICATIONS

- | Max. speed 35 Hz
- | Horizontal oscillation causes strong impact effects for effective sample processing
- | Up to 8 mm feed size and 5 µm final fineness
- | 6 grinding stations for jars of min. 2 ml and max. 50 ml, adapter holds up to 50 x 2 ml single use vials
- | Steel jars can be precooled manually in liquid nitrogen
- | Bench-top model, touch screen, storable SOPs and cycle programs, 7 different jar materials



## PERFORMANCE AND DESIGN

- | Grind sizes down to 5 µm possible
- | Powerful pulverization with up to 35 Hz
- | Twice as fast as mills with only 30 Hz
- | Ergonomic design with touch display

## FLEXIBILITY

- | Suitable for dry, wet or cryogenic grinding
- | Equally suited for rapid (<2 min) and long-term grinding (up to 99 hours)
- | 12 SOPs and 4 program cycles with max. 99 repeats facilitate routine applications
- | Grinding jars of various sizes and materials; adapters for single-use vials



## SOLUTIONS FOR BIOLOGICAL APPLICATIONS AND CELL DISRUPTION

Mixer mills are widely used for homogenizing biological samples such as tissue, liver, muscle, plants, corn or sputum. For cell disruption via bead beating mixer mills are also the perfect solution. The MM 500 vario accommodates adapters for different single-use vials:

0.2 ml / 1.5 ml / 2 ml / 5 ml

Depending on the tube and the type of adapter, 5-10 tubes can be inserted per adapter, resulting in the following maximum vial capacity per batch:

50 x 1.5 or 2 ml (or 60 x 0.2 ml)

20 x 5 ml

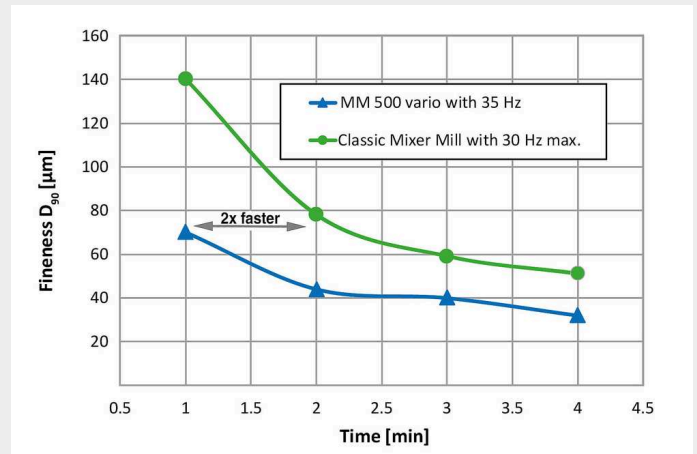
Typical grinding / homogenizing processes of biological materials take less than 2 min. Cell disruption with a good reproducibility and efficiency takes 20 sec to 5 min, depending on the cell type. Cryogenic grinding in single-use vials can also be a suitable way to pulverize tough or temperature-sensitive samples.



Solutions for biological applications and cell disruption

## MAXIMIZE YOUR THROUGHPUT

- | Maximum frequency of 35 Hz reduces grinding time to 50% compared to mixer mills with only 30 Hz
- | Six grinding stations instead of two, as in classic mixer mills, ensure high throughput
- | In combination, the throughput of the MM 500 vario is 6 times higher compared to a classic mixer mill



*Grinding of basalt in the MM 500 vario results in better fineness compared to classic Mixer Mills thanks to the increased frequency of 35 Hz instead of 30 Hz (50 ml jar + 12 x 12 mm grinding balls).*

FOR SAFE AND EFFECTIVE GRINDING PROCESSES  
**ACCESSORIES FOR THE MM 500 VARIO**



**GRINDING JARS IN 6 DIFFERENT MATERIALS**

All grinding jars of the smaller MM 400 model are compatible with the MM 500 vario. The nominal volume ranges from 1.5 ml to 50 ml and available materials include hardened steel, stainless steel, agate, tungsten carbide, zirconium oxide and PTFE, ensuring contamination-free sample preparation.

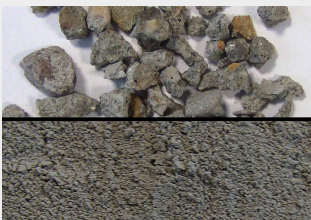


**ADAPTERS FOR SINGLE-USE VIALS**

The adapters for 0.5 / 1.5 / 2 / 5 ml single-use vials of the smaller MM 400 model can be used in the MM 500 vario.

**TYPICAL SAMPLE MATERIALS**

RETSCH mixer mills are true allrounders. They homogenize, for example, waste, soil, chemical products, coated tablets, drugs, ores, grain, tissue, glass, hair, ceramics, bones, plastics, alloys, minerals, oil seeds, plants, sewage sludge, pills, textiles, wool etc.



concrete



wood



plastic granulates



hair

MIXER MILL MM 500 VARIO

## FUNCTIONAL PRINCIPLE

The grinding jars of the mixer mill MM 500 vario perform radial oscillations in a horizontal position. The inertia of the grinding balls causes them to impact with high energy on the sample material at the rounded ends of the grinding jars and pulverize it. Also, the movement of the grinding jars combined with the movement of the balls result in the intensive mixing of the sample. The degree of mixing can be increased even further by using several smaller balls.



[Click to view video](#)

## TECHNICAL DATA

<b>Applications</b>	mechanochemistry, homogenization, size reduction, cryogenic grinding, mechanical alloying, mixing,
<b>Field of application</b>	agriculture, biology, chemistry / plastics, construction materials, engineering / electronics, environment / recycling, food, geology / metallurgy, glass / ceramics, medicine / pharmaceuticals
<b>Feed material</b>	hard, medium-hard, soft, brittle, elastic, fibrous
<b>Size reduction principle</b>	impact, friction
<b>Material feed size*</b>	<= 8 mm
<b>Final fineness*</b>	~ 5 µm
<b>Batch size / feed quantity*</b>	max. 6 x 20 ml
<b>No. of grinding stations</b>	6
<b>Vibrational frequency</b>	3 - 35 Hz (180 - 2100 min <sup>-1</sup> )
<b>Typical mean grinding time</b>	30 s - 2 min
<b>Dry grinding</b>	yes
<b>Wet grinding</b>	yes
<b>Cryogenic grinding</b>	yes
<b>Cell disruption with reaction vials</b>	yes
<b>Self-centering clamping device</b>	yes
<b>Type of grinding jars</b>	screw top design
<b>Material of grinding tools</b>	hardened steel, stainless steel, tungsten carbide, zirconium oxide, agate, PTFE
<b>Grinding jar sizes</b>	1.5 ml / 5 ml / 10 ml / 25 ml / 35 ml / 50 ml
<b>Setting of grinding time</b>	digital, 10 s - 8 h
<b>Total grinding time</b>	99 h
<b>Storable SOPs</b>	12
<b>Number of storable cycle programs</b>	4 (with 99 repeats)
<b>Electrical supply data</b>	100-120 V, 50/60 Hz; 200-230 V, 50/60Hz
<b>Power connection</b>	1-phase
<b>Protection code</b>	IP 30
<b>Power consumption</b>	750 W
<b>W x H x D closed</b>	690 x 375 x 585 mm
<b>Net weight</b>	~ 60 kg
<b>Standards</b>	CE

\*depending on feed material and instrument configuration/settings


[www.retsch.com/mm500-vario](http://www.retsch.com/mm500-vario)

## ORDER DATA

### MIXER MILL MM 500 VARIO

**Mixer Mill MM 500 vario with quick release clamp  
(please order grinding jars and balls separately)**

20.766.0001  MM 500 vario 200–230 V, 50/60 Hz

20.766.0002  MM 500 vario 100–120 V, 50/60 Hz

### GRINDING JARS MM 500 VARIO, SCREW TOP DESIGN

#### HARDENED STEEL

01.462.0237  25 ml

#### STAINLESS STEEL

01.462.0230  1.5 ml

01.462.0231  5 ml

01.462.0290 5 ml (for use with adapter 02.706.0351)

01.462.0236  10 ml

01.462.0213  25 ml

01.462.0214  35 ml

01.462.0216  50 ml

#### TUNGSTEN CARBIDE

01.462.0235



10 ml

01.462.0217



25 ml

#### AGATE

01.462.0232



5 ml

01.462.0233



10 ml

#### ZIRCONIUM OXIDE

01.462.0234



10 ml

01.462.0201



25 ml

01.462.0215



35 ml

#### PTFE

01.462.0238



25 ml

01.462.0244



35 ml

22.041.0004



Mixing beakers of polystyrene, 56 ml, 100 pcs.

## ACCESSORIES FOR GRINDING JARS MM 500 VARIO

03.018.0155

Safety element for empty grinding station

22.486.0005



Opening aid for grinding jars, 2 pcs.


02.706.0351






Adapter for use of 2/4 grinding jars 5 ml (01.462.0550)

22.085.0007		Gasket for grinding jar 1.5 ml, 10 pcs.
22.085.0008		Gasket for grinding jar 5 ml, 10 pcs. (for grinding jar 01.462.0231)
22.111.0001		Gasket for grinding jar 5 ml, 10 pcs. (for grinding jar 01.462.0550)
22.085.0009		Gasket for grinding jar 10 ml, 10 pcs.
22.085.0006		Gasket for grinding jar 25 ml hardened steel and stainless steel, 10 pcs.
22.085.0003		Gasket for grinding jar 25 ml zirconium oxide and tungsten carbide, 10 pcs.
22.085.0005		Gasket for grinding jar 35 ml stainless steel, 10 pcs.
22.085.0004		Gasket for grinding jar 35 ml zirconium oxide, 10 pcs.
22.085.0002		Gasket for grinding jar 50 ml stainless steel, 10 pcs.

## ACCESSORIES FOR COLD GRINDING MM 500 VARIO

22.354.0001		Cryo kit for cooling the grinding jars with liquid nitrogen (incl. 2 insulated containers (1 and 4 liter), 2 pairs of grinding jar tongs, 1 pair of safety glasses)
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## ACCESSORIES FOR CELL AND TISSUE DISRUPTION

22.008.0010		Adapter for 5 reaction vials 5.0 ml, made of PTFE
22.008.0014		Adapter for 10 reaction vials 1.5 and 2.0 ml, made of PTFE or stainless steel
22.008.0005		Adapter for 5 reaction vials 1.5 and 2.0 ml, made of PTFE or stainless steel
22.008.0006		Adapter for 10 reaction vials 0.2 ml, made of PTFE
22.749.0006		Safe-lock reaction vials 5.0 ml, 200 pcs.

22.749.0001



Safe-lock reaction vials 2.0 ml, 1000 pcs.

22.749.0002



Safe-lock reaction vials 1.5 ml, 1000 pcs.

22.749.0004



Safe-lock reaction vials 0.2 ml, 1000 pcs.

22.749.0008



Reaction vials made of stainless steel 316L, 2.0 ml, 10 pcs.

## ACCESSORIES MM 500 VARIO

99.200.0038 IQ/OQ Documentation for MM 500 vario

## GRINDING BALLS

### HARDENED STEEL

05.368.0029



5 mm Ø

05.368.0030



7 mm Ø

05.368.0059



10 mm Ø

05.368.0032



12 mm Ø

05.368.0108



15 mm Ø

### STAINLESS STEEL

22.455.0010





2 mm Ø, 500 g (approx. 110 ml)


22.455.0011



3 mm Ø, 500 g (approx. 120 ml)

22.455.0002  3 mm Ø, 200 pieces (approx. 6 ml)

22.455.0001  4 mm Ø, 200 pieces (approx. 14 ml)

22.455.0003  5 mm Ø, 200 pieces (approx. 25 ml)

05.368.0034  5 mm Ø

05.368.0035  7 mm Ø

05.368.0063  10 mm Ø

05.368.0037  12 mm Ø


05.368.0109  15 mm Ø


05.368.0062  20 mm Ø

05.368.0105  25 mm Ø

#### TUNGSTEN CARBIDE




22.455.0006  3 mm Ø, 200 pieces (approx. 6 ml)

22.455.0005  4 mm Ø, 200 pieces (approx. 14 ml)

22.455.0004  5 mm Ø, 200 pieces (approx. 25 ml)

05.368.0038  5 mm Ø







05.368.0039  7 mm Ø

05.368.0071		10 mm Ø
05.368.0041		12 mm Ø
05.368.0110		15 mm Ø

**AGATE**

05.368.0024		5 mm Ø
05.368.0025		7 mm Ø
05.368.0067		10 mm Ø
05.368.0027		12 mm Ø

**ZIRCONIUM OXIDE**

05.368.0089		2 mm Ø, 0.5 kg (approx. 135 ml)
05.368.0090		3 mm Ø, 0.5 kg (approx. 140 ml)
22.455.0007		3 mm Ø, 200 pieces (approx. 6 ml)
22.455.0009		5 mm Ø, 200 pieces (approx. 25 ml)
05.368.0146		7 mm Ø
05.368.0094		10 mm Ø
05.368.0096		12 mm Ø
05.368.0113		15 mm Ø

05.368.0093



20 mm Ø

05.368.0106



25 mm Ø

#### PTFE WITH STEEL CORE

05.368.0045



10 mm Ø

05.368.0046



12 mm Ø

05.368.0114



15 mm Ø

05.368.0047



20 mm Ø

#### POLYAMIDE FOR MIXING BEAKERS

05.368.0042



5 mm Ø

05.368.0043



7 mm Ø

05.368.0044



9 mm Ø

05.368.0003



12 mm Ø

#### GLASS BEADS

22.222.0001



0.10 – 0.25 mm Ø, 500 g (approx. 320 ml)

22.222.0002



0.25 – 0.50 mm Ø, 500 g (approx. 320 ml)

22.222.0003



0.50 – 0.75 mm Ø, 500 g (approx. 320 ml)

22.222.0004



0.75 – 1.00 mm Ø, 500 g (approx. 320 ml)

22.222.0005



1.00 – 1.50 mm Ø, 500 g (approx. 320 ml)