

PLANETARY BALL MILL PM 100



Planetary Ball Mills are used wherever the **highest degree of fineness** is required. In addition to well-proven **mixing and size reduction** processes, these mills also meet all technical requirements for **colloidal grinding** and provide the energy input necessary for **mechanical alloying**. The extremely high centrifugal forces of a planetary ball mill result in very high pulverization energy and therefore **short grinding times**.

The PM 100 is a convenient benchtop model with **1 grinding station**.

You may also be interested in the High Energy Ball Mill Emax, an entirely new type of mill for high energy input. The unique combination of high friction and impact results in extremely fine particles within the shortest amount of time.

APPLICATION EXAMPLES

alloys, bentonite, bones, carbon fibres, catalysts, cellulose, cement clinker, ceramics, charcoal, chemical products, clay minerals, coal, coke, compost, concrete, electronic scrap, fibres, glass, gypsum, hair, hydroxyapatite, iron ore, kaolin, limestone, metal oxides, minerals, ores, paints and lacquers, paper, pigments, plant materials, polymers, quartz, seeds, semi-precious stones, sewage sludge, slag, soils, tissue, tobacco, waste samples, wood, ...

PRODUCT ADVANTAGES

- | powerful and quick grinding down to nano range
- | grinding with up to 33.3 x acceleration of gravity
- | reproducible results due to energy and speed control
- | suitable for long-term trials
- | 2 different grinding modes (dry and wet)
- | optional pressure and temperature measuring system PM GrindControl
- | wide range of materials for contamination free grinding
- | Safety Slider for safe operation
- | perfect stability on lab bench thanks to FFCS technology
- | innovative counter weight and imbalance sensor for unsupervised operation
- | comfortable parameter setting via display and ergonomic 1-button operation
- | automatic grinding chamber ventilation
- | 10 SOPs can be stored
- | programmable starting time
- | power failure backup ensures storage of remaining grinding time
- | jars with O-type sealing for safe operation, pressure tight

FEATURES

Applications	pulverizing, mixing, homogenizing, colloidal milling, mechanical alloying
Field of application	Chemistry, agriculture, biology, construction materials, engineering / electronics, environment / recycling, geology / metallurgy, glass / ceramics, medicine / pharmaceuticals
Feed material	soft, hard, brittle, fibrous - dry or wet
Size reduction principle	impact, friction
Material feed size*	< 10 mm
Final fineness*	< 1 µm, for colloidal grinding < 0.1 µm
Batch size / feed quantity*	max. 1 x 220 ml, max. 2 x 20 ml with stacked grinding jars
No. of grinding stations	1
Speed ratio	1 : -2
Sun wheel speed	100 - 650 min ⁻¹
Effective sun wheel diameter	141 mm
G-force	33.3 g
Type of grinding jars	"comfort", optional aeration covers, safety closure devices
Material of grinding tools	hardened steel, stainless steel, tungsten carbide, agate, sintered aluminium oxide, silicon nitride, zirconium oxide
Grinding jar sizes	12 ml / 25 ml / 50 ml / 80 ml / 125 ml / 250 ml / 500 ml
Setting of grinding time	digital, 00:00:01 to 99:59:59
Interval operation	yes, with direction reversal
Interval time	00:00:01 to 99:59:59
Pause time	00:00:01 to 99:59:59
Storable SOPs	10
Interface	RS 232 / RS 485
Drive	3-phase asynchronous motor with frequency converter
Drive power	750 W
Electrical supply data	different voltages
Power connection	1-phase
Protection code	IP 30
Power consumption	~ 1250W (VA)
W x H x D closed	640 x 480 (780) x 420 mm
Net weight	~ 86 kg
Standards	CE

Patent / Utility patent

Counter weight (DE 20307741), FFCS (DE 20310654),
SafetySlider (DE 202008008473)

*depending on feed material and instrument configuration/settings

FUNCTIONAL PRINCIPLE

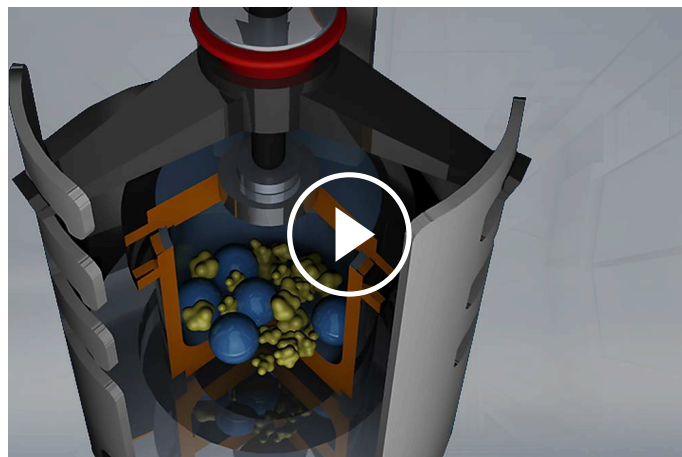
The grinding jar is arranged eccentrically on the sun wheel of the planetary ball mill. The direction of movement of the sun wheel is opposite to that of the grinding jars in the ratio 1:-2.

The grinding balls in the grinding jars are subjected to superimposed rotational movements, the so-called Coriolis forces. The difference in speeds between the balls and grinding jars produces an interaction between frictional and impact forces, which releases high dynamic energies. The interplay between these forces produces the high and very effective degree of size reduction of the planetary ball mill.

Planetary mills with a single grinding station require a counterweight for balancing purposes. In the Ball Mill PM 100 this counterweight can be adjusted on an inclined guide rail. In this way the different heights of the centers of gravity of differently-sized grinding jars can be compensated in order to avoid disturbing oscillations of the machine.

Any remaining vibrations are compensated by feet with some free movement (Free-Force Compensation Sockets). This innovative technology is based on the d'Alembert principle and allows very small circular movements of the machine housing that result in an automatic mass compensation. The laboratory bench is only subjected to minimal frictional forces generated in the feet.

In this way the PM 100 ensures a quiet and safe operation with maximum compensation of vibrations even with the largest pulverization forces inside the grinding jars and therefore can be left on the bench unsupervised.



[Click to view video](#)

www.retsch.com/pm100

ORDER DATA

PLANETARY BALL MILL PM 100

(please order grinding jars and balls separately)

20.540.0001



PM 100 230 V, 50/60 Hz

with 1 grinding station, speed ratio 1 : -2

other electrical versions available for the same price

ACCESSORIES PM 100 / PM 200 / PM 400

03.025.0002



Adapter for stacking grinding jars "comfort", 50 ml, hardened steel, stainless steel, for PM 100 and PM 400

03.025.0003



Adapter for stacking grinding jars "comfort", 50 ml, tungsten carbide, agate, sintered aluminum oxide, zirconium oxide, for PM 100 and PM 400

22.221.0002



Add-on weight for PM 100

02.728.0048



Opening aid for clamping unit

99.200.0006



IQ/OQ Documentation for PM 100 / PM 100 CM

PRESSURE AND TEMPERATURE MEASURING SYSTEM PM GRINDCONTROL

incl. measuring transceiver, stationary transceiver, software, case and grinding jar for PM 100 and PM 400

22.782.0023

GrindControl with grinding jar "comfort" 250 ml, stainless steel

22.782.0024

GrindControl with grinding jar "comfort" 500 ml, stainless steel



GRINDING JARS "COMFORT" PM 100 / PM 200 / PM 400

HARDENED STEEL

01.462.0145






50 ml

01.462.0144		125 ml
01.462.0224		250 ml
01.462.0229		500 ml

STAINLESS STEEL

01.462.0239		12 ml
01.462.0240		25 ml
01.462.0149		50 ml
01.462.0321		80 ml
01.462.0148		125 ml
01.462.0223		250 ml
01.462.0228		500 ml

TUNGSTEN CARBIDE

01.462.0156		50 ml
01.462.0392		80 ml
01.462.0155		125 ml
01.462.0222		250 ml

AGATE

01.462.0139



50 ml

01.462.0197



80 ml

01.462.0136



125 ml

01.462.0220



250 ml

01.462.0225



500 ml

SINTERED ALUMINUM OXIDE

01.462.0153



50 ml

01.462.0152



125 ml

01.462.0221



250 ml

01.462.0226



500 ml

SILICON NITRIDE (OTHER VOLUMES UPON REQUEST)

01.462.0138

125 ml

01.462.0135

250 ml

01.462.0132

500 ml

ZIRCONIUM OXIDE

01.462.0188



50 ml

01.462.0187



125 ml

01.462.0219



250 ml

01.462.0227



500 ml

ACCESSORIES FOR GRINDING JARS "COMFORT"

Accessories for grinding jars "comfort" for wet grinding, grinding with inert atmosphere and Mechanical Alloying (MA)




VENTILATION LIDS

(order valve kit separately)

22.107.0623	for grinding jar "comfort" 50 ml, stainless steel
22.107.0624	for grinding jar "comfort" 125 ml, stainless steel
22.107.0625	for grinding jar "comfort" 250 ml, stainless steel
22.107.0627	for grinding jar "comfort" 250 ml, tungsten carbide
22.107.0632	for grinding jar "comfort" 250 ml, sintered aluminum oxide
22.107.0630	for grinding jar "comfort" 250 ml, zirconium oxide
22.107.0629	for grinding jar "comfort" 500 ml, hardened steel
22.107.0626	for grinding jar "comfort" 500 ml, stainless steel
22.107.0628	for grinding jar "comfort" 500 ml, tungsten carbide
22.107.0634	for grinding jar "comfort" 500 ml, agate
22.107.0633	for grinding jar "comfort" 500 ml, sintered aluminum oxide
22.107.0631	for grinding jar "comfort" 500 ml, zirconium oxide
22.864.0001	Valve kit for ventilation lid (2 valves)










SAFETY CLOSURE DEVICES

22.867.0002	 for grinding jars "comfort" 50 ml
22.867.0007	 for grinding jars "comfort" 80 ml, agate or tungsten carbide / and for grinding jars "comfort" 125 ml
22.867.0003	 for grinding jars "comfort" 80 ml, stainless steel

22.867.0004		for grinding jars "comfort" 250 ml
22.867.0005		for grinding jars "comfort" 500 ml, hardened steel, stainless steel, agate, sintered aluminum oxide, silicon nitride and zirconium oxide




GASKETS FOR GRINDING JARS "COMFORT"






O-RINGS

05.114.0057		O-ring for grinding jars "comfort" 50 ml, 1 piece
05.114.0121		O-ring for grinding jars "comfort" 80 ml, tungsten carbide, 1 piece
05.114.0056		O-ring for grinding jars "comfort" 80 ml, agate and stainless steel / for grinding jars "comfort" 125 ml, 1 piece
05.114.0055		O-ring for grinding jars "comfort" 250 ml, hardened steel, stainless steel, tungsten carbide and silicon nitride, 1 piece
22.085.0010		O-ring for grinding jars "comfort" 250 ml, agate, sintered aluminum oxide and zirconium oxide, 1 set
05.114.0054		O-ring for grinding jars "comfort", 500 ml, hardened steel and stainless steel, 1 piece
22.085.0011		O-ring for grinding jars "comfort", 500 ml agate, sintered aluminum oxide, silicon nitride zirconium oxide and tungsten carbide, 1 set











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
05.368.0033		20 mm Ø
05.368.0057		30 mm Ø
05.368.0056		40 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

05.368.0061



30 mm Ø

05.368.0060



40 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

05.368.0070



20 mm Ø

05.368.0069



30 mm Ø

05.368.0068



40 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

05.368.0111



15 mm Ø

05.368.0028



20 mm Ø

05.368.0065



30 mm Ø

05.368.0064



40 mm Ø

SINTERED ALUMINUM OXIDE

05.368.0019



5 mm Ø

05.368.0021



10 mm Ø

05.368.0112



15 mm Ø

05.368.0054



20 mm Ø

05.368.0053



30 mm Ø

05.368.0052



40 mm Ø

SILICON NITRIDE

05.368.0088



10 mm Ø

05.368.0085



20 mm Ø

05.368.0086



30 mm Ø

05.368.0087



40 mm Ø

ZIRCONIUM OXIDE

32.368.0005



0.1 mm Ø, 0.5 kg (approx. 135 ml)

32.368.0003



0.5 mm Ø, 0.5 kg (approx. 135 ml)

32.368.0004



1 mm Ø, 0.5 kg (approx. 135 ml)

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)

05.368.0094



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

05.368.0092



30 mm Ø

05.368.0091



40 mm Ø