LAARMANN®

Innovators in Solids

PLANETARY BALL MILL

LM PBM

For rapid fine crushing of soft, hard, brittle and fibrous material to end fineness <1µm

- Quick and easy to clean
- Rapid fine grinding
- Easy exchange of grinding jars and balls
- Grinding jars and balls made from a wide range of materials available
- Grinding jar volume from 50ml up to 500ml
- Can be expanded from 1 to 4 grinding jar positions
- CE-certified
- End fineness <1µm
- Programmable control

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LAARMANN® Planetary Ball Mills for fine grinding of soft, hard to brittle or fibrous materials

The LAARMANN® Planetary Ball Mills are used for fine grinding of soft, hard to brittle or fibrous materials.

Dry and wet grindings are possible. They support the daily sample preparation for laboratory and development usage.

Working principle

LAARMANN® Planetary Ball Mills consist of several cylindrical grinding jars (positioned on the sun wheel as shown on the figure) which are filled with loose grinding balls. Two superimposed rotational movements move the grinding jars.

Like in a planetary system the grinding jar rotates on an orbit around the centre. This rotational movement is the self-rotation of the grinding container superimposed. The resulting centrifugal and acting acceleration forces lead to strong grinding effects.

Furthermore there are forces working according to the Coriolis acceleration. The result is an intensive grinding effect between the grinding balls and the sample.

There are different rotational ratios. With a rotation ratio of 1:-2 the grinding jar rotates twice during a sun wheel turn. The minus of this case indicate the opposite rotation direction.

Depending on the speed ratio different movement patters of the grinding balls / media can be achieved. It can be achieved that the grinding media are crossing the grinding jar and loosen from the wall.
At hitting the wall of the grinding jar the sample will be stressed. At a different motion pattern the grinding balls roll over the sample and stress the ground material.

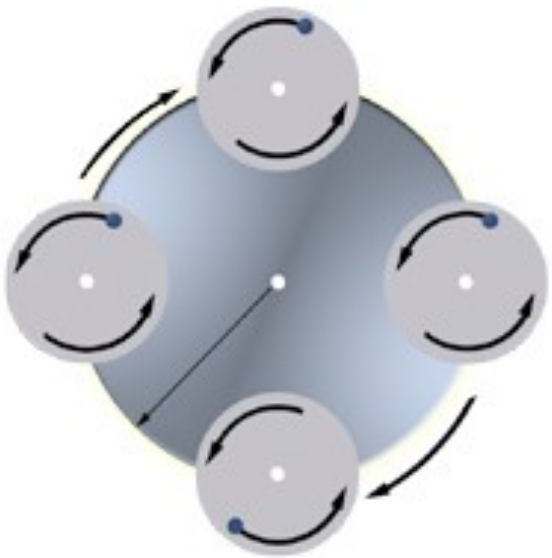
Operation

LAARMANN® Planetary Ball Mills enable the convenient programming of the following grinding parameters:

- Grinding duration in hours and minutes
- Speed
- Speed ratio (speed sun wheel : grinding jar)

PBM Planetary ball mill closed

Counter weight with 1 jar. can be expanded for 1-4 positions



Movement planetary mill

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Features and benefits

- High efficient fine grinding up to end fineness <1µm
- Different speed ratios available
- Grinding jars from 50ml to 500 ml in different materials
- Suitable for long-term trials and continuous use
- Automatic direction reversal to avoid agglomerations
- Reproducible results due to programmable grinding parameters
- Can be expanded from 4 to 1 grinding jar positions
- CE - certified

Working principle

The selection of the right grinding jar and the correct filling level has a big impact on the grinding result. Depending on the application you have to select the correct material and amount/volume for the grinding jar and the grinding balls.

A jar filling should consist of about 1/3 sample and 1/3 ball charge. The remaining third is the free jar volume that is necessary for the movement of the balls. The following table provides recommendations.

We recommend to select always grinding jars and balls build from the same material

Nominal volume	Sample amount	Recommended ball charge						
		Max feed size	5mm	10mm	15mm	20mm	30mm	40mm
125 ml	15-20 ml	< 4 mm	500 pcs.	30 pcs.	18 pcs.	7 pcs.		
250 ml	25-120 ml	< 6 mm	1200 pcs.	50 pcs.	45 pcs.	15 pcs.	6pcs.	
500 ml	75-220 ml	< 10 mm	2000 pcs.	100 pcs.	70 pcs.	25 pcs.	8pcs.	4pcs

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Grinding jars available with different liner:

- Stainless steel
- Hardened steel
- Tungsten carbide
- Agate
- Sintered corundum
- Zirconium oxide
- Pu-coated
- PTFE-coated

500ml zirconium oxide

Features of grinding jars

The grinding jars are built from one block of steel or built with a stainless steel protective jacket with liner from the above materials.

Unique advantages of LAARMANN® grinding jars:

- Safe according to stainless steel protective jacket
- Easy opening according to gap between lid and jar
- Self-centring base of grinding jar
- Gas-tight and dust-proof sealed by o-ring
- Labelling field (e.g. for sample information)

100ml agate

Grinding balls available in materials such as tungsten carbide, agate, zirconium oxide and stainless steel

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Applications

- Floors
- Wood fibres
- Plant materials
- Seeds
- Tobacco
- Betonite
- Concrete
- Gypsum
- Sand
- Stone
- Cement clinker
- Hair
- Bones
- Tissue
- Carbon fibres
- Paints and lacquers
- Catalysts
- Plastics
- Pigments
- Polymers
- Cellulose
- Glass
- Hydroxylapatite
- Kaolin
- Ceramic oxides
- Quarz
- Clay minerals
- Ores
- Semi-precious stones
- Cole
- Coke
- Alloys
- Metal oxides
- Quarz
- Slags
- Electronic scrap
- Sludges
- Organic and unorganic waste

TECHNICAL DATA	
Electrical requirements	200-240 Volt 50/60 Hz, others available on request
Motor power	750 Watt

TRANSPORT DATA	
Dimensions wxdxh	759 x 479 x 548 mm
Weight	95 kgs (only machine)

PERFORMANCE	
Working principle	impact, friction
Feed size maximum	10 mm
Number of grinding jars	4/3/2/1
Maximum volume of each grinding jar	500 ml
Minimum volume of each grinding jar	50 ml
Maximum end fineness	<1µm; <0,1µm for colloidal grinding
Adjustment of grinding duration	Digital adjustable
Start / Stop function	1
Setting of grinding time	Digital, 00:00 to 99:59
Interval operation	Yes, with direction reversal
Pause time	00:00 to 99:59
Speed ratio	1:-2
Sun wheel speed	50-650 min-1
Effective sun wheel diameter	360 mm

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