CRYOMILL

Efficient cryogenic grinding at -196°C

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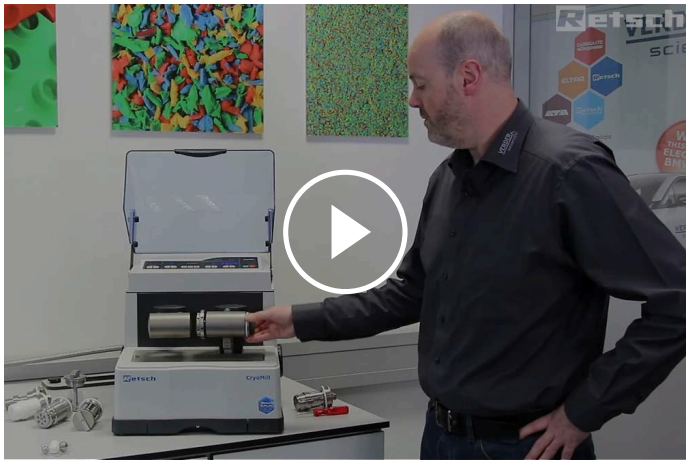
Cryogenic grinding is a process where thermally sensitive and elastic substances are successfully processed by cooling with liquid nitrogen. The CryoMill is a laboratory ball mill specifically designed for this application. It features an integrated cooling system which continually cools the grinding jar with liquid nitrogen before and during the grinding process. Thus, the sample is embrittled and volatile components are preserved.

The liquid nitrogen is continually supplied from an autofill system in the exact amount required to keep the temperature at –196 °C. The user never comes into direct contact with LN_2 which ensures a high degree of operational safety. The CryoMill's versatility (cryogenic, but also wet and dry grinding at room temperature) makes it the ideal grinder for sample quantities up to 20 ml. Powerful impact ball milling results in highest grinding efficiency.



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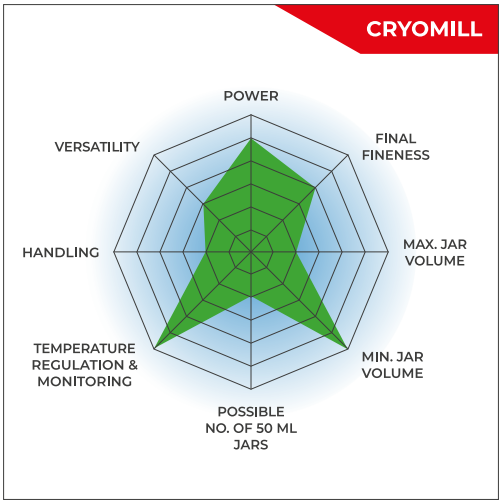
UNMATCHED PERFORMANCE FOR CRYOGENIC BALL MILLING

- Max. speed 30 Hz
- Horizontal oscillation causes strong impact effects for effective sample processing
- Up to 8 mm feed size and 5 µm final fineness
- 1 grinding station for jars of min. 5 ml and max. 50 ml, adapter for 6 x 2 ml tubes
- Jars are continuously cooled with liquid nitrogen during processing, safe handling thanks to autofill tank
- Small bench top model
- Storable SOPs and cycle programs, compact bench top model, 4 different jar materials for dry and wet grinding



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VERSATILE & SAFE

- powerful cryogenic grinding by impact and friction with up to 30 Hz
- 3 different grinding modes (cryogenic, dry/ wet at ambient temperature)
- closed LN_2-system (Autofill) for enhanced user safety
- screw-top jars ensure convenient, leak-proof operation
- wide range of accessories including various jar and ball sizes, adapter racks and LN_2 feeding system
- optional zirconium oxide jars specifically designed for cryogenic grinding
- 9 programmable cooling and grinding cycles (10 s to 99 min)

USER SAFETY & PERFECT RESULTS GUARANTEED

The CryoMill is a cryogenic grinder designed with user safety in mind. The liquid nitrogen flows through the closed system and the user never comes into direct contact with LN_2 which ensures a high degree of operational safety. The automatic cooling system guarantees that the grinding process is not started before the sample is thoroughly cooled. This results in reduced consumption and guarantees reproducible cryogenic grinding results.

The CryoMill is very easy to operate. Parameters such as oscillation frequency, pre-cooling or grinding time can be digitally set via a clearly structured keypad. LEDs in the display indicate the current state of operation, e.g. cooling or grinding. Usually, grinding only takes a few minutes so that the sample does not get warm during the process. If, however, longer grinding times are required, it is also possible to pre-select periods of intermediate cooling and the number of cryogenic cycles.

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All instrument parameters are retained during standby operation for subsequent processes. The laboratory mill can also be operated without cooling which makes it suitable for a vast range of applications.

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FOR SAFE AND EFFECTIVE GRINDING PROCESSES

ACCESSORIES FOR THE CRYOMILL

GRINDING JARS & ADAPTERS

The CryoMill is equipped with one grinding station for screw-top grinding jars with volumes of 10 ml, 25 ml, 35 ml or 50 ml. It is also possible to use adapters for 4 grinding jars of 5 ml each as well as for 6 reaction vials of 2 ml each. A 25 ml grinding jar of zirconium oxide and matching grinding balls as well as a PTFE jar are available for applications where steel would cause sample contamination.

LIQUID NITROGEN FEED

For safe and comfortable operation, RETSCH provides an autofill system for liquid nitrogen which is available with a 50 liter container and provides cooling in cryogenic grinding applications for approximately 5 hours. It is also possible to connect existing cryo tanks to the mill, using a connection tube with safety valve.

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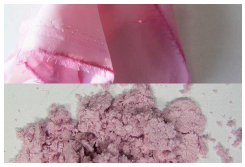
TYPICAL SAMPLE MATERIALS

Due to the automatic embrittlement of the samples during cryogenic grinding the CryoMill is suitable for pulverizing, for example, waste, soil, chemical products, tissue, hair, wood, sewage sludge, bones, plastics, oil seed, paper, plants, pills, textiles, animal feed, wool etc.

rubber duck

hard plastic



textiles

gummy bears

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Parsley

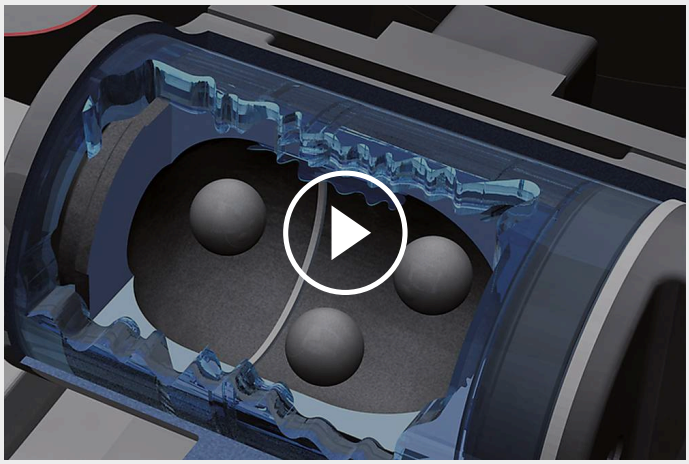
To find the best solution for your sample preparation task, visit our application database.

CRYOMILL

FUNCTIONAL PRINCIPLE

The grinding jar of the CryoMill performs 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 jar and pulverize it.

The grinding jar is continually cooled with liquid nitrogen from the integrated cooling system before and during the cryogenic grinding process.



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CRYOMILL

TECHNICAL DATA

Applications	size reduction, mixing, homogenization, cell disruption
Field of application	agriculture, biology, chemistry / plastics, construction materials, engineering / electronics, environment / recycling, food, geology / metallurgy, glass / ceramics, medicine / pharmaceuticals
Feed material	hard, medium-hard, soft, brittle, elastic, fibrous
Size reduction principle	impact, friction
Material feed size*	<= 8 mm
Final fineness*	~ 5 µm
Batch size / feed quantity*	max. 20 ml
No. of grinding stations	1
Vibrational frequency	digital, 5 - 30 Hz (300 - 1800 min-1)
Typical mean grinding time	10 min / 4 min (cooling / grinding)
Dry grinding	yes
Wet grinding	yes
Cryogenic grinding	yes
Cell disruption with reaction vials	yes
Self-centering clamping device	yes
Type of grinding jars	screw top design
Material of grinding tools	hardened steel, stainless steel, zirconium oxide, PTFE
Grinding jar sizes	5 ml / 10ml / 25 ml / 35 ml / 50 ml
Autofill	50 l
Setting of grinding time	digital, 30 s - 99 min
Storable SOPs	9
Electrical supply data	100-240 V, 50/60 Hz
Power connection	1-phase
Protection code	IP 30
Power consumption	260 W
W x H x D closed	395 x 373 x 577 mm (D: 710 mm with exhaust tube)
Net weight	~ 45 kg
Standards	CE

*depending on feed material and instrument configuration/settings

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ORDER DATA

CRYOMILL

(please order Autofill with LN2 container and safety valve, grinding jars and balls separately)

20.749.0001		CryoMill, 100–240 V, 50/60 Hz

GRINDING JARS CRYOMILL

HARDENED STEEL

01.462.0300		5 ml, to be used with adapter 02.706.0304
01.462.0330		25 ml
01.462.0329		35 ml
01.462.0328		50 ml

STAINLESS STEEL

01.462.0290		5 ml, to be used with adapter 02.706.0304
01.462.0331		10 ml
01.462.0334		25 ml
01.462.0333		35 ml
01.462.0332		50 ml

ZIRCONIUM OXIDE

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01.462.0336		25 ml

PTFE		
01.462.0335		25 ml

ACCESSORIES CRYOMILL

02.480.0003		Autofill 150 l (recommended), incl. connection tube and safety valve
02.480.0002		Autofill 50 l, incl. connection tube and safety valve
05.871.0001		Connection tube, incl. safety valve (for LN2 supply provided by customer)
02.706.0304		Adapter for use of 2/4 grinding jars, 5 ml
02.706.0303		Adapter for use of 2/4/6 reaction vials, 2 ml
02.706.0360		Adapter for use of 2/4/6 reaction vials, 2 ml stainless steel tubes
22.749.0001		Safe-lock reaction vials 2 ml, 1000 pcs.
22.749.0008		Reaction vials made of stainless steel 316L, 2.0 ml, 10 pcs.
99.200.0016		IQ/OQ Documentation for CryoMill
03.111.0262		Gasket for grinding jar 5 ml, 1 piece (please order amount multiple of 10 pcs.)
03.111.0313		Gasket for grinding jar 10 ml, 1 piece
03.111.0291		Gasket for grinding jar 25 ml, hardened steel or stainless steel, 1 piece
03.111.0296		Gasket for grinding jar 25 ml, zirconium oxide, 1 piece

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03.111.0290		Gasket for grinding jar 35 ml, 1 piece
03.111.0289		Gasket for grinding jar 50 ml, 1 piece

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

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

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05.368.0105		25 mm Ø

ZIRCONIUM OXIDE		
05.368.0146		7 mm Ø
05.368.0094		10 mm Ø
05.368.0096		12 mm Ø
05.368.0113		15 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

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