



# CRYOMILL

Efficient cryogenic grinding at -196°C

**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.**

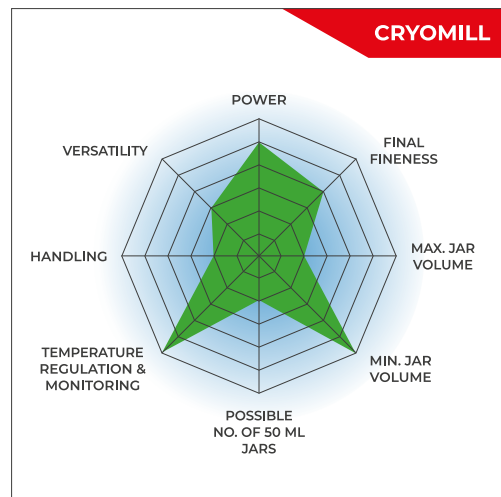
The liquid nitrogen is continually supplied from an autofill system in the exact amount required to keep the temperature at  $-196\text{ }^{\circ}\text{C}$ . The user never comes into direct contact with  $\text{LN}_2$  which ensures a high degree of operational safety. The CryoMill's versatility (cryogenic, 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  $5\text{ }\mu\text{m}$  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



## 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<sub>2</sub>-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<sub>2</sub> 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<sub>2</sub> 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.

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.



[Click to view video](#)

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.



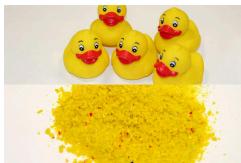
**LIQUID NITROGEN FEED**

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*

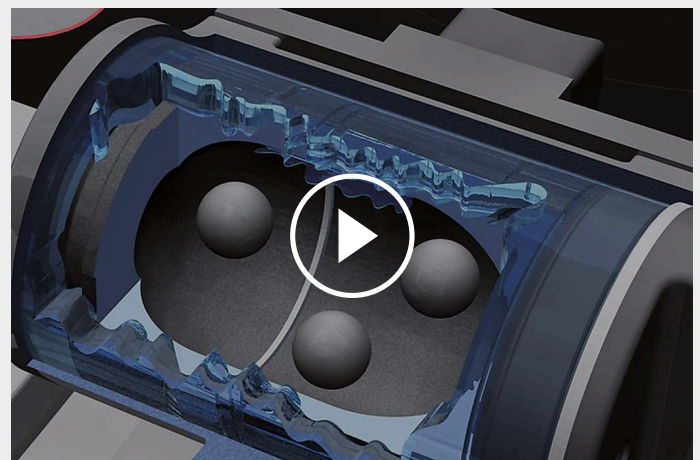
To find the best solution for your sample preparation task, visit our application database.

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## 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.



[Click to view video](#)

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## TECHNICAL DATA

<b>Applications</b>	size reduction, mixing, homogenization, cell disruption
<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. 20 ml
<b>No. of grinding stations</b>	1
<b>Vibrational frequency</b>	digital, 5 - 30 Hz (300 - 1800 min <sup>-1</sup> )
<b>Typical mean grinding time</b>	10 min / 4 min (cooling / grinding)
<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, zirconium oxide, PTFE
<b>Grinding jar sizes</b>	5 ml / 10ml / 25 ml / 35 ml / 50 ml
<b>Autofill</b>	50 l
<b>Setting of grinding time</b>	digital, 30 s - 99 min
<b>Storable SOPs</b>	9
<b>Electrical supply data</b>	100-240 V, 50/60 Hz
<b>Power connection</b>	1-phase
<b>Protection code</b>	IP 30
<b>Power consumption</b>	260 W
<b>W x H x D closed</b>	395 x 373 x 577 mm (D: 710 mm with exhaust tube)
<b>Net weight</b>	~ 45 kg
<b>Standards</b>	CE

\*depending on feed material and instrument configuration/settings

[www.retsch.com/cryomill](http://www.retsch.com/cryomill)

## 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

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

22.111.0001

Gasket for grinding jar 5 ml, 10 pcs.

22.085.0019

Gasket for grinding jar 10 ml, 10 pcs.

22.085.0022

Gasket for grinding jar 25 ml, hardened steel or stainless steel, 10 pcs.

22.085.0023

Gasket for grinding jar 25 ml, zirconium oxide, 10 pcs.

22.085.0024

Gasket for grinding jar 35 ml, 10 pcs.

22.085.0025

Gasket for grinding jar 50 ml, 10 pcs.

## 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


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