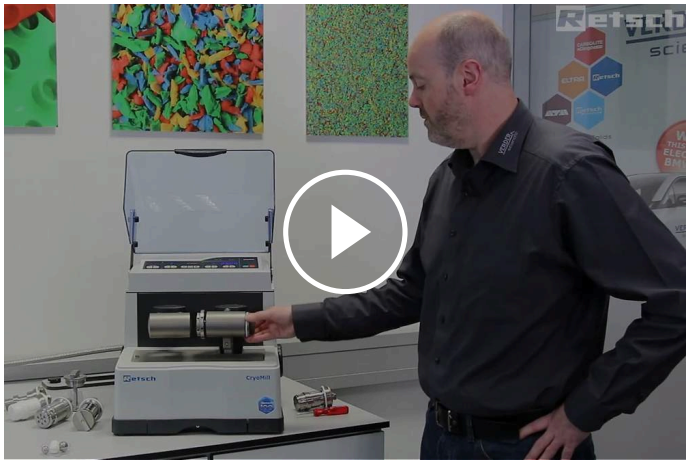

# CRYOMILL

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.**

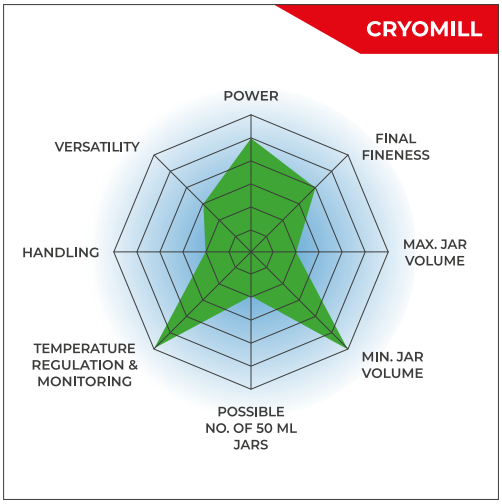
The liquid nitrogen is continually supplied from an autofill system in the exact amount required to keep the temperature at –196 °C. The user never comes into direct contact with $LN_2$ which ensures a high degree of operational safety. The CryoMill's versatility (cryogenic, but also wet and dry grinding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



비디오 시청 클릭

## 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



## 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.

안전하고 효과적인 분쇄 작업을 위해

# 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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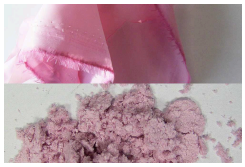
## 대표 시료

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*



*텍스타일*

*gummy bears*


비디오 시청 클릭

*Parsley*

샘플 준비 작업에 가장 적합한 솔루션을 찾으려면 애플리케이션 데이터베이스를 방문하십시오.

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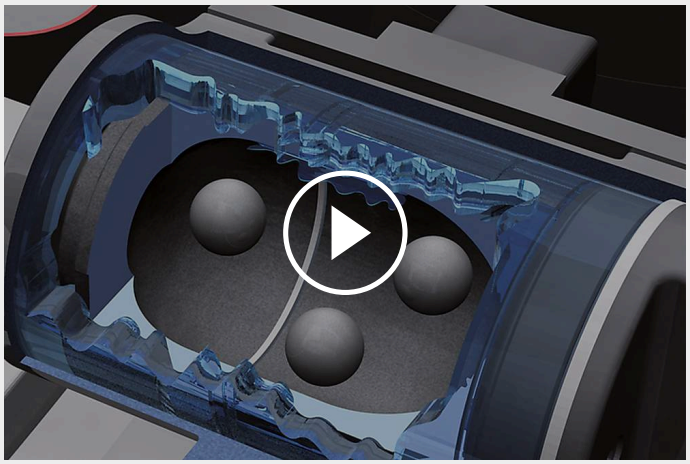
## 작동 원리

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.



비디오 시청 클릭

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# 기술 데이터

| | |
|---|---|
| **응용 분야** | 분쇄, 균질화, 혼합, 세포 분쇄 |
| **응용분야** | 건축자재, 기술적/전기적, 농산물, 생물학, 식품, 유리 제품/ 세라믹, 의학/제약, 지질학 / 금속 공학, 화학/플라스틱 공학, 환경 / 재활용 |
| **투입 시료** | 경질, 중-경질, 연질, 취성, 탄성, 섬유질 |
| **크기 축소 원리** | 충격, 마찰 |
| **최대 투입 크기*** | <= 8 mm |
| **최종 분말 입도*** | ~ 5 µm |
| **시료 일괄 처리량*** | 최대. 20 ml |
| **분쇄조 수** | 1 |
| **Vibrational frequency** | 디지털, 5 - 30 Hz (300 - 1800 min-1) |
| **평균 분쇄 시간** | 10 분 냉각과 4 분 분쇄 |
| **건식 분쇄** | 가능 |
| **습식 분쇄** | 가능 |
| **냉동 분쇄** | 가능 |
| **바이알을 이용한 세포파쇄** | 가능 |
| **자가 중심 결착기** | 가능 |
| **분쇄 용기 종류** | 스크류형 디자인 |
| **분쇄 도구 재질** | 경화 스틸, 스테인레스 스틸, 산화 지르코늄, PTFE |
| **분쇄 용기 크기** | 5 ml / 10ml / 25 ml / 35 ml / 50 ml |
| **Autofill** | 50 l |
| **분쇄 시간 설정** | 디지털, 30 초 - 99 분 |
| **표준 운영 절차 저장 가능 수** | 9 |
| **전원 공급 데이터** | 100-240 V, 50/60 Hz |
| **전원 연결** | 단상 |
| **안전 보호 코드** | IP 30 |
| **소비 전력** | 260 W |
| **폭 x 높이 x 깊이 닫혔을 때** | 395 x 373 x 577 mm (깊이: 배기 튜브 포함 시 710 mm ) |
| **중량** | ~ 45 kg |
| **표준** | CE |

*투입 재료와 장비 환경, 설정에 따라

www.retsch.com/cryomill

# 주문 정보

## CRYOMILL

**(Autofill 포함 LN2 용기 및 안전 밸브, 분쇄 용기 및 볼 별도 주문)**

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

## CRYOMILL 분쇄 용기

### HARDENED STEEL

| | | |
|---|---|---|
| 01.462.0300 |  | 5 ml, 02.706.0304 어댑터와 사용 |
| 01.462.0330 |  | 25 ml |
| 01.462.0329 |  | 35 ml |
| 01.462.0328 |  | 50 ml |

### STAINLESS STEEL

| | | |
|---|---|---|
| 01.462.0290 | | 5 ml, 02.706.0304 어댑터와 사용 |
| 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 |

## CRYOMILL 액세서리

| | | |
|---|---|---|
| 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 |  | 연결 튜브, 안전 밸브 포함 (LN2는 고객이 직접 공급) |
| 02.706.0304 |  | 어댑터, 2/4 분쇄 용기 용, 5 ml |
| 02.706.0303 |  | 어댑터, 2/4/6 리액션 바이알 용, 2 ml |
| 02.706.0360 | | Adapter for use of 2/4/6 reaction vials, 2 ml stainless steel tubes |
| 22.749.0001 |  | 안전 잠금 리액션 바이알 2 ml, 1000 개 |
| 22.749.0008 |  | Reaction vials made of stainless steel 316L, 2.0 ml, 10 pcs. |
| 99.200.0016 |  | CryoMill IQ / OQ 문서 |
| 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. |

# 분쇄용 볼

## 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, 스틸 코어 | | |
|---|---|---|
| 05.368.0045 |  | 10 mm Ø |
| 05.368.0046 |  | 12 mm Ø |
| 05.368.0114 |  | 15 mm Ø |
| 05.368.0047 |  | 20 mm Ø |