



## 드럼 밀 TM 300

**The TM 300 Drum Mill is utilized for preparing granules and powders through a grinding process conducted in either dry or wet conditions. This versatile grinder can function as either a Ball or a Rod Mill by employing the corresponding module. To ensure an efficient grinding process, it is essential to use a sufficient number of balls or rods. Depending on the sample material, a final fineness below 20 microns can be achieved.**

The drum mill comprises a gear motor mounted on a robust steel frame, a set of separation grids, and a sample collector. The TM 300 is designed with a yoke and locking mechanism that facilitates easy access to the sample. Cleaning is made convenient by a quick-release locking mechanism, allowing effortless removal of the drum cover.

The TM 300 accepts sample volumes up to 20 l and is therefore also suited for upscaling processes.



[비디오 시청 클릭](#)

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## BENEFITS AT A GLANCE

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### SAFE AND CONVENIENT OPERATION

The TM 300 stands out for its user-friendly features. The easy tilt mechanism facilitates the swift and uncomplicated emptying of the grinding jar. The removable sample collector simplifies the sample retrieval process, making it convenient for operators to access their collected materials.

The solid noise-protection hood contributes to a quieter and more comfortable working environment.

The TM 300 is equipped with an emergency switch, providing a quick

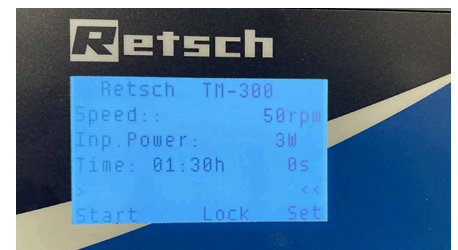
and reliable means to halt the milling process in case of unforeseen circumstances, underscoring the commitment to user safety.

The redesigned drums and drum covers of the TM 300 feature improved handling, allowing the lid to be secured with just one screw for a perfect seal, even during wet grinding.

## PARAMETER SETTING

Process parameters like grinding time or start/stop are conveniently set via the TM 300's large display interface. Settings include:

- | Variable speed from 1 to 80 rpm
- | Grinding time of up to 99:59:59 h:min:s
- | Rotation direction, e. g. to reduce caking effects
- | Programmable interval & break options for temperature-sensitive samples
- | Delayed start function



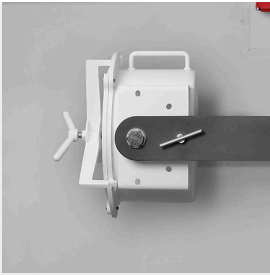
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## ACCESSORIES FOR EFFECTIVE GRINDING PROCESSES

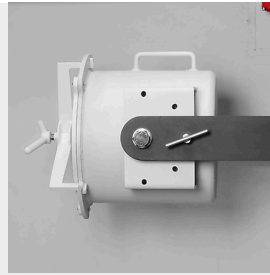
Catering to various application needs, the TM 300 offers standard **grinding drums** ranging from 5 to 43.4 liters. This ensures that the mill is adaptable to a wide spectrum of processing tasks.

An optional **separation grid** provides convenient separation of balls and sample after the grinding process. It is suitable for grinding balls sized 10, 20 or 30 mm. A connection for dust extraction prevents release of dust.

The grinding jar comes equipped with a **gasket**, ensuring a secure seal for loss-free milling operations. This feature not only enhances the efficiency of the process but also minimizes the risk of material waste.



5-liter Grinding drum



21.7-liter Grinding drum



Separation grid

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## DRUM FILLING LEVEL FOR GRINDING BALLS AND RODS

While the maximum sample feed size depends on properties like hardness and breaking behaviour, a particle size of approximately 5 mm is ideal for the TM 300. Larger sizes are acceptable but should not exceed 15 mm. For sample lumps which break very easily or for deagglomeration effects, a feed size between 20 and 30 mm is feasible. For such easy-to-process samples, the sample filling level may be increased to 20 l.

If special drums of stainless steel 1.4404 in sizes 21.7 / 10 / 5 l together with grinding balls of steel 1.4404 are employed, it is possible to carry out **wet grinding** in the TM 300. The total filling volume for wet grinding may exceed the recommended amount for dry grinding. It may be helpful to use a large number of small grinding balls to increase friction.

Grinding drum	Mass of grinding balls	Grinding ball size (mm)	Number of rods	Optimum sample volume (l)
5 l	10 kg	<5   10   20   30	-	1 - 1.5
10 l	up to -까지 20 kg	<5   10   20   30	-	2 - 2.5
21.4 l	40 kg	<5   10   20   30	-	4 - 5
43.4 l	-	-	8	9 - 20

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## FIVE DRUM POSITIONS FOR CONVENIENT HANDLING

The user can set the grinding drums in five different positions which are secured by a screw. This ensures easy filling and emptying of the drum but also improves the mixing and grinding process. The largest rod module of 43.4 l cannot be brought into the mixing position due to lack of space.

*Filling position*



*Mixing position*



*Grinding position*



*Emptying position*

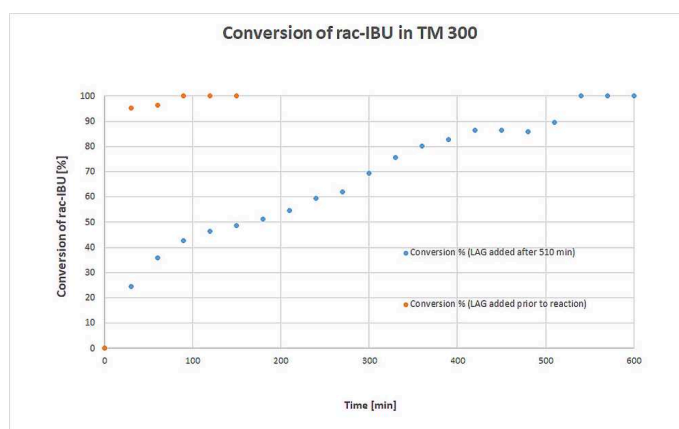


*Complete emptying position*

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## THE SOLUTION FOR EFFICIENT AND SUSTAINABLE CO-CRYSTAL SYNTHESIS

The TM 300 is capable of meeting the demands of modern pharmaceutical manufacturing. This can be demonstrated by the example of the mechanochemical synthesis of rac-Ibuprofen:Nicotinamide co-crystals. The TM 300 is an environmentally friendly alternative to conventional solution-based methods. In just 90 minutes, 3.2 kg of co-crystals with a yield of 99 % were produced, using only minimal amounts of solvent in the so-called liquid assisted grinding (LAG) process. This reduces energy consumption compared to conventional methods and drastically minimizes environmental impact.



Conversion of rac-IBU. Blue plot: neat grinding approach with addition of 10 kg of balls (d = 10 mm) after 270 min and 10 kg of balls (d = 30 mm) after 360 min; addition of LAG additive EtOH after 510 min. Orange plot: LAG-assisted approach with EtOH added prior to the reaction and 20 kg balls 10 mm.

Results presented by the research group of Michael Felderhoff [1]

TM 300 enables mechanochemical processes to be carried out on a kilogram scale, opening up new possibilities for sustainable industrial manufacturing processes. Particularly interesting is the minimal metal abrasion – the measured values were well below concerning levels and significantly lower than, for example, in eccentric vibratory mills. The table shows the minimal abrasion values in the TM 300 during the test run.

Sample	Al [ppm]	Cr [ppm]	Co [ppm]	Fe [ppm]	Ni [ppm]
Raw material IBU	11.3	39.0	25.7	71.9	34.9
Raw material Nicotinamid	8.9	33.3	26.7	40.0	33.3
Co-crystals after 30 min	10.8	35.9	30.8	51.3	38.5
After 60 min	11.0	37.0	31.7	63.4	39.6
After 90 min	17.2	43.8	35.9	64.6	45.3

#### SETUP:

- | 2,03 kg rac IBU; 1,20 kg NIC
- | 10 l drum for wet grinding, 20 kg 10 mm grinding balls stainless steel
- | LAG Ethanol 0.1 ml/g
- | 60 rpm for 90 min
- | 99 % yield

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## **SPECIAL APPLICATION: BOND INDEX TEST**

Another application area of the TM 300 is Bond Index Testing. The Bond Work Index is used to assess the grinding efficiency and to calculate the necessary grinding power when choosing comminution equipment in the design phase of, for example, a mining plant. Precise determination of BWI is crucial for the accurate design and estimation of costs linked to the comminution process in industries like cement, mining or steel.

Both the Ball Mill and the Rod Mill module can be used for the process. At least 15 to 20 kg sample material is required to simulate a closed grinding circuit.

### **BALL MILL MODULE**

The Ball Mill Work Index (BWI) is used for the range from 2.1 mm down to 100 µm. The sample needs to be pre-crushed to particle sizes as defined below.

- | Minerals: < 3.35 mm and sieved
- | Drillcore: < 3.35 mm and sieved
- | Half Drillcore: < 3.35 mm and sieved

The optimum number of grinding balls is 285. With the ball diameters varying due to wear, the overall number should be adjusted from time to time to ensure a total mass of 20.125 grams.

The grinding jar of the Bond Index Ball Mill measures 12" x 12" and has well-rounded corners.

### **ROD MILL MODULE**

The Rod Mill Work Index (RWI) is used for particle size determination in a size range from 25 mm down to 2.1 mm. The sample needs to be pre-crushed to particle sizes as defined below.

- | Minerals: < 12.50 mm and sieved
- | Drillcore: < 12.50 mm and sieved
- | Half a drillcore: < 12.50 mm and sieved

The grinding jar for the Bond Index Rod Mill is 12" x 24" in size and has a wave-shaped design.

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## TYPICAL SAMPLE MATERIALS

RETSCH drum mill은 진정한 만능 제품입니다. 제품은 활성탄, 합금, 벤토나이트, 뼈, 탄소 섬유, 촉매, 셀룰로오스, 시멘트 클링커, 도자기, 화학 제품, 점토 광물, 석탄, 코크스, 퇴비, 콘크리트, 전자 스크랩, 섬유, 석고, 유리, 모발, 하이드 록실 인회석, 카올린 석회석, 금속 산화물, 광물, 광석, 페인트 및 광택제, 종이, 의약품, 안료, 식물, 폴리머, 석영, 종자, 준 보석, 하수 슬러지, 슬래그, 토양, 조직, 담배, 폐기물, 목재 등과 같은 제품들을 균질화 합니다.

### HARD-BRITTLE: 요업제품



5 l sample  
21.7 l ball module  
Pre-grinding:  
40 kg x 20 mm grinding balls  
4 h at 60 rpm  
Fine grinding:  
40 kg x 10 mm grinding balls  
5 h at 60 rpm

### HARD-BRITTLE: 플라스틱



4.5 l sample  
21.7 l ball module  
Pre-grinding:  
40 kg x 30 mm grinding balls  
3 h at 60 rpm  
Fine grinding:  
40 kg x 10 mm grinding balls  
4 h at 60 rpm

### MEDIUM-HARD: SOIL



25 kg sample  
43.4 l rod module  
8 grinding rods  
1 h at 80 rpm

### FIBROUS-TOUGH: SAWDUST



4.2 l sample  
21.7 l ball module  
40 kg x 30 mm grinding balls  
5 h at 70 rpm

샘플 준비 작업에 가장 적합한 솔루션을 찾으려면 애플리케이션 데이터베이스를 방문하십시오.

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## 작동 원리

**Drum mill**에서 시료 (일반적으로 선 분쇄 된 시료)는 분쇄용 볼과 함께 드럼 내부에 배치되고 외력을 받게 됩니다.

Ball Mill은 건조한 상태의 시료에 충격과 마찰을 가하여 고체 시료의 미 분쇄에 사용됩니다. 시료와 분쇄용 볼이 포함된 드럼은 수평 축에서 회전합니다. 큰 직경의 분쇄용 볼이 사용되면 입자들이 더 쉽게 분쇄되며 작은 직경의 볼은 실질적으로 더 고운 최종 입도를 생산합니다.

The ball and the rod mill basically have the same concept comprising either a 12"x12" jar with grinding balls or a 12"x24" jar with grinding rods.

The jar is attached to a rotating yoke which is driven by a motor and can be placed in three different positions: Upwards for loading, horizontal for grinding, downwards for discharging.

To carry out the Bond Index test the pre-defined number of grinding balls or grinding rods is required. The electronic control integrated in the drive is equipped with an overload protection and permits and controls different speeds.

During the grinding process the difference in speeds between the balls / rods and grinding jar produces an interaction between frictional and impact forces, which releases the required comminution energy. The interplay between these forces produces a very effective degree of size reduction.

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## 기술 데이터

응용 분야	pulverizing, mixing used as Bond Index Tester: quantification of grindability of ores and minerals
응용분야	건축 재료, 농업, 생물학, 엔지니어링 / 전자 공학, 유리 / 세라믹, 의학 / 제약, 지질학 / 야금, 화학, 환경 / 재활용
투입 시료	연질, 경질, 취성, 섬유질 - 건식 또는 습식
크기 축소 원리	마찰
최대 투입 크기*	< 20 mm used as Bond Index Tester: < 3.35 mm with ball module / 12.50 mm with rod module
최종 분말 입도*	< 20 µm used as Bond Index Tester: < 100 µm with ball module / 2,100 µm with rod module
시료 일괄 처리량*	minimum 1 l / maximum 20 l used as Bond Index Tester: min. 15 kg with ball module / min. 20 kg with rod module
회전 속도	1 - 80 min <sup>-1</sup> used as Bond Index Tester: 70 min <sup>-1</sup> with ball module / 46 min <sup>-1</sup> with rod module
분쇄조 수	1
분쇄 도구 재질	경화 강철, stainless steel used as Bond Index Tester: hardened steel
분쇄 드럼 사이즈	5 l / 10 l / 21.7 l / 43.3 l used as Bond Index Tester: 21.7 l with ball module / 43.3 l with rod module
분쇄 시간 설정	디지털
구동	주파수 변환기를 가진 3상 비동기식 모터
구동 전력	0.75 kW
전원 공급 데이터	다른 전압
전원 연결	단상
안전 보호 코드	IP 41
소비 전력	~ 1800 VA
폭 x 높이 x 깊이 단했을 때	1500 x 1200 x 700 mm

중량	~ 306 kg
표준	CE

\*투입 재료와 장비 환경, 설정에 따라

## REFERENCES

[1] Jan-Hendrik Schöbel, Frederik Winkelmann, Joel Bicker, and Michael Felderhoff; Mechanochemical kilogram-scale synthesis of rac:ibuprofen:nicotinamide co-crystals using a drum mill; RSC Mechanochemistry, 2025, DOI: 10.1039/D4MR00096J

[www.retsch.kr/tm300](http://www.retsch.kr/tm300)

## 주문 정보

### 드럼 밀 TM 300

DRUM MILL TM 300 FOR DRY GRINDING  
COMPLETE INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SEPARATING SCREENS FOR 20 MM BALLS  
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)




#### Drum

21.301.2001		TM 300	230 V, 50 / 60 Hz	21,7 l	볼 분쇄 용	1.0037 강
21.301.2002		TM 300	230 V, 50 / 60 Hz	10 l	볼 분쇄 용	1.0037 강
21.301.2003		TM 300	230 V, 50 / 60 Hz	5 l	볼 분쇄 용	1.0037 강
21.301.2004		TM 300	230 V, 50 / 60 Hz	43.4 l	로드 분쇄 용	1.0037 강

다른 전력 버전도 동일한 가격으로 제공

DRUM MILL TM 300 FOR WET GRINDING  
COMPLETE INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SEPARATING SCREENS FOR 20 MM BALLS  
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)

#### Drum


21.301.2005		TM 300	230 V, 50 / 60 Hz	21,7 l	볼 분쇄 용	stainless st. 1.4404
21.301.2006		TM 300	230 V, 50 / 60 Hz	10 l	볼 분쇄 용	stainless st. 1.4404
21.301.2007		TM 300	230 V, 50 / 60 Hz	5 l	볼 분쇄 용	stainless st. 1.4404

다른 전력 버전도 동일한 가격으로 제공

DRUM MILL TM 300 FOR BOND INDEX TESTING  
INCL. DRUM, BASE FRAME, COLLECTING UNIT WITH SET OF SEPARATING SCREENS FOR BALLS/RODS  
(PLEASE ORDER BALL FILLING/ROD FILLING SEPARATELY)

#### Drum

21.301.2008		TM 300	230 V, 50 / 60 Hz	21.7 l	with rounded corners	볼 분쇄 용
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21.301.2009		TM 300	230 V, 50 / 60 Hz	43.4 l	with wave form	로드 분쇄 용
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다른 전력 버전도 동일한 가격으로 제공

## ACCESSORIES TM 300 FOR DRY GRINDING

### BALL FILLINGS/ROD FILLING FOR DRY GRINDING, ,

23.455.0018	분쇄 용 볼, 30 mm Ø	(20 kg)	1.3505 강
23.455.0015	분쇄 용 볼, 20 mm Ø	(20 kg)	1.3505 강
23.455.0019	분쇄 용 볼, 10 mm Ø	(20 kg)	1.3505 강
23.455.0020	분쇄 용 볼, 5 mm Ø	(20 kg)	1.3505 강
23.455.0035	분쇄 용 볼, 30 mm Ø	(8 kg), 20 mm Ø (6 kg), 10 mm Ø (6 kg)	1.3505 강
23.455.0016	Rod filling (for drum 43.4 l only)	(8 pcs.)	1.3505 강

### DRUMS FOR DRY GRINDING, ,

23.462.0056	드럼, 5 l	볼 분쇄 용	Stahl 1.0037
23.462.0058	드럼, 10 l	볼 분쇄 용	Stahl 1.0037
23.462.0060	드럼, 21.7 l	볼 분쇄 용	Stahl 1.0037
23.462.0062	드럼, 43.4 l	로드 분쇄 용	Stahl 1.0037

## ACCESSORIES TM 300 FOR WET GRINDING

### BALL FILLINGS FOR WET GRINDING, ,

23.455.0021	분쇄 용 볼, 30 mm Ø	(20 kg)	스테인레스 스틸 1.4404
23.455.0022	분쇄 용 볼, 20 mm Ø	(20 kg)	스테인레스 스틸 1.4404
23.455.0023	분쇄 용 볼, 10 mm Ø	(20 kg)	스테인레스 스틸 1.4404
23.455.0024	분쇄 용 볼, 5 mm Ø	(20 kg)	스테인레스 스틸 1.4404
23.455.0036	분쇄 용 볼, 30 mm Ø	(8 kg), 20 mm Ø (6 kg), 10 mm Ø (6 kg)	스테인레스 스틸 1.4404

### DRUMS FOR WET GRINDING, ,

23.462.0057	드럼, 5 l	볼 분쇄 용	스테인레스 스틸 1.4404
23.462.0059	드럼, 10 l	볼 분쇄 용	스테인레스 스틸 1.4404
23.462.0061	드럼, 21.7 l	볼 분쇄 용	스테인레스 스틸 1.4404

## ACCESSORIES TM 300 FOR BOND INDEX TESTING

### BALL FILLINGS/ROD FILLING FOR BOND INDEX TESTING

73.455.0018	Ball filling	1.3505 강	for drum 12" x 12"/21,7 l
73.455.0019	로드	1.0037 강	for drum 12" x 24"/43,4 l

요청 시 다른 강재로 제공 가능

### DRUMS FOR BOND INDEX TESTING

23.462.0063	드럼, 21.7 l with rounded corners 	볼 분쇄 용	1.0037 강
23.462.0064	드럼, 43.4 l with wave form	로드 분쇄 용	1.0037 강

요청 시 다른 강재로 제공 가능

## ACCESSORIES TM 300 FOR DRY GRINDING AND WET GRINDING

### 분리 스크린

03.407.0144	분리 스크린, 28 mm, 30 mm Ø 볼 용
03.407.0141	분리 스크린, 15 mm, 20 mm Ø 볼 용
03.407.0142	분리 스크린, 8 mm, 10 mm Ø 볼 용