Manual

Drum Mill TM 300

Translation

Table of Contents

1 Notes on the manual

This manual provides technical guidelines for the safe operation of the device. Read this manual through carefully before installing, putting into service and operating the device. Reading and understanding this manual is essential for handling the device safely and as intended.

This manual does not contain any repair instructions. Please contact your supplier or contact Retsch GmbH directly if anything is unclear or you have questions about these guidelines or the device, or in the case of any faults or necessary repairs.

You can find further information about your device at **https://www.retsch.com** on the pages for the specific device concerned.

Amendment status:
The document amendment 0003 of the "Drum Mill TM 300" manual has been prepared in accordance with the Directive of Machinery 2006/42/EC.

1.1 Disclaimer

This manual has been prepared with great care. We reserve the right to make technical changes. We assume no liability for personal injuries resulting from the failure to follow the safety information and warnings in this manual. No liability will be assumed for damage to property resulting from the failure to follow the information in this manual.

1.2 Copyright

2 Safety

Safety Officer
The operating company itself must ensure the following with respect to persons authorised to work on the device:

- that they have read and understood all regulations contained in the chapter on safety;
- that they are aware before they start work of all instructions and regulations for the target group related to the work;
- that they have easy access to the manual for this device at all times;
- that they have been familiarised with the safe and correct handling of the device before starting work on it, by means of a verbal introduction by a competent person and/or using this manual.

⚠ Improper operation can lead to personal injuries. The operating company itself is responsible for its safety and that of its staff. The operating company itself must ensure that no unauthorised persons have access to the device.

Target group
All those operating, cleaning or working with or on the device.

This device is a modern, powerful product from Retsch GmbH and has been developed in line with the state-of-the art. The device is safe to use when operated correctly and when following the instructions in this manual.

⚠ People under the influence of intoxicating substances (medications, drugs, alcohol) or who are overtired may not operate the device or work on the device.

2.1 Explanations of the Safety Instructions

The following **warnings** in this manual warn of possible risks and damage:

⚠ DANGER D1.0000

Risk of fatal injuries
Source of danger

- Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

Fatal or serious injuries may result if the “Danger” sign is disregarded. There is a **very high risk** of a life-threatening accident or lasting personal injury. The signal word **⚠ DANGER** is additionally used in the running text or in instructions.

⚠ WARNING W1.0000

Risk of life-threatening or serious injuries
Source of danger

- Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

Life-threatening or serious injuries may result if the “Warning” sign is disregarded. There is an **increased risk** of a serious accident or of a possibly fatal personal injury. The signal word **WARNING** is additionally used in the running text or in instructions.

CAUTION C1.0000

Risk of injuries
Source of danger

– Possible consequences if the danger is ignored.
- **Instructions and information on how to avoid the risk.**

Average to slight injuries may result if the “Caution” sign is disregarded. There is an average or slight risk of an accident or personal injury. The signal word **CAUTION** is additionally used in the running text or in instructions.

NOTICE N1.0000

Type of damage to property
Source of the damage to property

– Possible consequences if the information is ignored.
- **Instructions and information on how to avoid the damage to property.**

Damage to property may result if the information is disregarded. The signal word ***NOTICE*** is additionally used in the running text or in instructions.

2.2 General Safety Instructions

CAUTION C2.0002

Risk of injury
Lack of knowledge of the manual

– The manual contains all safety-related information. Disregarding the manual can therefore lead to injuries.
- **Read the manual carefully before operating the device.**

CAUTION C3.0015

Risk of injury
Improper modifications to the device

– Improper modifications to the device can result in injuries.
- **Do not make any unauthorised changes to the device.**
- **Only use the spare parts and accessories approved by Retsch GmbH!**

NOTICE

N2.0012

Changes to the device
Improper modifications

- The conformity declared by Retsch GmbH with the European Directives will lose its validity.
- Any warranty claims will be terminated.
- **Do not make any modification to the device.**
- **Use spare parts and accessories that have been approved by Retsch GmbH exclusively.**

2.3 Repairs

This manual does not contain any repair instructions. For safety reasons, repairs may only be carried out by Retsch GmbH or an authorised representative or by qualified service technicians.

In case of repair, please inform…

…the Retsch GmbH representative in your country,
…your supplier, or
…Retsch GmbH directly.

Service address:

2.4 Responsibility of the operating company

The user of the machine (the operating company) is responsible for ensuring that every person who works on the machine has been given precise instructions on the basis of this Manual (commissioning, operation, servicing). Training for operators must cover the following points:

- Intended purpose of the machine
- Hazardous areas
- Safety provisions
- You must be satisfied that staff have the requisite qualifications
- General instructions and actions in an emergency
- Applicable accident prevention regulations
- Personal protective clothing required
- Operation of the machine in line with this Manual
- Accepted, applicable rules governing occupational health and safety

Incorporate the TM 300 into your emergency planning:

- Integrate the TM 300 into your operating procedures regulating conduct in emergency situations.
- To prevent accidents during work processes, incorporate the TM 300 into your risk assessment in acc. with the German Ordinance on Industrial Health and Safety (BetrSichV).
- Take into consideration fire-fighting measures, combatting the effect of leaking substances, potential radiation, rescuing people, first-aid measures.

2.5 Personnel qualification and target group of this manual

This manual is intended for trained assembly personnel , maintenance staff and users . Training must be provided in the language of the personnel concerned so that all instructions are understood. As such the following personnel qualifications are necessary:

Assembly, commissioning, instruction, troubleshooting, servicing work, as described in this manual	Skilled technical staff as well as external service providers who speak German and the language of the operating personnel. The usual skills communicated during training, e.g. as a plant fitter, mechatronics engineer or toolmaker, are prerequisites for the assembly, commissioning and troubleshooting of the machine. Employees must be able to manage all applicable mechanical tasks and be familiar with and have experience of dealing with these.
Operation	Education/training in accordance with the above section, responsibilities of trained employees.
Servicing/repairs	They must be experienced, trained professionals, familiar with requirements and guidelines.

2.6 Confirmation Form for the Managing Operator

This manual contains essential instructions for operating and maintaining the device which must be strictly observed. It is essential that they be read by the user and by the qualified staff responsible for the device before the device is commissioned. This manual must be available and accessible at the place of use at all times.

The user of the device herewith confirms to the managing operator (owner) that he has received sufficient instructions about the operation and maintenance of the system. The user has received the manual, has read and taken note of its contents and consequently has all the information required for safe operation and is sufficiently familiar with the device.

The managing operator should for legal protection have the user confirm the instruction about the operation of the device.

I have read and taken note of the contents of all chapters in this manual as well as all safety instructions and warnings.

User
Surname, first name (block letters)
Position in the company
Place, date and signature

Managing operator or service technician
Surname, first name (block letters)
Position in the company
Place, date and signature

3 Packaging, Transport and Installation

3.1 Packaging

The packaging has been adapted to the mode of transport. It complies with the generally applicable packaging guidelines.

NOTICE N3.0001

Complaint or return
Keeping the packaging

- Inadequate packaging and insufficient securing of the device can jeopardise the warranty claim in the event of a complaint or return.
- **Keep the packaging for the duration of the warranty period.**

3.2 Transport

NOTICE N4.0017

Damage to components
Transport

- Mechanical or electronic components may be damaged during transport. The device must not be knocked, shaken or thrown during transport.
- **Move the device gently during transport**.

NOTICE N5.0014

Complaints
Incomplete delivery or transport damage

- The forwarding agent and Retsch GmbH must be notified immediately in the event of transport damage. It is otherwise possible that subsequent complaints will not be recognised.
- **Please check the delivery on receipt of the device for its completeness and intactness.**
- **Notify your forwarding agent and Retsch GmbH within 24 hours.**

3.3 Temperature Fluctuations and Condensation

NOTICE N6.0016

Damaged components due to condensation
Temperature fluctuations

- The device may be exposed to substantial fluctuations in temperature during transport. The ensuing condensation can damage electronic components.
- **Wait until the device has acclimatised before putting it into service.**

Temporary storage:
In case of an interim storage the device must be stored dry and within the specified ambient temperature range.

3.4 Conditions for the Installation Site

NOTICE N7.0021

Ambient temperature
Temperatures outside the permitted range

- Electronic and mechanical components may be damaged.
- The performance data alters to an unknown extent.
- **Do not exceed or fall below the permitted temperature range (5 °C to 40 °C ambient temperature) of the device.**

- Installation height: max. 2 000 m above sea level
- Ambient temperature: 5 °C – 40 °C
- Maximum relative humidity < 80 % (at ambient temperatures ≤ 31 °C)

For ambient temperatures U_T between 31 °C and 40 °C, the maximum relative humidity value L_F linearly decreases according to $L_F = -(U_T - 55) / 0.3$:

Ambient temperature	Max. rel. humidity
≤ 31 °C	80 %
33 °C	73.3 %
35 °C	66.7 %
37 °C	60 %
39 °C	53.3 %
40 °C	50 %

NOTICE N8.0015

Humidity
High relative humidity

- Electronic and mechanical components may be damaged.
- The performance data alters to an unknown extent.
- **The relative humidity in the vicinity of the device should be kept as low as possible.**

3.5 Electrical Connection

WARNING W2.0015

Risk to life caused by an electric shock
Connection to socket without a protective earth conductor

- Connecting the device to sockets without a protective earth conductor can lead to life-threatening injuries caused by an electric shock.
- **Always operate the device using sockets with a protective earth conductor (PE).**

NOTICE N9.0022

Electrical connection
Failure to observe the values on the type plate

- Electronic and mechanical components may be damaged.
- **Connect the device only to a mains supply matching the values on the type plate.**

WARNING When connecting the power cable to the mains supply, use an external fuse that complies with the regulations applicable to the place of installation.

- Check the type plate for details on the necessary voltage**,** frequency, and maximum external current source fuse for the device.
- The listed values must agree with the existing mains supply.
- Only use the supplied power cable to connect the device to the mains supply.
- The circuit breaker at the installation site for connecting the mains cable to the mains should be suitable for higher inrush currents. It is recommended to use a type C circuit breaker or a Neozed or NH type fuse. The rated current of the fuse can be found on the rating plate or in the technical data.

The drive on the machine is fitted with a frequency converter . In order to comply with the EMC Directive , this is equipped with a mains filter and shielded cables to the motor. If your mains connection for the machine includes a residual current device , the anti-interference circuit on the frequency converter may result in false alarms on the residual current device when it is switched on – it is always switched on when the grinding chamber cover is closed – without there being any fault on the machine or the mains installation.
In accordance with the state of the art, selected all current sensitive residual current devices are recommended for such cases. The trip current must be adequately dimensioned because short-term capacitive compensation currents (shielded cable, mains filters) can easily lead to false alarms when switched on.
In some circumstances it may be necessary to operate the machine without the residual current device, although in this case checks must be conducted to ensure that this does not contradict any local regulations of electricity companies or other institutions as well as any applicable standards.

3.6 Transport

WARNING W3.0005

Risk of injury due to the device falling down
Lifting the device above head height

- The device can fall causing serious injuries when lifted above head height.
- **Never lift the device above head height!**

NOTICE N10.0018

Transportation lock
Transport without transportation lock, or operation with transportation lock

- Mechanical components may be damaged.
- **Only transport the device with mounted transportation lock.**
- **Do not operate the device with built-in transportation lock.**

NOTICE

N11.0017

Damage to components
Transport

– Mechanical or electronic components may be damaged during transport.
The device must not be knocked, shaken or thrown during transport.

- **Move the device gently during transport**.

The device is secured for transport by a transport lock on the transport pallet. The device has to be transported with a forklift truck as follows:

- Approach the packed device with the forklift and position the forks centrally underneath the device.
- Carefully lift the device and move it to its installation site.

3.7 Installing the device

The installation site of the device must be a level and solid surface.

Set up the device as described below:

- Remove the wooden box.

NOTICE In order to carry out the next steps, the device must be emergency unlocked. For more information, please see chapter “Emergency unlocking”.

- Remove the emergency unlocking mechanism of the device.
- Remove the accessories which are located inside the device.
- Remove the transport lock which secures the device on the transport pallet with a 17 mm wrench.
- Carefully approach the device from the right-hand side and place the forks centrally underneath the device.
- Carefully lift the device and move it to its installation site.

NOTICE The device must be secured before it is put into operation, because otherwise it may cause damage to the device.

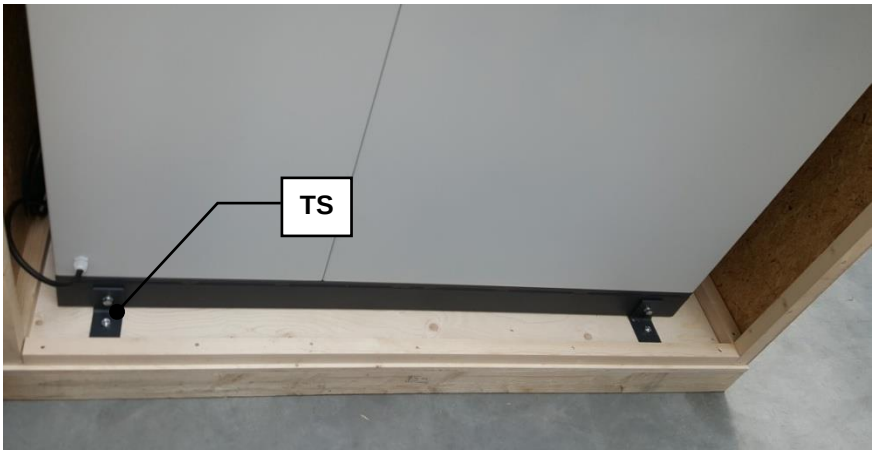


Fig. 1: Loosening the transport lock from the transport pallet

3.8 Position of the user

The position of the operator for normal operation is in front of the housing door, at the height of the control panel and the emergency stop button.

3.9 Type Plate Description

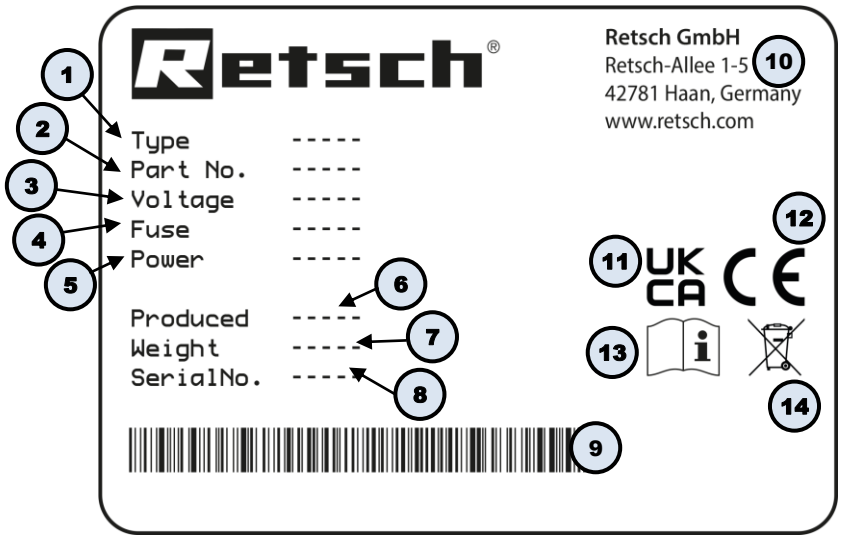


Fig. 2: Type plate

1 Device designation
2 Part number
3 Power version, Mains frequency
4 Fuse type and fuse strength
5 Capacity, Amperage
6 Year of production
7 Weight
8 Serial number
9 Bar code
10 Manufacturer's address
11 UKCA marking
12 CE marking
13 Safety warning: Read the manual
14 Disposal label

ⓘ In the case of queries please provide the device designation (**1**) or part number (**2**), as well as the serial number (**8**) of the device.

4 Technical data

4.1 Intended use of the device

⚠ CAUTION C4.0010

Risk of burns or poisoning
Varying sample properties

- The properties and therefore also the chemical reactivity of the sample can change during the grinding process and can cause burns or poisoning as a result.
- **Do not process any substances in this device whose chemical reactivity is so changed by grinding that there is a risk of explosion or poisoning.**
- **Take note of the safety data sheets for the sample material.**

⚠ CAUTION C5.0005

Risk of injury
Potentially explosive atmosphere

- The device is not suitable for use in potentially explosive atmospheres. Operating the device in a potentially explosive atmosphere can lead to injuries caused by an explosion or fire.
- **Never operate the device in a potentially explosive atmosphere!**

⚠ CAUTION C6.0006

Risk of injury
Sample material that is harmful to health

- Sample material that is harmful to health can injure people (illness, contamination).
- **Use suitable extraction systems with sample material that is harmful to health.**
- **Use suitable personal protective equipment with sample material that is harmful to health.**
- **Take note of the safety data sheets for the sample material.**

NOTICE N12.0007

Range of application of the device
Long-term operation

- This laboratory device is designed for eight-hour single-shift operation with a duty cycle of 30 %.
- **This device may not be used as a production machine nor is it intended for continuous operation.**

Target group: Users, operators
Machine type designation: TM 300

The TM 300 drum mill is suitable for preparing granulates and powders and permits both dry and wet grinding. A corresponding module enables it to be used as ball or rod mill.

The drum mill is used successfully in almost all areas of industry and research. This applies in particular where there are high requirements in terms of cleanliness, speed, fineness and reproducibility.
Since the TM 300 operates with very big grinding vessels, it is particularly suitable for materials with a large volume or when a significant quantity needs to be ground.
Due to its tough design, the TM 300 has proven to be extremely useful in the building materials sector (cement), in geology, minerology, metallurgy and in the environmental sector.
Samples of waste, activated carbon, soil, concrete, cellulose, iron ore, electronic waste, paint, plaster, glass, wood, limestone, kaolin, catalysers, ceramics, coal, compost, plant parts, polymers, quartz, seeds, slag, tobacco, cement clinker and many other substances can be ground easily, quickly and without loss.

TM 300 with a function as test machine for quantifying the grindability of ores and minerals or similar materials from the application areas of building materials, geology, metallurgy, environment and recycling.
Any other use is regarded as improper use and may lead to damage to equipment and even to injuries.
A detailed overview and knowledge of the properties of the raw material is extremely important, especially when planning the structure of a grinder. To minimise all potential risks, extensive tests are needed to obtain information about the properties of the raw materials.
The Bond Work Index test method can provide a clear definition of the requisite crushing capacities and quality of the desired products.

Benefits

- Powerful, fast grinding
- Suitable for wet and dry grinding
- Variable speed, reproducible results
- Suitable for long time tests
- Can be used as ball or rod mill
- Tipping mechanism for simple emptying of the drum
- Removable sample collector
- Convenient parameter setting on the display
- Standard drum sizes of between 5 and 41.3 litres
- Grinding drum with seal for loss-free work
- Solid enclosure with steel frame and safety switch
- Suitable for identifying the work index according to Bond
- Separation screen for different grinding ball diameters (ball mill)

4.2 Grinding drum nominal volume

NOTICE

N13.0000

Wear or damage to the grinding set
Insufficient filling quantity

- Increased wear or damage to the grinding set is possible when operating the grinding set with insufficient filling quantity.
  - **The grinding set must always be filled to at least 40% of the nominal volume.**

Dry grinding

Ball module
Steel 1.0037: 5 / 10 / 21.7 litres

Rod module
Steel 1.0037: 43.4 litres

Wet grinding

Ball module
Steel 1.4404: 5 / 10 / 21.7 litres

4.3 Feed size

The maximum feed size depends on the grinding drum volume and hardness of the sample material . The size of the grinding balls should always exceed that of the material.

Grinding drum	5 litres	= max. particle size < 20 mm
Grinding drum	10 litres	= max. particle size < 20 mm
Grinding drum	21.7 litres	= max. particle size < 20 mm
Grinding drum	43.4 litres	= max. particle size < 20 mm

Final fineness < 20 µm

The following applies to the function as a test device for the quantification of the Bond Index:
The maximum feed size depends on the material and the specifications of the ball and rod module within the Bond Work Index standard.

Ball module:
Examples:
Minerals pre-crushed to < 3.35 mm (identified by means of sieve analysis)
Core samples pre-crushed to < 3.35 mm (identified by means of sieve analysis)
Split core samples pre-crushed to < 3.35 mm (identified by means of sieve analysis)

The ball filling is specified by the Bond Work Index and contains the following:
43 x 1.45”
67 x 1.17”
10 x 12
71 x 0.75”
94 x 0.61”

The optimum number of grinding balls is 285. As the diameter of balls varies over time due to wear, the ball filling should be adjusted periodically to produce an overall weight of 20.125 kg. Where possible, no changes should be made to the correct proportion of ball diameters specified above.

Rod module:

Examples:
Minerals pre-crushed to < 12.5 mm (identified by means of sieve analysis)
Core samples pre-crushed to < 12.5 mm (identified by means of sieve analysis)
Split core samples pre-crushed to < 12.5 mm (identified by means of sieve analysis)

The rod filling is specified by the Bond Work Index and contains the following:
6 x 1.25” diameter and a length of 21”
2 x 1.75” diameter and a length of 21”

4.4 Payload

Maximum quantity of sample material: 30 kg

4.5 Mains connection

220 - 240 V, 50/60 Hz
Mains voltage fluctuations +/- 10%

4.6 Rated Power

1800 VA, 1~

4.7 Pre-fuse

16 A

4.8 Motor Rotation Speed

The speed can be set between 1-80 rpm.

The grinding according to Bond specifies the following speeds:
Ball module 70 rpm
Rod module 46 rpm

4.9 Emissions

⚠ CAUTION C.0020

Risk of injury caused by not hearing acoustic signals
Loud grinding noise

- Loud grinding noise may result in not hearing acoustic warning signals, leading to injuries.
- **Take the volume of grinding noise into consideration when designing the acoustic signals in the working environment.**
- **Where necessary, use additional visual signals.**

4.9.1 Noise levels

Noise levels TM 300:
Noise measurement in accordance with DIN 45635-31-01-KL3
The noise levels are mainly influenced by the machine speed, the material being ground and the grinding set.

Noise levels with ball module
Workplace-related emissions value LpAeq = up to 96 dB(A)
Sound power level LWA = 104 dB(A)

Measurement conditions:
Grinding drum: 21.7 litres, steel 1.3541
Grinding tools: 20 kg steel balls, 20 mm diameter
Sample material: 1500 g cement clinker, particle size <20 mm
Sound level meter : Brüel & Kjaer 2237 Controller

Noise levels with rod module
Workplace-related emissions value LpAeq = up to 94 dB(A)
Sound power level LWA = 102 dB(A)

Measurement conditions:
Grinding drum : 43.4 litres, steel 1.3541
Grinding tools: 23.65 kg grinding rods, 30mm diameter
Sample material: 3000 g cement clinker, particle size <20 mm
Sound level meter: Brüel & Kjaer 2237 Controller

4.10 Degree of Protection

- IP 41

4.11 Protective Equipment

The machine is fitted with a safety mechanism which prevents the machine being started in an unsafe state.

- The machine can only be started when the housing door is closed.
- It is only possible to open the housing door when the machine is stationary.

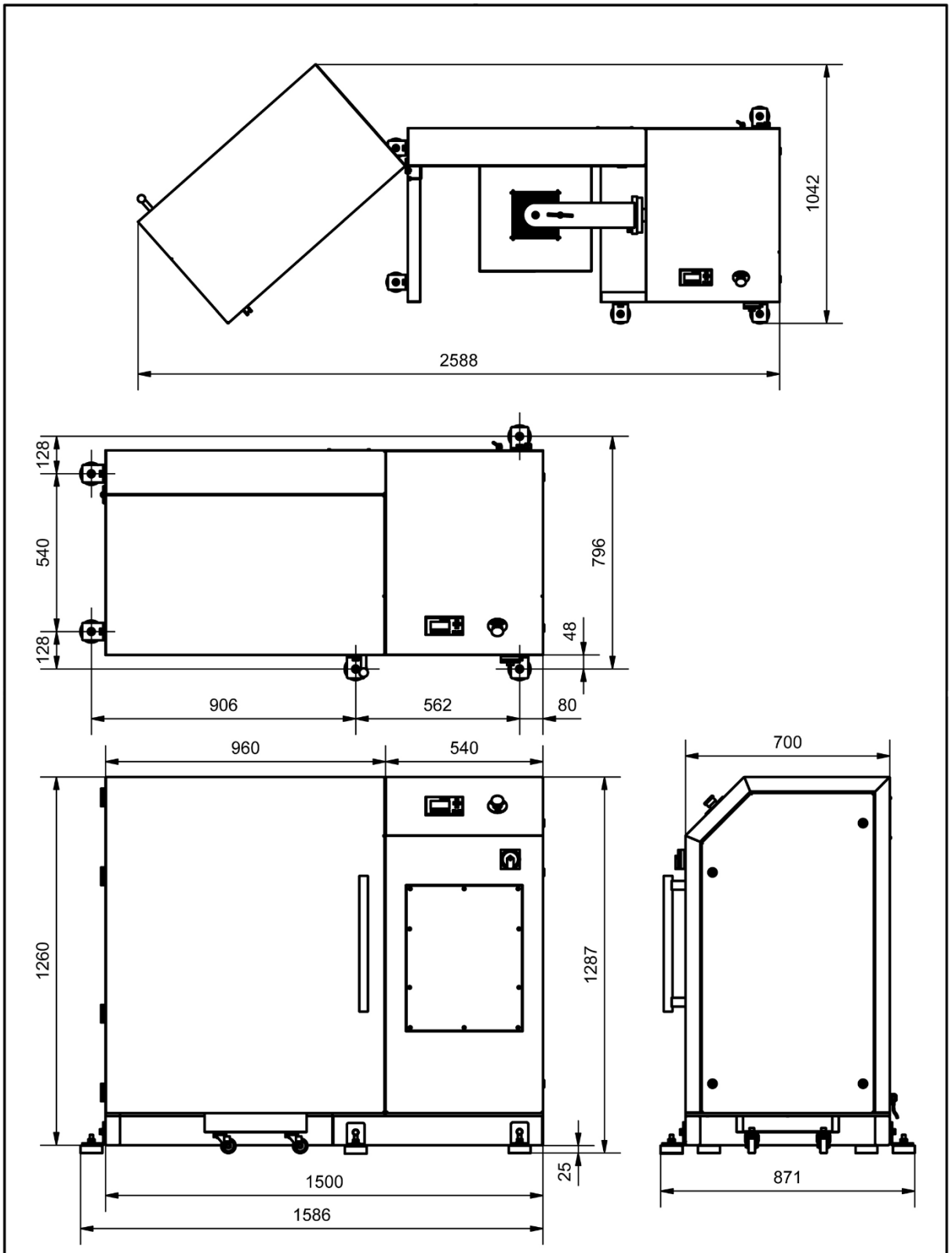
4.12 Dimensions and Weight

Height:	1255 mm
Width:	1500 mm
Depth:	775 mm
Weight :	net approx. 295 kg

4.13 Required Floor Space

Height:	1255 mm
Width (housing door open):	2600 mm
Depth (housing door open):	1600 mm

4.14 Installation drawing



Retsch	construction size

5 Operating the device

CAUTION

C7.0006

Risk of injury
Sample material that is harmful to health

– Sample material that is harmful to health can injure people (illness, contamination).

- **Use suitable extraction systems with sample material that is harmful to health.**
- **Use suitable personal protective equipment with sample material that is harmful to health.**
- **Take note of the safety data sheets for the sample material.**

CAUTION

C8.0077

Risk of hearing loss
High sound level

– The sound level may be high depending on the type of material, the number of balls used, the set grinding frequency and the grinding time. Excess noise in terms of intensity and duration can lead to impairments or permanent damage to hearing.

- **Ensure you take suitable soundproofing measures.**
- **Wear hearing protection if there is loud or lasting noise.**

5.1 Views of the device

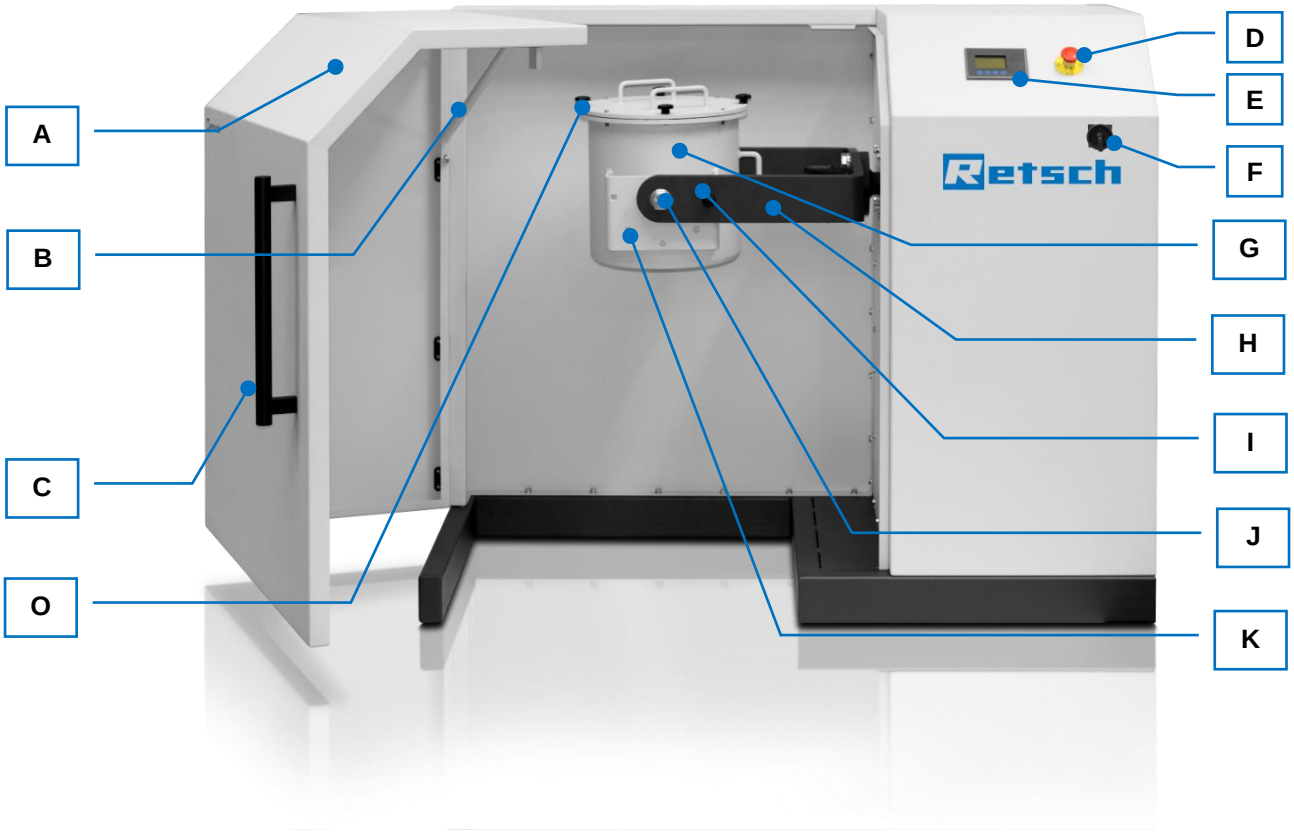


Fig. 3: Front view of the machine

5.1.1 Overview table of the parts of the device

Element	Description	Function
A	Housing door	Closes the grinding chamber.
B	Bar	Prevents the housing door being closed if the rod module is not correctly positioned.
C	Handle	For opening the housing door .
D	Emergency stop button	Pressing this switches the machine off immediately.
E	Control panel	For controlling the machine.
F	Main switch	Turning this switches the machine on/off.
G	Grinding drum	Grinding drum (e.g. 21.7 litres).
H	Grinding drum support	Holds and rotates the grinding modules.
I	Locking screw	For securing the grinding drum position; use a 36 mm open end wrench.

J	Fixture for the grinding drum support	Screw for changing the grinding modules.
K	Locking holes	5 different locking positions possible.
O	Screws (Grinding drum cover)	4 screws secure the cover of the grinding drum.

5.2 Operating elements and displays

Fig. 4: View of the control panel

5.2.1 Overview Table of the Operating Elements and the Display

Element	Description	Function
L	Operating button	For operating the machine settings.
M	Button to open/lock the housing door	Unlocks/locks the housing door .
N	Display	Displays the control functions and parameters.

5.3 Opening the device

The following steps are necessary to open the housing door so that the grinding modules can be used:

- Connect the machine to the power supply.
- Switch on the main switch (**F**) at the front.
- Press button F3 (Lock / Unlock).

The safety lock opens and the housing door (**A**) can be opened.

5.4 Closing the device

It is only possible to lock the grinding chamber when the machine is connected to the power supply and the main switch has been switched on.

- Make sure that nobody is in the grinding chamber.
- Close the housing door (**A**).
- A sensor detects the correct position of the closing pin on the housing door (**A**).

The housing door can now be locked using button F3 (**M**) on the control panel.

5.5 Emergency Unlocking

⚠ CAUTION

C9.0009

Risk of injuries
Drive coasting

- In the event of a power failure, the drive on the device continues to coast for a long time, as does the drive on connected device parts. After activating the emergency release, items of clothing and parts of the body can get caught in moving components of the device. This can result in substantial injuries.

- **Disconnect the device from the power supply before activating the emergency release.**
- **Wait until all parts of the device have stopped moving.**

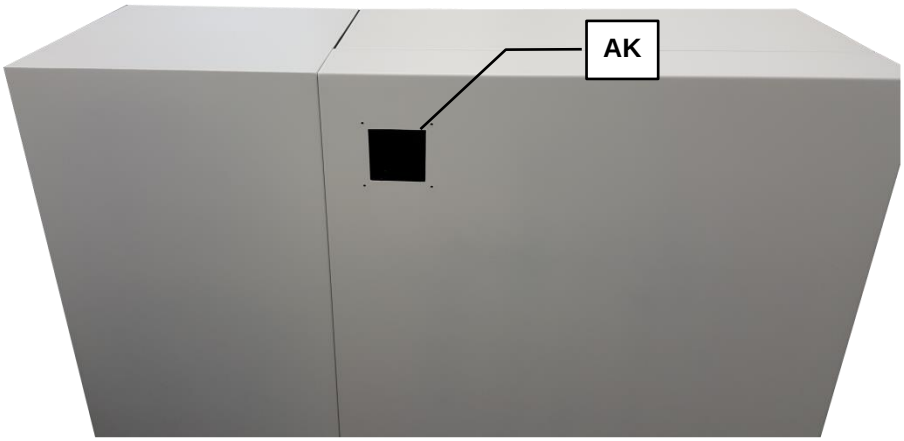


Fig. 5: Emergency release (on the back of the machine)

A key is supplied with the machine on delivery, using which the machine can be opened manually in the event of a power failure .

- Remove the cap (**AK**).
- Place the key (**SN**) into the opening (**NR**).
- The key must be pushed into the mechanism to unlock the gear drive.

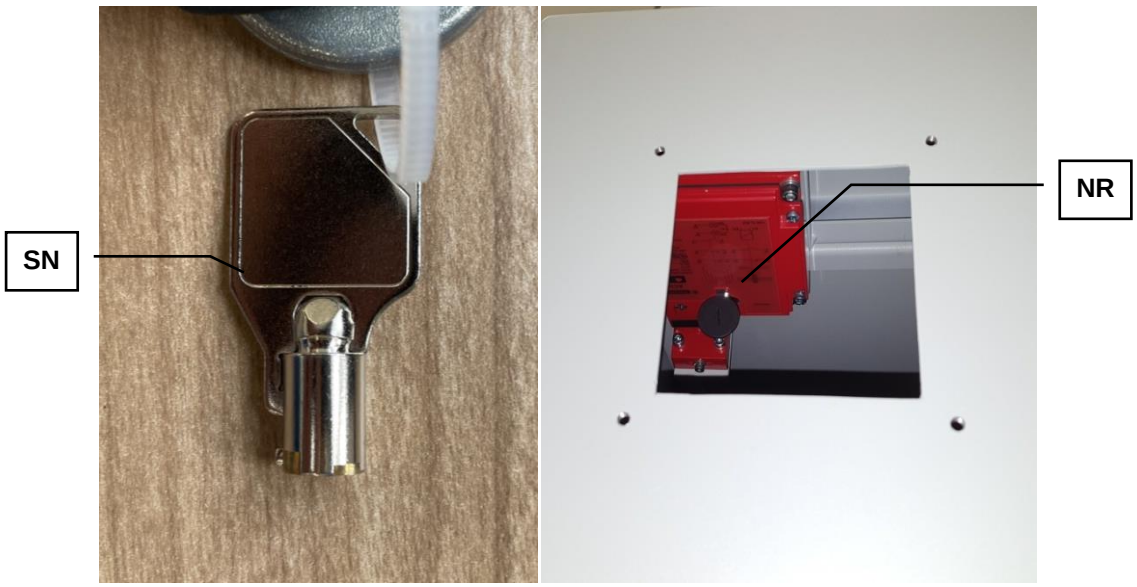


Fig. 6: Emergency release procedure

- Turn the key (**SN**) as far as it will go **in a clockwise direction**.
- The interlock is open, and the hood can be opened.
- The interlock must be set to “lock” again in order to be able to restart the machine.
- To do this, turn the key (**SN**) as far as it will go **in an anticlockwise direction**.

5.6 Inserting the grinding drum

NOTICE

N14.0066

Wear or damage to the machine
Operating without grinding set and with overloading

- Operating the machine without a grinding set, grinding media and sample can result in increased wear or damage to the machine.
- **Only operate the machine with clamped grinding set with grinding media and sample.**
- **Do not overload the machine. We recommend filling approx. 25% of the nominal volume with sample and a maximum 50% of the nominal volume with grinding media.**

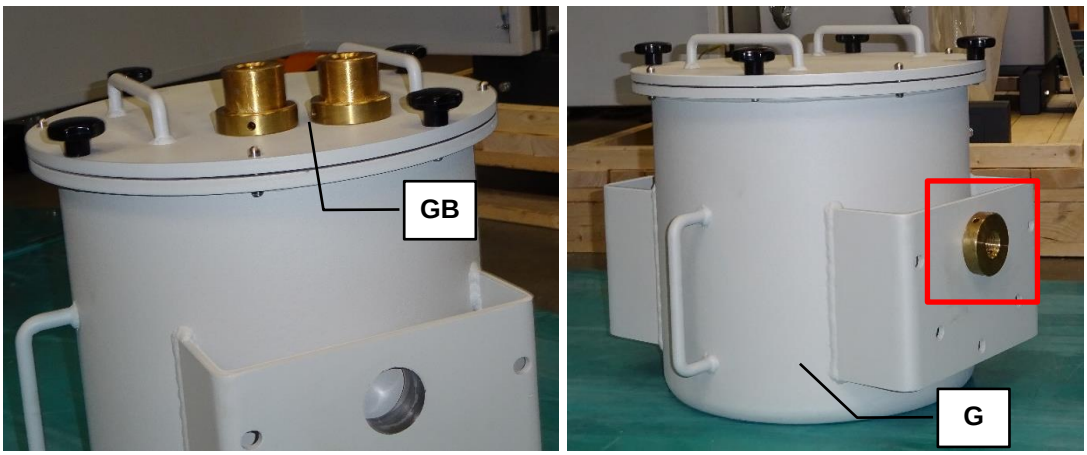


Fig. 7: Grinding drum and roller bearing bushes

- Lightly grease the two roller bearing bushes (**GB**) of the grinding drum.
- Position the greased roller bearing bushes in the side openings of the grinding drum (**G**).

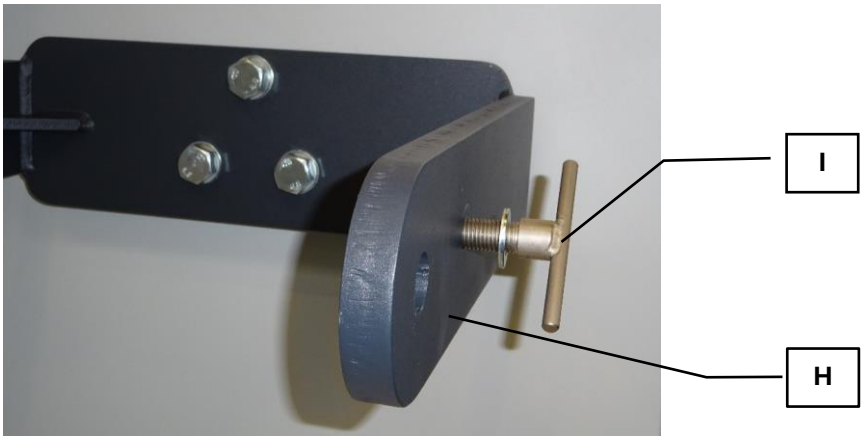


Fig. 8: Grinding drum support

- Unscrew the locking screw (**I**) of the grinding drum support (**H**), which is located inside the appliance, until the locking screw (**I**) on the inside of the grinding drum support (**H**) is no longer visible.

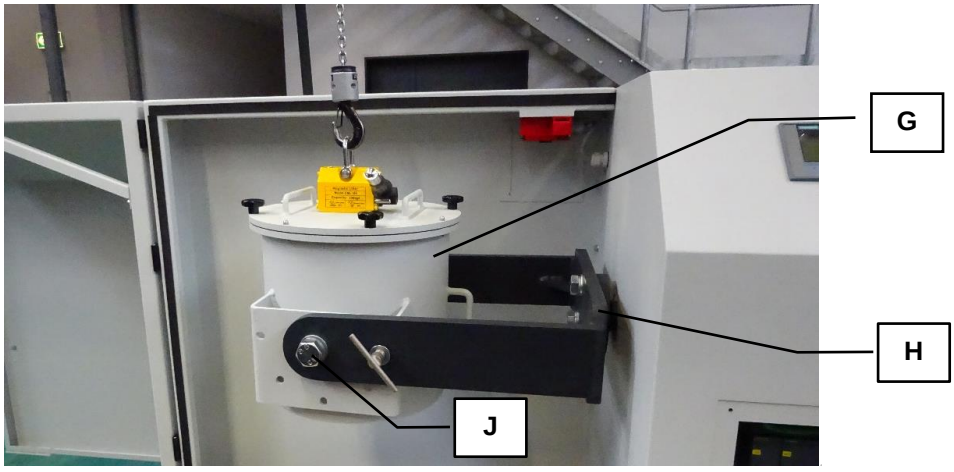


Fig. 9: Inserting the grinding drum into the grinding drum support

- Lift the grinding drum (**G**) using the lifting aid and position it in the grinding drum support (**H**). Use the handles on the grinding drum lid as attachment points.
- Screw on the grinding drum (**G**) with two hexagon screws 933/M24x65 and circlips and washers (**J**)

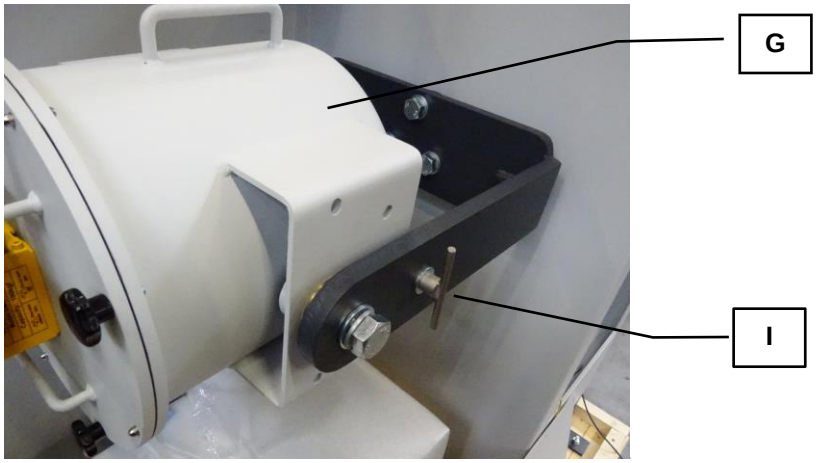


Fig. 10: Fixing the grinding drum with the locking screw

- Horizontally align the grinding drum (**G**) (the lid is on the side)
- Tighten the locking screw (**I**) of the grinding drum support (**H**) as far as it will go to fix the position of the grinding drum.

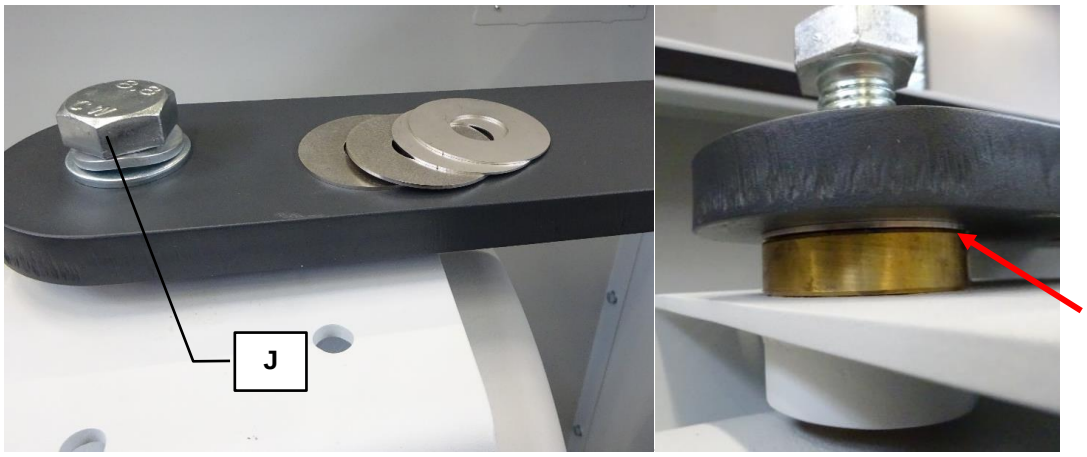


Fig. 11: Compensate the gap between the grinding drum and the grinding drum support

- Align the grinding drum support (H) including the grinding drum (**G**) so that the locking screw points downwards. Afterwards, loosen the M24 screw (**J**) facing upwards.
- Compensate the gap (red arrow) between the roller bearing and the grinding drum support with the washers provided.
- Tighten the previously loosened M24 screw with a 36 mm open-end wrench.

5.6.1 Grinding modules

Fig. 12: 5 litre ball module

Fig. 13: 10 litre ball module

Fig. 14: 21.7 litre ball module

Fig. 15: 43.4 litre rod module

5.7 Preparing the grinding process

5.7.1 Filling the grinding balls

The grinding drum must be mounted when filling and emptying the grinding drum .

- Place the grinding drum in the filling position.

Fig. 16: Grinding drum (21.7 litres) in the filling position

Load the grinding drum with grinding balls

- First fill the balls into the grinding drum, followed by the material.

Fig. 17: Positioning the grinding balls

5.7.2 Filling the rods

Load the grinding drum with grinding rods

- First fill the rods into the grinding drum, followed by the material.

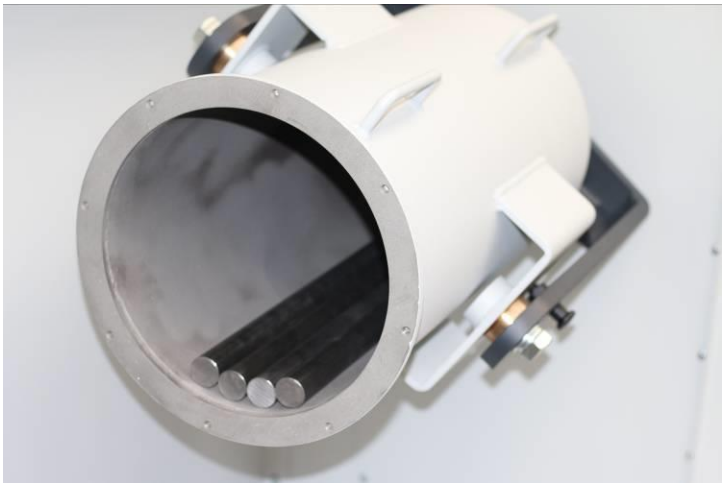


Fig. 18: Positioning the grinding rods

5.7.3 Locking the grinding drum

CAUTION

C10.0024

Risk of burns and scalding

Hot grinding drum and/or sample material

- The sample material and grinding drum can get very hot during grinding.
- **Always wear protective gloves when touching the grinding drum after grinding.**
- **Never open a hot grinding drum!**
- **Allow the grinding drum to cool down to room temperature before opening.**

Fig. 19: Grinding drum with closed lid

- If not already done, tilt the grinding drum into a vertical position.
- Place the lid on the grinding drum. Ensure that the lid is centred and flat on the grinding drum.

- Turn the lid clockwise until the three clamps engage in the receptacles of the grinding drum. Close the grinding drum hand-tight by turning the handle clockwise.

5.7.4 Changing the grinding drum-positions

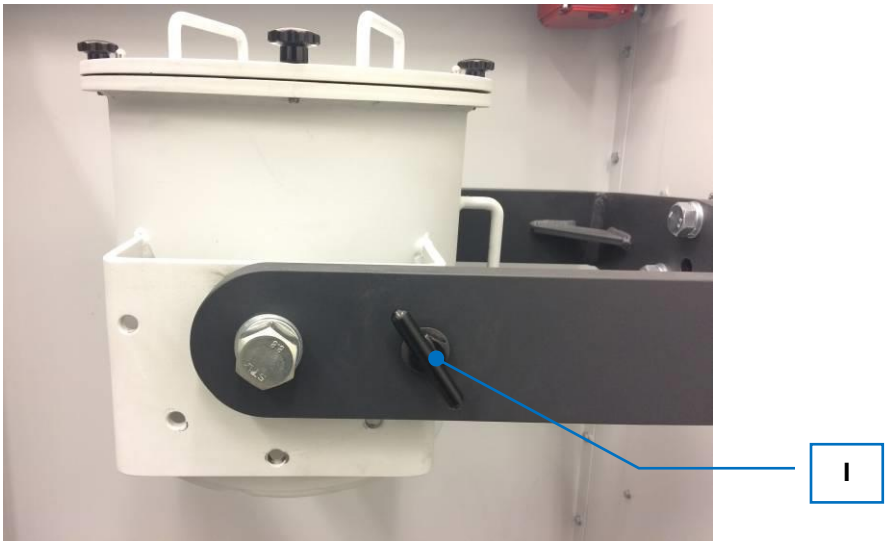


Fig. 20: Image of the filling position

- Unscrew the locking screw (**I**) and change the position of the grinding drum to the grinding position.

5.8 Grinding drum positions

CAUTION

C11.0032

Risk of crushing

Movement of the grinding drum

– There is a risk of crushing caused by the turning and swinging of the grinding drum.

- **Turn the grinding drum carefully and make sure that your fingers do not get trapped in the supports while turning the drum.**

The grinding drums can be placed in five different positions.

- To do this, the locking screw (**I**) is unscrewed.
- You must hold the grinding drum with your other hand.
- You can then place the grinding drum in the desired position and then tighten the locking screw (**I**) again by hand.

5.8.1 Filling position

Fig. 21: Grinding drum in the filling position

5.8.2 Mixing position

Fig. 22: Grinding drum in the mixing position

- Mixing is only possible with grinding drum sizes of up to 21.7 litres

5.8.3 Grinding position

Fig. 23: Grinding drum in the grinding position

5.8.4 Emptying position

Fig. 24: Grinding drum in the emptying position

5.8.5 Complete emptying position

Fig. 25: Grinding drum in the complete emptying position

5.9 Removing sample material after grinding

⚠ CAUTION

C12.0024

Risk of burns and scalding
Hot grinding drum and/or sample material

- The sample material and grinding drum can get very hot during grinding.
- **Always wear protective gloves when touching the grinding drum after grinding.**
- **Never open a hot grinding drum!**
- **Allow the grinding drum to cool down to room temperature before opening.**

⚠ CAUTION

C13.0032

Risk of crushing
Movement of the grinding drum

- There is a risk of crushing caused by the turning and swinging of the grinding drum.
- **Turn the grinding drum carefully and make sure that your fingers do not get trapped in the supports while turning the drum.**

The following steps are required to remove the sample material after grinding:

- Wait until the end of the grinding process and for the grinding drum to be in the correct position. Both are shown on the display (**N**).
- Open the housing door (**A**).
- Position the collecting receptacle with suitable separation screen beneath the grinding drum (**G**).
- Unscrew and remove the four screws (**O**) on the grinding drum lid and lift the grinding drum lid off.
- Hold the grinding drum (**G**) firmly by the handle in one hand before unscrewing the locking screw (**I**) with your other hand.

- Turn the grinding drum (**G**) to the emptying position and then to the complete emptying position to empty all sample material into the collecting receptacle.

5.10 Accessories

The TM 300 is supplied with a suitable collecting receptacle and separation screen . This includes sieves to suit all ball sizes for separating the grinding balls from the material.

ⓘ Use a sieve with slightly smaller holes than the diameter of the balls used. The balls will otherwise also be sifted out.

Fig. 26: Separation screen

Fig. 27: Connection for dust extraction

ⓘ The separation screen (**P**) is suitable for grinding balls with different diameters. The collecting receptacle is fitted with a connection (**R**) for dust extraction.

5.11 Control panel – Operating the machine

5.11.1 Start menu

Press any function button.

Fig. 28: Start menu – Housing door not locked

Fig. 29: Start menu – Housing door locked

F1:	**Start/Stop**	Starts and stops the machine.
F2:		*No function in the start menu.*
F3:	**Lock / Unlock** (close / open)	Locks or unlocks the housing door. When the housing door is closed and can be locked, “Ready” is shown on the display; the grinding process can be started by pressing button F1.
F4:	**Set**	Opens the settings.

5.12 Settings

Select button F4 to go to the menu settings .
Grinding can be configured using this menu.

The display then shows the following functions:

Fig. 30: Settings selection menu 1/6

Runtime (duration of the grinding process)

F1: +1	Increases the duration of the grinding process.
F2: - 1	Reduces the duration of the grinding process
F3: h/m/s	Switches between setting for hours/minutes/seconds
F4: Next	Opens the next menu page.

The following setting appears after pressing button F4:

Fig. 31: Settings selection menu 2/6

Fig. 32: Settings selection menu 2/6

In this menu you can specify the desired number of revolutions per minute to be made by the grinding drum.

Speed (number of revolutions of the grinding drum)

F1:	**+1**	Increases the speed.
F2:	**-1**	Decreases the speed.
F3:	**Toggle** (Setting the direction of rotation)	Pressing once switches between the two directions of rotation.
	Rev-Mode: no	Clockwise rotation of the grinding drum. If interval mode is specified in the next menu, the direction of rotation of the grinding drum remains unchanged after each interval (clockwise rotation)
	Rev-Mode: yes	Anticlockwise rotation of the grinding drum. If interval mode is specified in the next menu, the direction of rotation of the grinding drum is changed after each interval (anticlockwise rotation/clockwise rotation)
F4:	**Next**	Opens the next menu page.

The following setting appears after pressing button F4.

Fig. 33: Settings selection menu3/6

In this menu you can specify the desired interval duration for the grinding process.

Interval duration

F1: +1	Increases the interval duration.
F2: -1	Decreases the interval duration.
F3: h/m	Switches between setting for hours/minutes.
F4: Next	Opens the next menu page.

The following setting appears after pressing button F4.

Fig. 34: Settings selection menu4/6

In this menu you can specify the desired duration of breaks between the intervals. This is only possible if you have previously selected interval mode.

Break duration (duration of breaks between the intervals)

F1: +1	Increases the break duration.
F2: -1	Decreases the break duration.
F3: h/m	Switches between setting for hours/minutes.
F4: Next	Opens the next menu page.

The following setting appears after pressing button F4.

Fig. 35: Settings selection menu5/6

Fig. 36: Settings 5/6

Revolutions (specifying the total number of revolutions)

F1:	**+ 1**	Increases the total number of revolutions.
F2:	**- 1**	Decreases the total number of revolutions.
F3:	**Toggle**	Pressing once switches between the two stop options.
	Stop on: Revolut	Stopping after the set number of revolutions.
	Stop on: Time	Stopping after the set time.
F4:	**OK**	Saves the settings.

The following setting appears after pressing button F4.

Fig. 37: Settings selection menu6/6

In this menu you can specify the desired time for a delayed start of the grinding process.

Start delay

F1: +1	Increases the time until the start of grinding.
F2: -1	Decreases the time until the start of grinding.
F3: h/m	Switches between setting for hours/minutes.
F4: OK	To the start menu

After confirming the selection you return to the start menu.

Fig. 38: Start menu – Start grinding

Start the grinding process by pressing button F1.

5.13 Starting the grinding process

The display initially shows the following view once grinding has been started by pressing button F1.

Fig. 39: Display after starting grinding with start delay

Confirm the safety question using button F1 if the grinding drum is in the horizontal position. Grinding will then start.

Confirm the safety question using button F4 if the grinding drum is not in the horizontal position. Grinding will not then start, and instead you will return to the start menu.

After starting by confirming the safety question using button F1, the display shows the following view if a delayed start time has previously been specified.

Fig. 40: Display after starting grinding with start delay

This view provides information about a delayed start to grinding if this has been specified in the settings.
The time runs down, then grinding begins automatically.

Fig. 41: Display during the grinding process, Stop on: Revolut

Fig. 42: Display during the grinding process, Stop on: Time

The display provides information about the current grinding process:

Speed	(In revolutions per minute)	Provides information about the current speed of the grinding module.
Power	Input power (expressed in Watt)	This informs about the currently measured input power into the frequency converter.
Time	(In hours, minutes and seconds)	Provides information about the time until grinding is finished.
Curr. Revolutions		Provides information about the current number of grinding drum revolutions.
Targ. Revolutions		This informs about the selected number of grinding drum revolutions until the grinding process is completed.

The grinding process can be ended at any time by pressing button F1.

5.14 Information Notes

The display shows this note once a grinding process has been stopped or is finished.

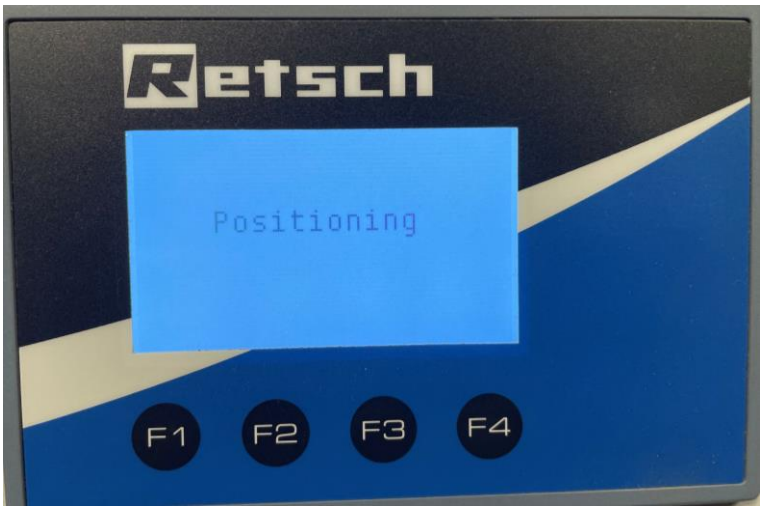


Fig. 43: Note - Positioning

The display provides information that the grinding drum is being placed in the correct position.

Wait for the correct positioning of the grinding drum before opening the housing door and removing the sample material.

5.15 Error Messages

An error message appears on the display if it is not possible to start the grinding process.

The display shows the following error message if the emergency stop is activated or the housing door cannot be locked:

Fig. 44: Check safety

With this error message, deactivate the emergency stop or open and close the housing door and start the grinding process again.

6 Maintenance

WARNING

W4.0003

Risk to life caused by an electric shock
Cleaning live parts with water

– Cleaning the device with water can lead to life-threatening injuries caused by an electric shock if the device has not been disconnected from the power supply.

- **Only carry out cleaning work on the device when it has been disconnected from the power supply.**
- **Use a cloth moistened with water for cleaning.**
- **Do not clean the device under running water!**

WARNING

W5.0000

Risk of loss of life due to an electric shock
High voltage due to capacitor discharge

– Due to the capacitor discharge on the frequency converter, the device conducts voltage for up to **3 minutes** after the mains plug has been removed.

– You could touch live contacts when the device is open. An electric shock can cause serious injuries in the form of burns and cardiac arrhythmia, respiratory failure or cardiac arrest.

• **Wait 3 minutes after removing the power cable before opening the device.**

6.1 Removing the side cover

Fig. 45: Side cover

Fig. 46: Key

- Release the locks marked on the image with the help of the supplied key .
- Disconnect the earth cable on the inside of the cover.
- Remove the cover.
- Carry out the specified maintenance work.
- Connect the earth cable again.
- Put the cover back on.

6.2 Lubrication

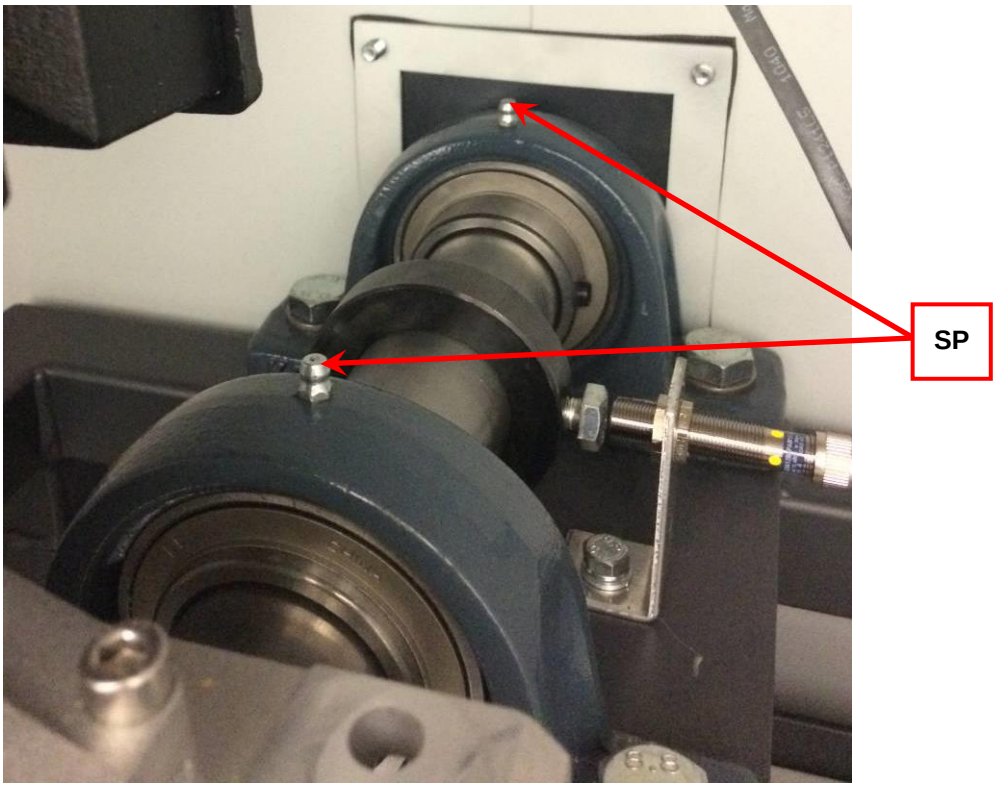


Fig. 47: Lubrication points Drive shaft

The drive of the TM 300 has 2 lubrication points (**SP**) behind the side cover; these must be regularly lubricated after 150 hours of operation.

Use a lithium based grease (**without graphite**) such as Shell Gadus S2 V220 2 or BP Energrease LS-EP 2.

7 Return for Service and Maintenance

Fig. 48: Return form

The acceptance of devices and accessories of the Retsch GmbH for repair, maintenance or calibration can only be effected, if the return form including the decontamination declaration service has been correctly and fully completed.

- ⇨ Download the return form located in the download section "Miscellaneous" on the Retsch GmbH homepage (http://www.retsch.com/downloads/miscellaneous/).
- ⇨ When returning a device, attach the return form to the outside of the packaging.

In order to eliminate any health risk to the service technicians, Retsch GmbH reserves the right to refuse the acceptance and to return the respective delivery at the expense of the sender.

8 Disposal

In the case of a disposal, the respective statutory requirements must be observed. In the following, information on the disposal of electrical and electronic devices in the European Community are given.

Within the European Community the disposal of electrically operated devices is regulated by national provisions that are based on the EU Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).

Accordingly, all devices supplied after August 13th 2005 in the business-to-business area, to which this product is classified, may no longer be disposed of with municipal or household waste. To document this, the devices are provided with the disposal label.

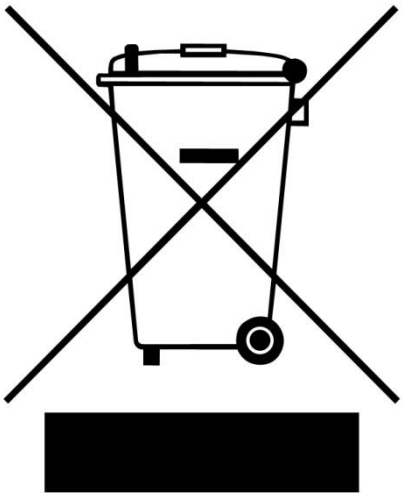


Fig. 49: Disposal label

Since the disposal regulations worldwide and also within the EU may differ from country to country, the supplier of the device should be consulted directly in case of need.

This labelling obligation is applied in Germany since March 23rd 2006. From this date on, the manufacturer must provide an adequate possibility of returning all devices delivered since August 13th 2005. For all devices delivered before August 13th 2005 the end user is responsible for the proper disposal.

9 Index

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EU Declaration of Conformity

Translation

DRUM MILL

TM 300 | 21.301.xxxx

EU DECLARATION OF CONFORMITY

We, represented by the undersigned, hereby declare that the above device complies with the following directives and harmonised standards:

Machinery Directive 2006/42/EC

Applied standards, in particular:

DIN EN ISO 12100	Machine Safety - General Design Principles
DIN EN 60204-1	Safety of machinery – Electrical equipment of machines
DIN EN ISO 13849-1	Safety of machinery - Safety-related parts of control systems

Electromagnetic compatibility 2014/30/EU (tested at 230 V, 50 Hz)

Applied standards, in particular:

EN 55011	Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement
DIN EN 61326-1	Electrical equipment for measurement, control and laboratory use - EMC requirements

Restriction of hazardous substances (RoHS) 2011/65/EU

Authorised person for compilation of the technical documentation:
Julia Kürten (Technical Documentation)

Furthermore, we declare that the relevant technical documentation for the above device has been prepared in accordance with Annex VII Part A of the Machinery Directive and we undertake to submit the documentation to the market surveillance authorities on request.

In the event of a modification of the device not agreed on by Retsch GmbH, as well as the use of non-approved spare parts or accessories, this declaration loses its validity.

Retsch GmbH

Haan, 06/2024

Dr. Stefan Mähler, Technical Manager

CE

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