# Manual

# Cutting Mill SM 50


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 0001 of the "Cutting Mill SM 50" 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



## 1.3 Explanation of signs and symbols

In this manual, the following signs and symbols are used:

| Signs and symbols | Meaning |
|---|---|
| ⓘ | Reference to recommendation and/or important information. |
| **Bold font** | Labelling of an important term. |
| • .<br>• .<br>• | Lists |
| (1), (2), (…)<br>(A), (B), (..) | The components have a fixed marking. |
| ⇨ | Action steps of instructions. |
| ➔ | Result of an action step |

| | |
|---|---|
|  | In the explanations in this operating manual, the **Retsch Cutting Mill SM 50** is mostly referred to as the **device**. |

## 1.4 Explanations of the Safety Instructions

**⚠ 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 Safety

**⚠ 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.**

**Target group:**

The SM 50 has been designed for preparing samples in a laboratory environment. laboratory environment. This manual is therefore directed at persons who work with this device in a comparable environment and who already have experience with similar equipment.

The SM 50 is a modern, efficient, state-of-the-art product from Retsch GmbH. Its reliability is ensured when used as intended and with knowledge of this technical documentation.

**Safety Officer:**
The operating company itself must ensure that people authorised to work on the device…

- have read and understood all regulations contained in the chapter on safety;
- are aware before they start work of all instructions and regulations for the target group related to the work;
- have easy access to the technical documentation for this device at all times;
- 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 technical documentation.

**⚠ CAUTION** Improper operation can lead to personal injuries and damage to property. The operating company itself is responsible for its own safety and that of its staff. The operating company itself is responsible for ensuring that no unauthorised persons have access to the device.

**⚠ CAUTION** People under the influence of intoxicating substances (medications, drugs, alcohol), fatigue or health disorders are not allowed to operate the device.

## 2.1 Intended use of the device

The device SM 50 is designed for the comminution of soft, medium-hard, tough, brittle, elastic and short-fibred grinding material in dry and slightly moist condition to a particle size of up to 50 mm. The device features the fast, loss-free and powerful comminution of samples and delivers reproducible results.

The device is designed for stationary operation in a clean and dry working environment.

Operators and operating personnel must have read the operating manual and be familiar with the full range of functions of the device.

## 2.2 Improper use

The SM 50 may only be used as intended.

Any uses other than the described intended use are regarded as improper use.

The SM 50 is **not** suitable for processing sample materials that can form explosive air mixtures.

Any form of claims for damage to equipment or personal injury resulting from improper use and/or the failure to comply with the safety instructions shall be ruled out.

## 2.3 Obligations 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 SM 50 into your emergency planning:

- Integrate the SM 50 into your operating procedures regulating conduct in emergency situations.
- To prevent accidents during work processes, incorporate the SM 50 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.

### 2.3.1 Provisions

The user bears responsibility for ensuring that people working with the device and the corresponding equipment have taken note of and understood all relevant safety regulations.

### 2.3.2 Personnel

- Ensure that only trained personnel are deployed whose training and experience enable them to recognise risks and avoid potential hazards.
- Staff should be given regular training on using the device, and in particular regarding sudden events.

- Only allow trainee staff to work on the device when they are being supervised by qualified personnel.
- Check the safety awareness of staff regularly.
- Define staff responsibilities according to qualification and job description.
- Provide staff with personal protective equipment (PPE).
- Ensure that the following conditions have been met:
  - Staff have read and understood this Manual, and in particular the chapter on Safety.
  - Staff are aware and take note of the relevant accident prevention and safety regulations.
  - Staff wear the designated personal protective equipment (PPE) when working with the device.

### 2.3.3 Workstation and device

- Ensure that there is sufficient lighting and ventilation at the workstation.
- Ensure that the exhaust air is properly conducted outside.
- All signs on the device must be kept in a legible condition.
- Ensure that all inspections and servicing work prescribed in this Manual are carried out.

### 2.3.4 Qualification of personnel

| Work/operating phase | Qualification |
|---|---|
| Transport<br>Installation<br>Commissioning<br>Operation<br>Controlling<br>Servicing<br>Disposal | Qualified employee who has been trained in the safe use of the device. |
| Work on the electrical equipment on the device | Electrician who, on the basis of his/her training, knowledge and experience is able to evaluate the work assigned and recognise potential hazards. |

### 2.3.5 Personal protective equipment (PPE)

**Recommendations for personal protective equipment**

| Work/operating phase | Personal protective equipment (PPE) |
|---|---|
| Transport<br>Installation | Safety shoes |
| Commissioning<br>Maintenance and repair | Safety shoes<br>Protective gloves |
| Disposal | Safety shoes |

| | |
|---|---|
| Normal operation (operation and control) | Safety shoes<br>Hearing protection<br>Safety goggles<br>Protective gloves for removing the rotor, sieve and ground material at extreme temperatures. |

## 2.4 Protective Equipment

**Emergency stop switch**

The device is **not** factory-equipped with an emergency stop switch. In an emergency, the device must be shut down by pressing the main switch or by disconnecting the device from the power supply.

## 2.5 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:**

## 2.6 Preventing risks during normal operation

Failure to observe the following safety instructions constitutes improper use and poses a danger to personnel and a risk to operational safety.

**Transport and installation**

- Do not carry the device alone during transport and installation.
- Wear safety shoes during transport and installation.
- Only connect the appliance to sockets equipped with a protective earth (PE).
- When connecting the device, the values on the rating plate must match the values of the power supply.

**Operation**

- Read the operating manual before the device is commissioned.
- Only operate the device in a sufficiently large workspace with a stable and secure position of the device.
- Check the power cable for damage before operation.
- Never operate the device if damage is visible or suspect.
- Only operate the device within the specified technical operating limits.
- Do not wear jewellery, keep your hair tied back and do not wear a tie or other loose clothing during operation.
- Wear safety goggles and hearing protection during operation.
- Before operating the device, take measures to account for limited communication during device operation.
- Observe your surroundings during grinding, as the noise level makes it difficult to perceive acoustic signals.
- Do not operate the device in potentially explosive atmospheres.
- Read the safety data sheets of the samples and follow the instructions by taking appropriate measures in advance.
- Do not grind any explosive and/or flammable substances.
- Do not grind any substances that may become explosive and/or flammable during grinding.
- During operation, sample-carrying components can become very hot. Wait for the sample to cool down before sampling and wear protective gloves, if necessary.

**Maintenance and repair**

- Switch off the device using the main switch before maintenance.
- Secure the device against being switched on again and disconnect it from the power supply before maintenance.
- Do not clean the device under running water.
- Do not clean the device with compressed air.
- Repairs must only be carried out by the manufacturer of the device or an authorised representative.

## 2.7 Preventing damage to equipment

- If strong temperature fluctuations are expected (e.g. during air transport), protect the device from condensation.
- Do not bump, shake or throw the device during transport to the installation site and set-up.
- **Conditions for the installation site** must be observed when setting up the device.
- When inserting the sieve, rotor and grinding chamber insert, ensure they are positioned correctly.
- Never operate the device without the grinding chamber insert in place.
- Only feed grinding material after the rotor has started running.
- Do not feed the grinding material in too quickly.
- Move the slider slowly and do not overfill the hopper.
- When using the collecting vessel, do not overfill it to prevent back-flow into the grinding chamber.
- Use a damp cloth to clean the device.
- Do not use any solvent or aggressive cleaning agent when cleaning the device.
- Only use original spare parts for maintenance.

## 2.8 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 The SM 50 Cutting Mill

The SM 50 of the Retsch GmbH is a laboratory device and is used for sample preparation.

The device enables comminution in batches of soft, medium-hard, hard, fibrous, elastic and brittle materials in dry and slightly moist condition to a particle size of up to 50 mm.
Depending on the properties of the material and the accessories used, a final finenesses of up to 250 µm can be achieved.
The final fineness of the materials fed as grinding material is determined significantly by:

- the sieve
- the properties (fracture behaviour) of the materials fed as grinding material

All sample-carrying components are modular elements that can be replaced quickly and easily during routine operation. The device meets high standards of purity, speed, fineness, reproducibility and safety.

The following materials, among others, can be comminuted as grinding material:

- spices, herbs
- springs
- toys
- plastic parts, packaging
- thin branches, roots, grasses
- textiles
- paper, cardboard, corp

Thanks to its robust design, the device can be used in industry and research, among other uses, in the following areas:

- the plastics sector
- pharmaceuticals and chemicals
- the food and feed industry
- the energy, environment and recycling industry
- agriculture


**Fig. 1:** SM 50 Cutting Mill

## 3.1 Technical data

| Scope of application | |
|---|---|
| Applications | Comminution, deagglomeration |
| Scope of application | Agriculture, Biology, Chemistry, Plastics, Building Materials, Engineering, Electrical Engineering, Energy Sector, Environment, Food, Medicine, Pharmacy, Recycling |
| Feed material | soft, medium-hard, tough, brittle, elastic, fibrous |

| Operating data | |
|---|---|
| Mains connection | 1~, 100 V, 110 V, 120 V, 50/60 Hz<br>1~, 200-230 V, 50/60 Hz |
| Mains voltage fluctuations | +/- 10% |
| Power consumption | 1700 VA |
| Upstream fuse | 100 V, 110 V, 120 V: 20 A<br>200-230 V: 10 A |
| Degree of protection | IP20 |
| Noise emissions | Noise measurement in accordance with DIN 45635-31-01-KL3.<br>The noise emission values are influenced by the grinding material, the feed particle size and the accessories used.<br>LpAeq = > 92 dB(A) |
| Electromagnetic compatibility (EMC) | EMC Class B according to DIN EN 55011 |

| Values for grinding | |
|---|---|
| Commminution principle | Cutting, shearing |
| Dry grinding | Yes |
| Wet grinding | No |
| Rotational speed | 500 - 4000 rpm<br>Step increments 100 rpm |
| Maximum feed quantity | 300 ml (500 ml glass)<br>2000 ml (3 l collection container) |
| Maximum particle size of the feed quantity | 50 mm |
| Maximum hardness of the feed quantity | <4 Mohs |
| Maximum achievable final fineness | <250 µm, depending on the material and sieve |
| Grinding chamber insert (materials) | Grinding chamber insert: aluminium, stainless steel<br>Gravity insert: aluminium |
| Rotor (materials) | stainless steel, heavy metal-free steel |
| Operation | 4.3-inch touch display with rotary push button |

| Dimensions and weight | |
|---|---|
| Height<br>Height with funnel extended<br>Width<br>Width with dust extractor connected<br>Depth | 750 mm<br>900 mm<br>565 mm<br>At least 765 mm<br><br>530 mm |
| Weight | Approx. 80 kg |
| Installation footprint required | 600 x 610 mm |

| | |
|---|---|
| Dust extraction connection | Diameter 32 mm<br>Length 120 mm |

| Conditions for the installation site | |
|---|---|
| Installation height | Max. 2000 m above sea level |
| Ambient temperature | 5 °C to 40 °C |
| Humidity | Maximum relative humidity 80% up to 31 °C, decreasing linearly to 50% relative humidity at 40 °C |

## 3.2 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.**

**⚠ CAUTION** C3.0045

**Risk of hearing damage**
High sound level

- Depending on the type of material, the rotor used, the rotational speed set and the duration of the grinding process, a high noise level may occur. An excessive level of noise, both in intensity and duration, can cause impairments or permanent hearing damage.
- **Ensure appropriate noise protection measures are in place.**
- **Wear hearing protection in case of high or prolonged noise levels.**

**Noise characteristic values:**
Noise measurement in accordance with DIN 45635-31-01-KL3.
The noise emission values are essentially influenced by the rotational speed, the properties of the grinding material, the sieve used, the rotor and the grinding chamber insert.

| Example 1 | |
|---|---|
| Feed material | Wood chips |
| Feed quantity | 100 ml |
| Parameters | Grinding chamber insert, vacuum cleaner, 3000 rpm |

Under these operating conditions, the workplace-related equivalent continuous sound level $L_{eq}$ = 91 dB(A).

| Example 2 | |
|---|---|
| Feed material | Wood chips |
| Feed quantity | 100 ml |
| Parameters | Gravity insert, 3000 rpm |

Under these operating conditions, the workplace-related equivalent continuous sound level $L_{eq}$ = 78 dB(A).

## 3.3 Views of the device

The numbering of components in the following views of the device is fixed and is used in further figures of components in the Manual.

### 3.3.1 Front

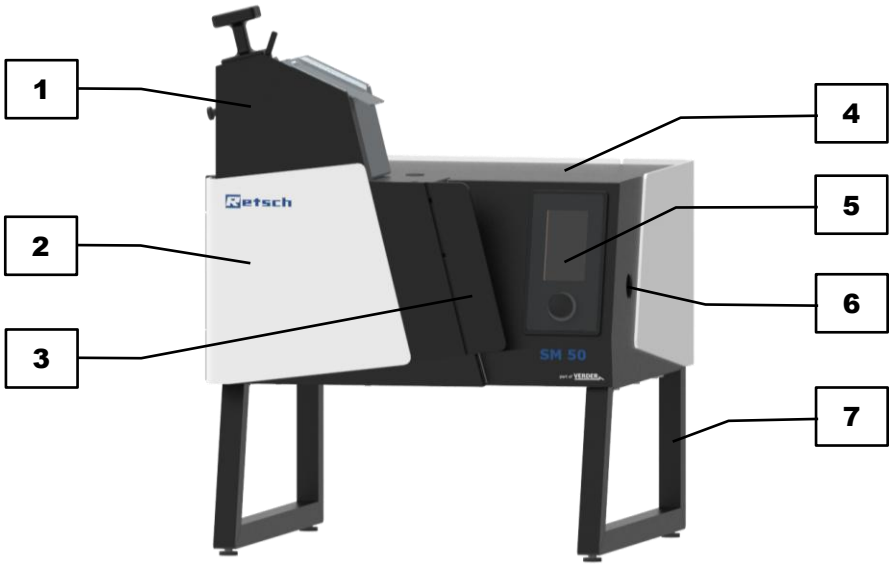



**Fig. 2:** Front view, grinding chamber door closed

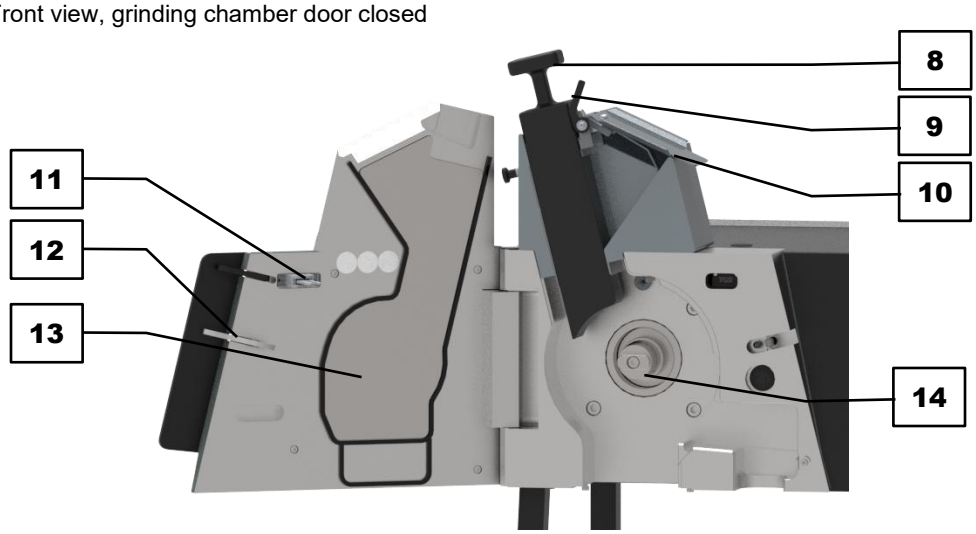



**Fig. 3:** Front view, grinding chamber door open

| No. | Component | Function |
|---|---|---|
| 1 | EasyInspect funnel | For the feeding of grinding material into the grinding chamber in batches. Not installed in the delivery state. |
| 2 | Grinding chamber door | Seals the grinding chamber during the grinding process. |
| 3 | Door handle | Handle for locking the grinding chamber manually. Position detection via the locking bolt. |
| 4 | Housing | Sheet metal housing for the drive and controller. |
| 5 | Touch display with a rotary push button | For device control and the selection and configuration of grinding parameters. |
| 6 | Dust extraction connection | Connection for the vacuum cleaner in cyclone operation. |
| 7 | Base frame with feet | Mount for the housing during operation on a table. |
| 8 | Plastic slide | Releases the material feed chute when pulled out. Pushes the grinding material into the grinding chamber. |
| 9 | Flap slide | Small slide for pushing down grinding material from the upper section of the hopper. |
| 10 | Funnel flap | Filling area of the hopper for feeding grinding material in batches. |
| 11 | Door lock | Automated door lock. |
| 12 | Door hook | Hook for manually locking the door to the grinding chamber. |
| 13 | Door insert | The counterpart to the cassette that is in contact with the sample. |
| 14 | Motor shaft | Mount for the rotor shaft |

### 3.3.2 A view on the grinding chamber

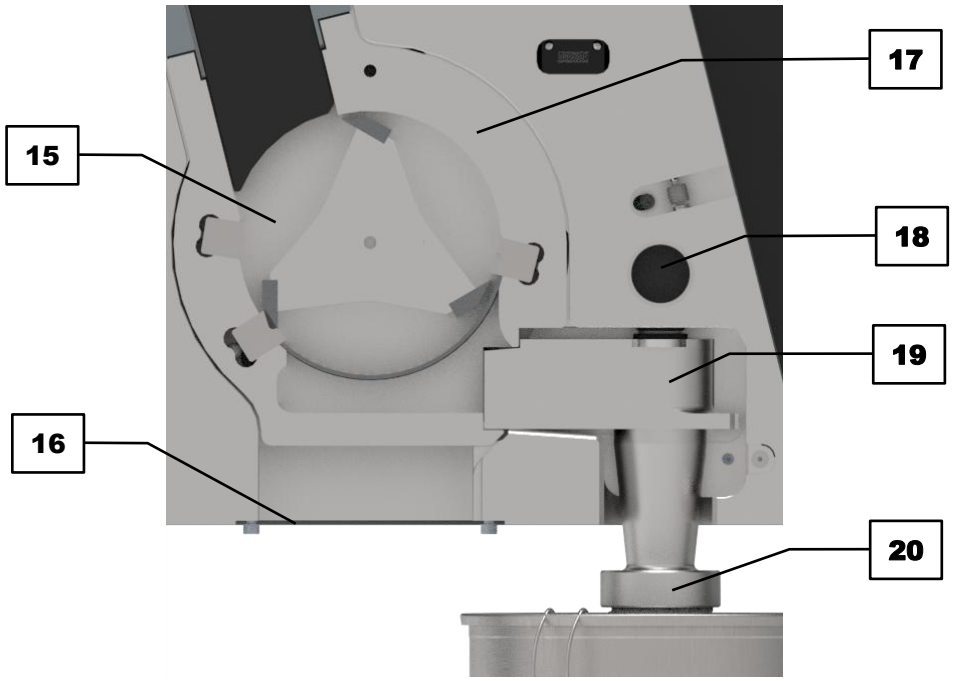



**Fig. 4:** Detailed view of the grinding chamber insert with cyclone outlet


**Fig. 5:** Detailed view of the gravity insert with gravity outlet

| No. | Component | Function |
|---|---|---|
| 15 | Grinding chamber | Location of the grinding material comminution. |
| 16 | Cover plate | Seals the grinding chamber when using the grinding chamber insert. Can only be disassembled using tools. Provides protection against accidental contact when the grinding chamber insert is removed. |
| 17 | Grinding chamber insert | Grinding chamber insert with cyclone outlet. |
| 18 | Plug | Removable for inspection or cleaning of the air duct. |
| 19 | Integrated cyclone | For the separation of the sample that has been comminuted in cyclone operation when used with a vacuum cleaner. |
| 20 | Cyclone outlet | Mount for the collecting vessel in which the crushed grinding material is collected when using the grinding chamber insert. |
| 21 | Gravity insert | Grinding chamber insert for the coarse comminution of high-density materials. |
| 22 | Rotor | Tool for the comminution of the grinding material in the grinding chamber. |
| 23 | Cutting bars | Cutting in the grinding chamber as a counterpart to the blades on the rotor. |
| 24 | Knives | Sharp-edged cutters on the rotor shaft. |
| 25 | Sieve | Influences the final fineness of the grinding material depending on the size and type of perforation. |
| 26 | Gravity outlet | Lid for the collecting vessel, in which the crushed grinding material is collected when using the gravity insert. |

### 3.3.3 Back

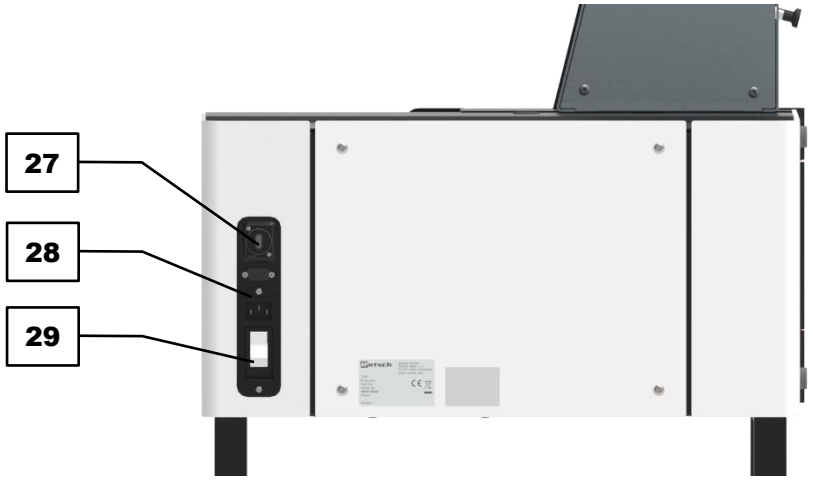



**Fig. 6:** Rear side of the device

| No. | Component | Function |
|---|---|---|
| 27 | USB interface | For connecting a USB storage device to update the controller software. |
| 28 | Appliance socket | Connection for the power cable. |
| 29 | Main switch | Switches the device on or off. |

## 3.4 Signs on the device

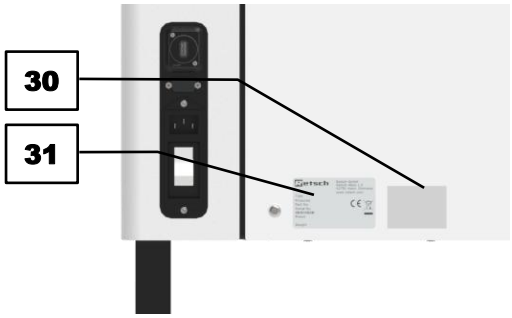



**Fig. 7:** Rear side

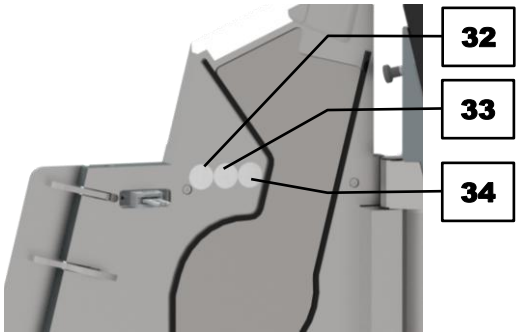



**Fig. 8:** Inner side of the door

| No. | Component | Function |
|---|---|---|
| 30 | Power warning | Caution: risk of electric shock! The housing may only be opened by trained personnel. Unplug the mains plug before carrying out maintenance! |
| 31 | Nameplate | Information about the device. |
| 32 | Read the operating manual | The operating manual for the device must be read before commissioning and operation. |
| 33 | Wear hearing protection | Wearing hearing protection is recommended. |
| 34 | Wear protective gloves | Wearing protective gloves is recommended when removing and inserting the rotor. |

## 3.5 Type Plate Description

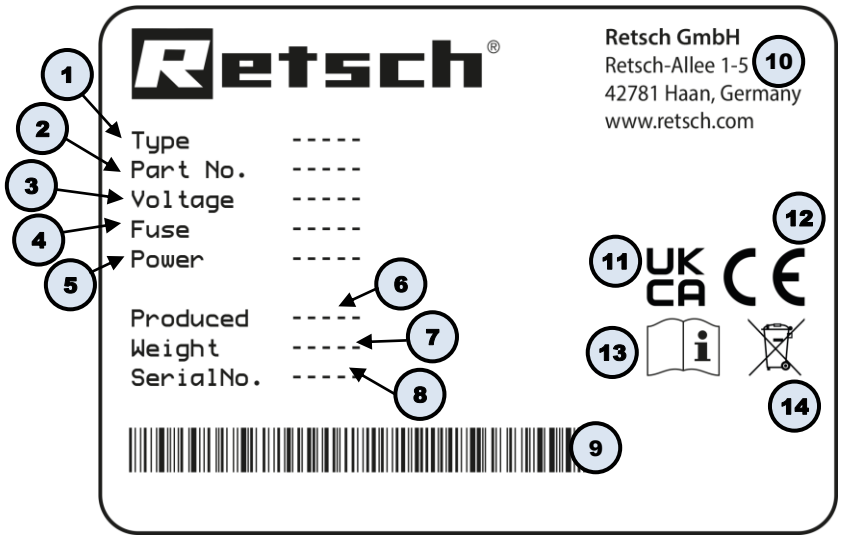



**Fig. 9:** Type plate

**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 Packaging, Transport and Installation

## 4.1 Accessories included with delivery

The device is delivered with:

- open-end spanners, size 8 and 10
- Allen keys, size 4 and 5
- a removal aid
- protective gloves
- a cleaning brush

## 4.2 Packaging

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

**NOTICE** N2.0001

**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.**

## 4.3 Transport

**⚠ WARNING** W2.0005

**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!**

**⚠ CAUTION** C4.0000

**Risk of injury caused by the device falling down**
Incorrect transport of the device

– Due to its weight, the device can cause injuries if it falls down.

- **Do not transport the device by yourself.**

Transport must be carried out according to the device properties and may only be facilitated by qualified personnel with the appropriate knowledge.
The safety instructions must be observed for transport.

**NOTICE** N3.0017

**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** N4.0014

**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.**

## 4.4 Temperature Fluctuations and Condensation

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

**NOTICE** N5.0016

**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.**

## 4.5 Conditions for the Installation Site

**⚠ CAUTION** C5.0047

**Risk of injury caused by the device falling**
Incorrect installation of the device

– Due to its weight, the device can cause injuries if it falls.
- **Only operate the device on a sufficiently large, strong and stable workstation.**
- **Ensure that all of the device feet are securely supported.**

**NOTICE** N6.0004

**Setting up the device**
Vibrations during operation

– Depending on the operating mode of the device, slight vibrations may occur.
- **Set up the device only on a vibration-free, plane and stable surface.**

**NOTICE** N7.0002

**Setting up the device**
Disconnecting the device from the mains

- A separation of the device from the mains must be possible at any time.
- **Set up the device in such a way, that the connection for the power cable is always easily accessible.**

**NOTICE** N8.0021

**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.**

**NOTICE** N9.0015

**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.**

- 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 % |

Please observe the following conditions for the installation site:
The rear side of the device must be freely accessible for switching it on and off.
When using the grinding chamber insert, at least 20 cm of space must be left on the right side of the device to connect a vacuum cleaner to the dust extraction connection.

Installation footprint required:
Width: 600 mm
Width with dust extractor connected: min. 765 mm
Depth: 610 mm

The SM 50 must be installed on a stable and solid surface. Vibrations from the device will otherwise be transmitted to the surroundings during the grinding process.

## 4.6 Remove packaging

Remove the screws/nails (blue triangles) that secure the carton to the pallet.

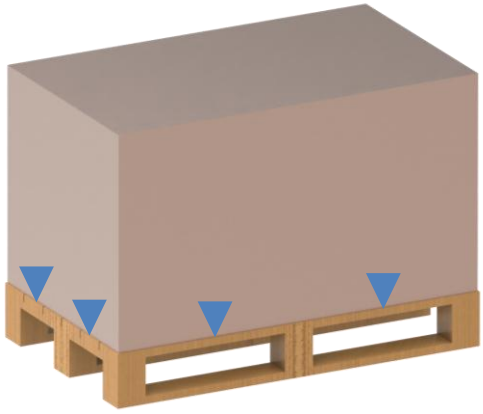


**Fig. 10:** Removing the screws on the packaging

Carefully lift the packaging box upwards.

## 4.7 Removing the Transportation Lock

The device is secured to the pallet with a transport lock. Before setting up the device, remove the transport lock as follows:
⇨ Carefully remove the device packaging and inspect the device for transport damage.
⇨ The transport lock consists of two steel struts (**7.1**) that are fixed to the right and left sides of the underside of the housing. The struts are secured with three screws each (one screw on the underside of the device, two screws on the pallet). Loosen the screw on the underside of the device using an Allen key.
⇨ Loosen the screws on the pallet using a screwdriver.
⇨ After removing the transport lock, screw the bolt that was removed from the underside of the device back into its original position and tighten it.
⇨ Keep the transport lock for any possible future transport of the device.

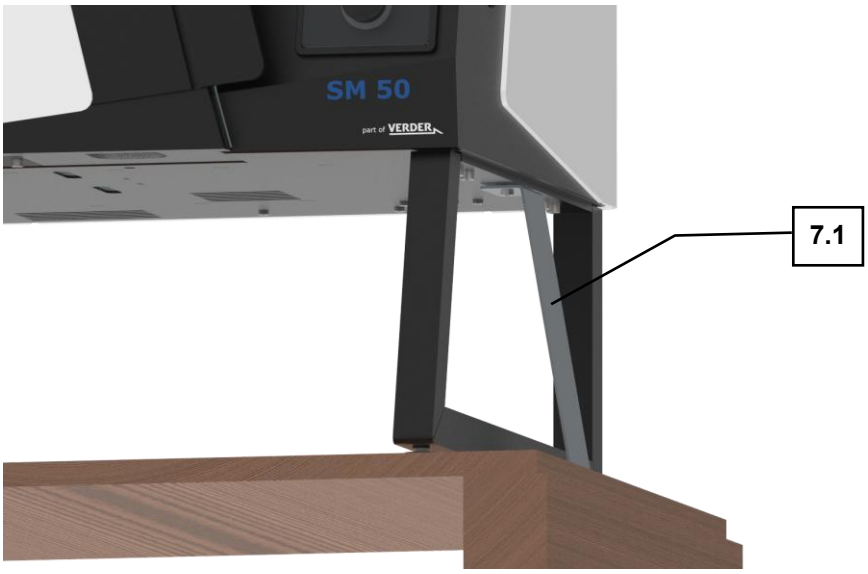



**Fig. 11:** Releasing the transport lock

## 4.8 Installation of the Device

**CAUTION** It is recommended that four persons carry the device. The base frame is suitable for use as a gripping point.

**CAUTION** Wearing protective gloves during transport is recommended.

Transport the device as follows:

⇨ **NOTE** The device is secured to the pallet with a transport lock. Ensure that the transport lock between the device and the pallet has been released.

⇨ Have four persons lift the device, with each person gripping a vertical strut of the base frame.

**CAUTION** The front of the device (funnel and door) is heavier than the rear of the device.

⇨ Carry the device slowly to the installation site.

⇨ Place the device on a stable and level surface.

# 5 First Commissioning

## 5.1 Electrical Connection

**⚠ WARNING** W3.0015

**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).**

**⚠ WARNING** W4.0002

**Danger to life through electric shock**
Damaged power cable

- Operating the device with a damaged power cable or plug can lead to life-threatening injuries caused by an electric shock.
- **Before operating the device, check the power cable and plug for damage.**
- **Never operate the device with a damaged power cable or plug!**

***NOTICE*** N10.0022

**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 SM 50 must be connected to the power supply on site for initial commissioning.

Ensure the following before connecting the device to the power supply:

- The application site complies with the installation requirements;
- The device is securely and firmly in place;
- The power values for the device (type plate) correspond to the values of the power supply at the site.

## 5.2 Connecting the device to the power supply

Connect the device to the mains as described below:
⇨ Compare the voltage and frequency on the type label (**31**) of the device with the values on site.
⇨ Plug the supplied mains cable into the device socket (**28**).

⇨ Plug the other end of the mains cable into a socket at the installation site.
⇨ Carry out external protection measures according to the regulations of the place of installation.

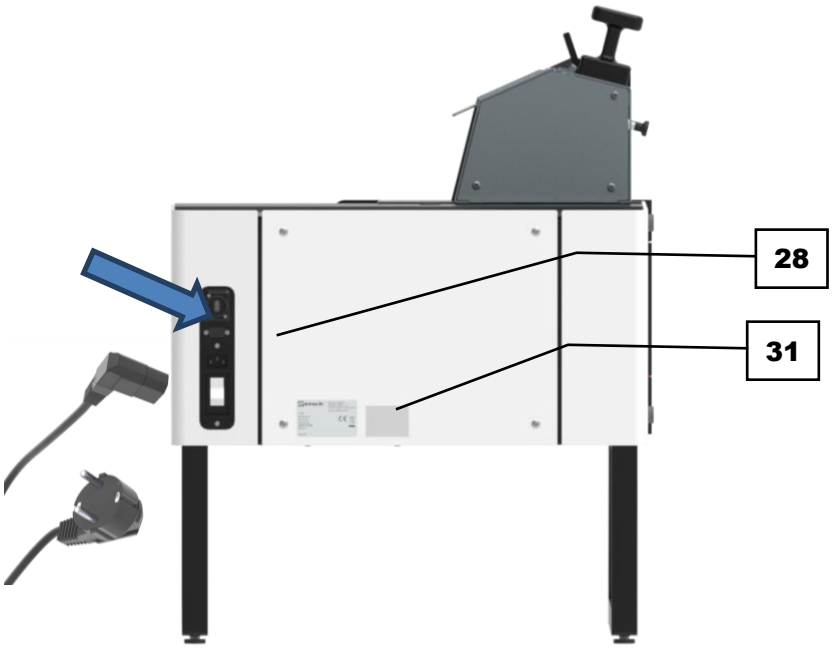



**Fig. 12:**Facilitating the power connection

## 5.3 Installation of the funnel

**⚠ WARNING**

**Risk of injury to skin and hands**
Rapidly rotating blades in the grinding chamber

– Risk of injury in the form of cuts to the skin and hands caused by the blades on the rotating rotor.
- **Never operate the device without the funnel installed.**
- **Never reach into the funnel and/or the grinding chamber during operation.**
- **Observe the instructions for the safe initial commissioning of the device.**

**⚠ DANGER** Never operate the device without the funnel installed!
The funnel must be installed before initial commissioning for safe use of the device. The funnel, as well as the associated connecting elements and tools required, are included in the scope of delivery. Install the funnel on the top of the device as described below
⇨ Connect the device to the mains.
⇨ Switch on the device using the main switch (**29**) on the rear side of the device.
➔ The touch display (**5**) indicates the opening and closing of the door (**2**).
⇨ Pull the door handle (**3**) forward. It will bend sideways by approximately 90° and release the door hook (**12**) as a result. Swing the door fully to the left side.
⇨ The cover plate (**1.1**) is screwed onto the top of the housing in the delivery state. Loosen the screws and remove the cover plate.

⇨ Push the funnel (**1**) from the front into the mill housing up to the rear wall and align it flush to the left.

**⚠ CAUTION** Hold the funnel in place until it is securely fastened to the mill housing with screws to prevent it from falling or tipping over.

⇨ Fasten the funnel to the mill housing with two screws (**1.2**), vertically upwards. When screwing in, ensure that the funnel is flush and aligned to the left side of the rear wall of the mill housing.

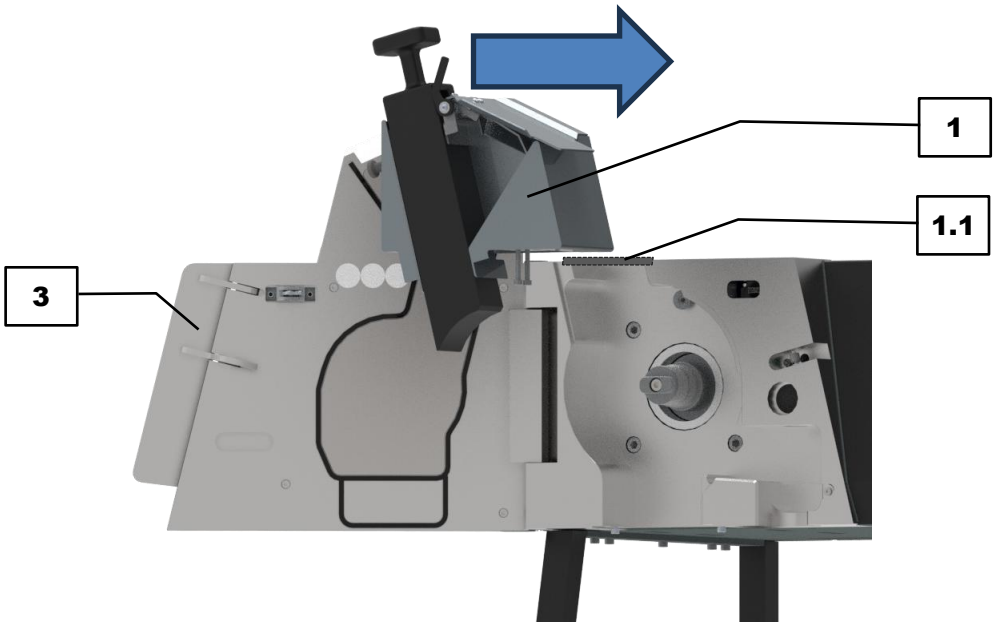



**Fig. 13:** Insert the funnel into the housing

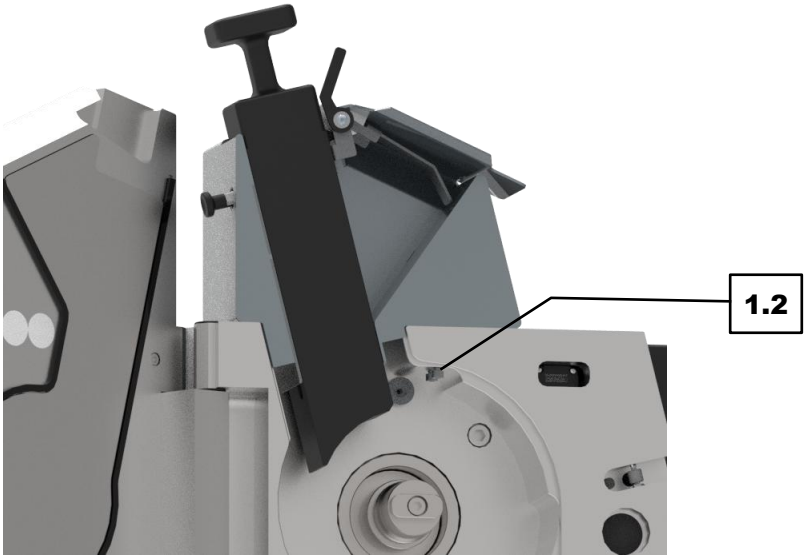



**Fig. 14:** Screw the funnel in place

## 5.4 Mounting of the door insert

The door insert must be installed during initial commissioning. The door insert, as well as the associated connecting elements and required tools, are included in the scope of delivery. Install the door insert on the inside of the device door as described below:

⇨ Connect the device to the mains.

⇨ Switch on the device using the main switch (**29**) on the rear side of the device.

➔ The touch display (**5**) indicates the opening and closing of the door (**2**).
⇨ Pull the door handle (**3**) forward. It will bend sideways by approximately 90° and release the door hook (**12**) as a result. Swing the door fully to the left side.
⇨ The door panel is fastened to the inside of the device door with four screws (**13.1**). Loosen the screws and remove the door panel from the outside of the device door (**2**).
⇨ Insert the door insert (**13**) into the designated recess on the inside of the device door.
⇨ Secure the door insert with three screws (**13.2**). To do so, insert the screws on the outside of the device door into the designated holes and tighten them.
⇨ Reattach the door panel and fasten it again with the screws (**13.1**) that were removed previously.

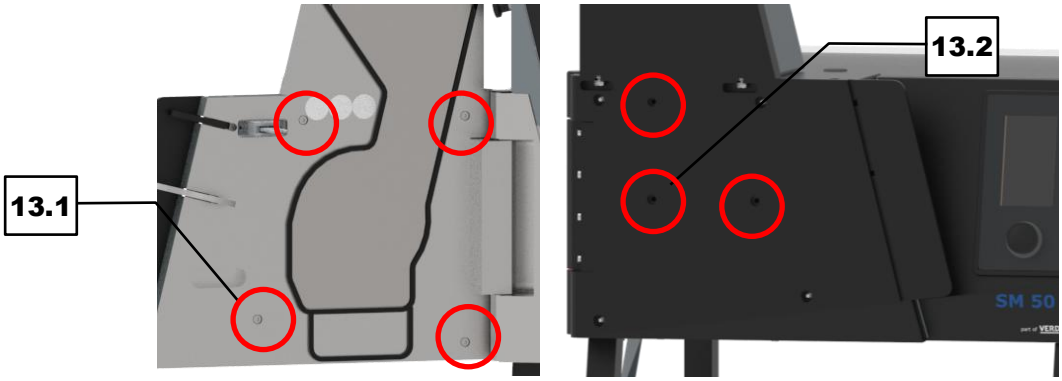



**Fig. 15:** Mounting the door insert

## 5.5 Mounting the gravity outlet

**DANGER** Never operate the device with the gravity insert in use, unless the gravity outlet is installed!
The following instructions apply when using the gravity insert. To ensure safe use of the device, the gravity outlet must be installed before initial commissioning. If the gravity insert was ordered, the gravity outlet, as well as the associated connecting elements and required tools, are included in the scope of delivery. Insert the gravity insert as described below:
⇨ The cover plate (**16**) is screwed to the bottom of the housing in the delivery state. Loosen the screws and remove the cover plate.
⇨ Guide the gravity outlet (**1**) from below to the mill housing and into the opening of the grinding chamber.
⇨ Fasten the gravity outlet to the device housing using two screws.
***NOTE*** The gravity outlet can remain mounted on the device permanently. This does not cause any impairment when using the grinding chamber insert with the cyclone outlet.

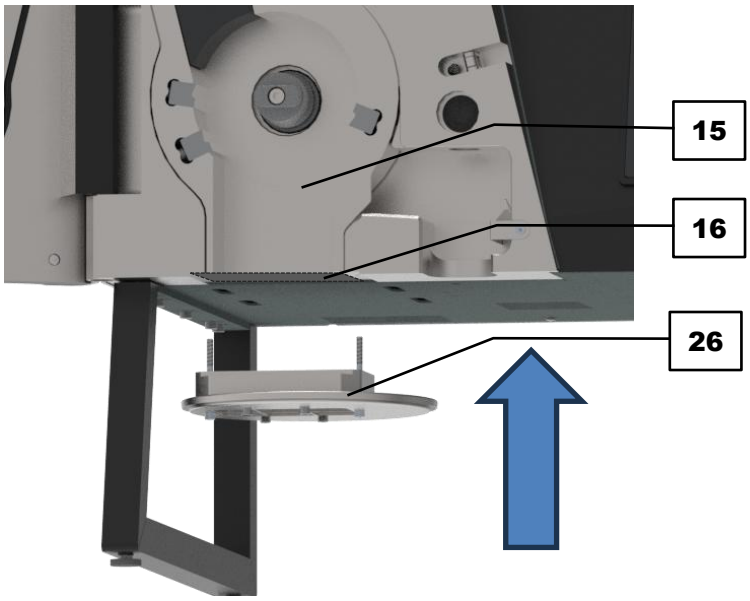



**Fig. 16:** Mounting the gravity outlet

# 6 Operating the Device

**DANGER**

**Danger to life**
Rotating parts

– Intervention during operation may lead to strangulation and bone fractures caused by rotating parts.

- **Wear work clothes (e.g. no scarves, ties, chains) when operating the device). Secure long hair with a hair net, for example.**

**WARNING** W5.0002

**Danger to life through electric shock**
Damaged power cable

– Operating the device with a damaged power cable or plug can lead to life-threatening injuries caused by an electric shock.

- **Before operating the device, check the power cable and plug for damage.**
- **Never operate the device with a damaged power cable or plug!**

**WARNING** W6.0001

**Serious injury**
Thermal energy in the grinding chamber

– The thermal energy in the grinding chamber may result in injuries depending on the sample material.

- **Comply with the instructions in the safety datasheets for the sample material and take appropriate measures.**

**WARNING**

**Serious injury**
Volume of the machine

– Depending on the sample material the machine can get very loud, which can result in physiological impairments (e.g. hearing loss, tinnitus, loss of balance, reduced alertness).

- **Wear hearing protection when operating the machine.**

**WARNING** W7.0001

**Serious injury, damage to property**
Chemical changes to substances

– During processing, certain substances may reach a flammable state that can result in injuries and damage to property.

- **Do not process any substances that can become explosive as a result of processing.**

**CAUTION** C6.0005

**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!**

## 6.1 Switching the device on/off

Switch on the device as follows:
⇨ Check whether the device is connected correctly to the mains.
⇨ Switch on the device using the main switch (**29**) on the rear side of the device.
➔ The touch display (**5**) indicates the opening and closing of the door (**2**).
➔ The device is ready for operation.

Switch off the device as follows:
***NOTE*** The device must only be switched off once there is no more grinding material left in the grinding chamber. The rotor can become blocked and mechanical components may be damaged.
⇨ Switch off the device using the main switch (**29**) on the rear side of device when no grinding process is running.
➔ The device is switched off.


**Fig. 17:** Main switch on the rear side of the device

## 6.2 Opening and Closing of the Device

Open the device as follows:
***NOTE*** The door can only be opened and closed when the device is switched on.
⇨ Pull the door handle (**3**) forward. It will bend sideways by approximately 60° and release the door hook (**12**) as a result. Swing the door (**2**) fully to the left side.

Close the device as follows:
⇨ Swing the door to the right side, bending the door handle by approximately 60°.
⇨ When touching the device housing, align the door handle flush with the outer surface of the door by applying pressure. This anchors the door hook in the housing. The door is locked automatically when the device is started.

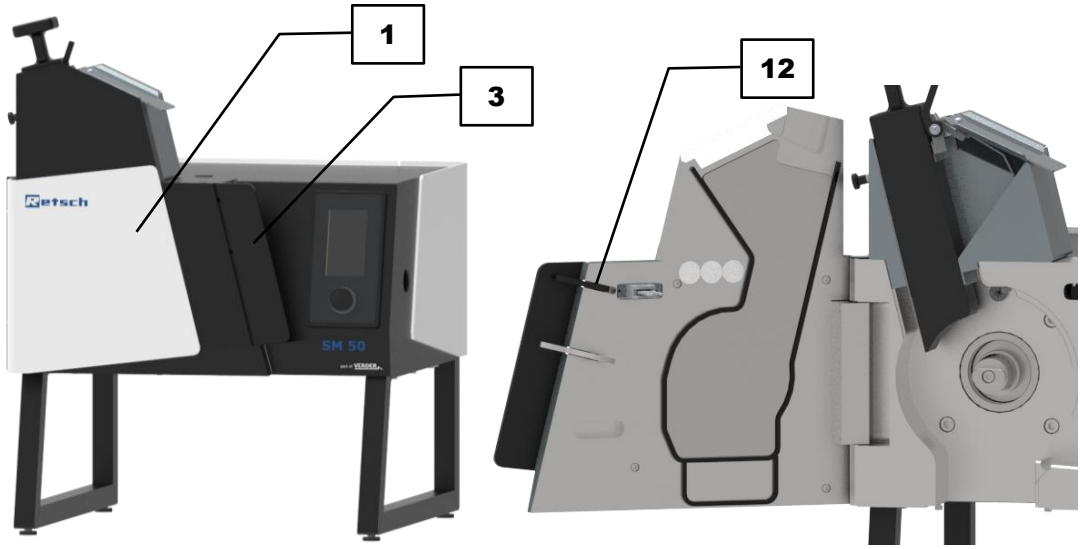



**Fig. 18:** Opening and closing the grinding chamber door

**NOTE** It is recommended to leave the device door open if the device is not used for a longer period of time. This prevents deformation of the seal on the device door.

## 6.3 Inserting the grinding chamber insert

Two different types of grinding chamber inserts are available for grinding.

**DANGER** Never operate the device without the funnel or without the grinding chamber insert or gravity insert with gravity outlet installed!

Insert the grinding chamber insert and the cyclone as described below:

- ⇨ Align the grinding chamber insert (**17**) according to the recesses for the funnel and outlet.
- ⇨ Insert the grinding chamber insert into the grinding chamber (**15**). Ensure that you insert the insert evenly to avoid jamming during insertion.
- ⇨ Align the cyclone (**19**), so that the threaded connection of the cyclone outlet (**20**) faces downward.
- ⇨ Insert the cyclone into the designated recess on the right-hand side of the grinding chamber. When inserting, rotate the cyclone slightly clockwise to avoid jamming with the air duct above. Press the cyclone against the rear housing wall until it is engaged and positioned by the spring.

⇨ If necessary, insert the vacuum cleaner into the opening for the dust extraction connection (**6**).

**NOTE** The vacuum cleaner supplied by Retsch has a suitable connection geometry. The use of an adapter may be required for other vacuum cleaner models.

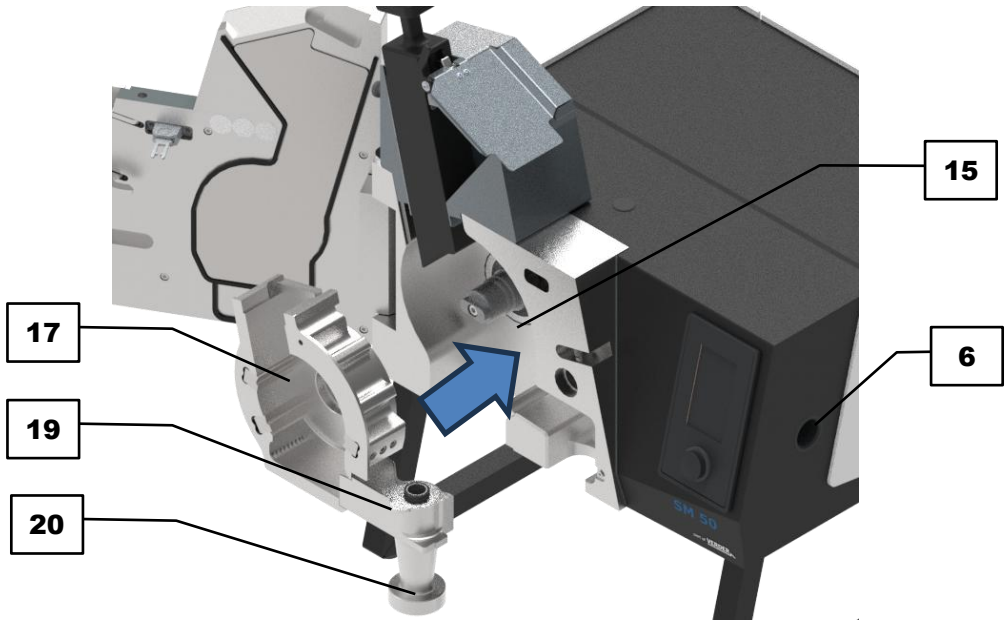



**Fig. 19:** Inserting the grinding chamber insert

Insert the gravity insert as described below:

**DANGER** To use the gravity insert, the cover plate on the underside of the machine must be removed using a tool. Failure to follow the instructions described in the chapter Initial Commissioning may result in serious or irreversible personal injury.

⇨ Align the gravity insert (**21**) according to the recesses for the funnel and the outlet.

⇨ Insert the gravity insert into the grinding chamber. Ensure that you insert the insert evenly to avoid jamming during insertion.

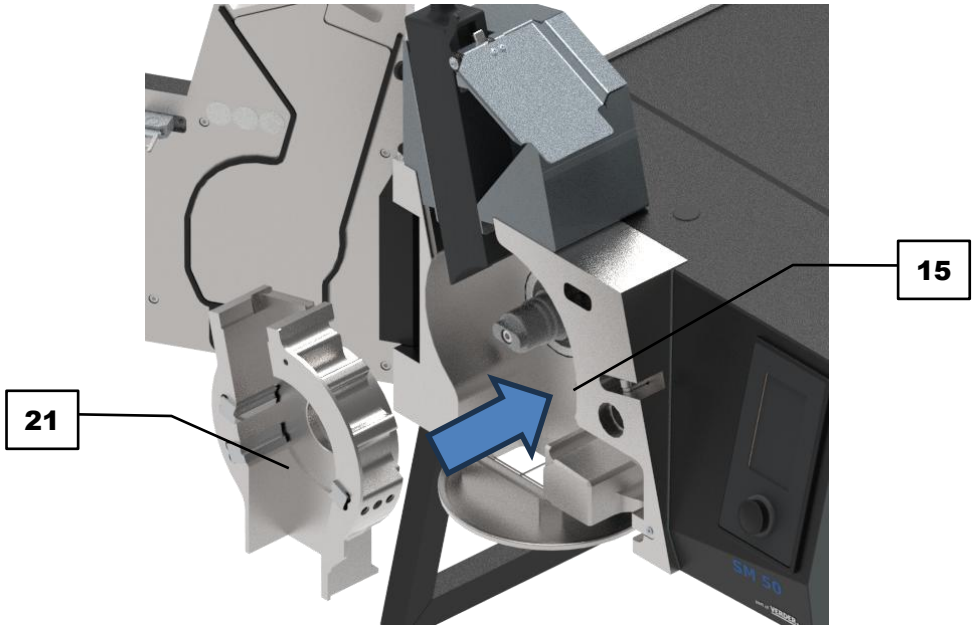



**Fig. 20:** Inserting the gravity insert

To remove the inserted gravity insert and the grinding chamber insert and cyclone, proceed as described below:

**CAUTION** Avoid any contact with the cutting bars in the grinding chamber when reaching into the grinding chamber. The sharp cutting edges can cause cut injuries.

**WARNING** To remove the gravity insert or grinding chamber insert, all of the other components (rotor and sieve) must be removed first.
⇨ If the rotor or sieve is installed, remove them first.
⇨ Pull the gravity insert or grinding chamber insert out of the grinding chamber evenly. If necessary, the removal aid can be used. To do so, screw the removal aid into the bore at the upper edge of the insert.
⇨ Grip the cyclone at the receptacle for the collecting container and pull it down slightly until the cyclone slides out of the air duct above. Then pull the cyclone out of the recess.

## 6.4 Mounting the bottom sieve

The sieve must be inserted into the grinding chamber before starting the grinding process. It is recommended that you only replace the sieve when no rotor is installed.
Remove or insert the sieve as follows:
**CAUTION** Avoid any contact with the blades of the rotor or the cutting bars in the grinding chamber when reaching into the grinding chamber. The sharp cutting edges can cause cut injuries.
***NOTE*** An incorrectly inserted sieve may cause damage to the grinding chamber insert, the rotor and the sieve itself.
⇨ Open the door.
⇨ To insert a sieve, align it with the curvature facing outward, matching the shape of the grinding chamber. The sieve must be aligned in the direction of rotation of the rotor. To do so, align the marking (arrow on the edge of the screen) upwards.
⇨ Slide the sieve evenly under the cutting bars until it is flush with the grinding chamber insert.

⇨ To remove an already inserted sieve, grasp the sieve in the middle and pull it out forwards. Gently press against the grinding chamber insert with the other hand to prevent it from being pulled at the same time. Alternatively, the hopper slider can be moved to the lowest position. When pulling the sieve out, maintain the orientation of the sieve to avoid jamming in the grinding chamber.
⇨ In addition to removing the sieve individually, it can also be removed together with the grinding chamber insert or gravity insert and taken out subsequently.

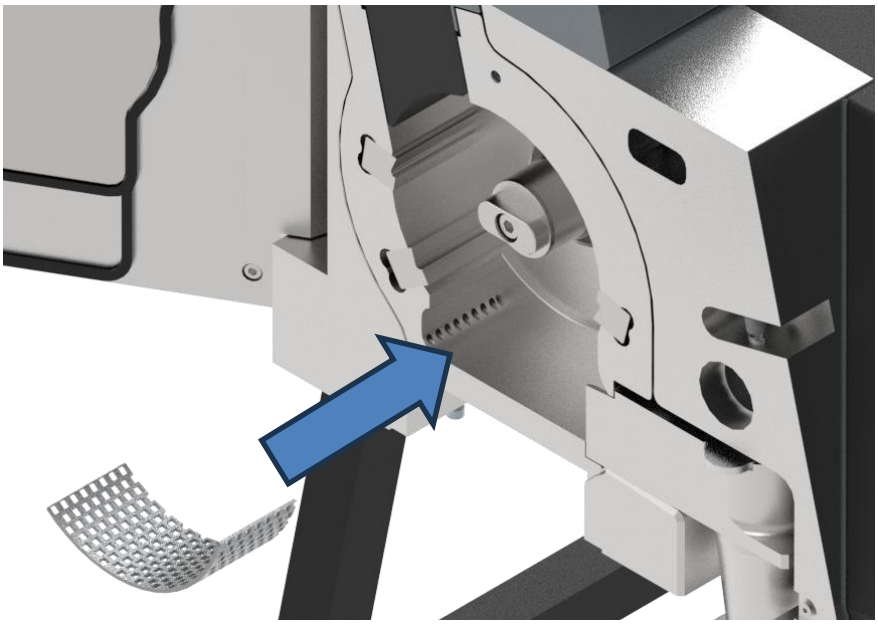


**Fig. 21:** Inserting the sieve

*NOTICE*
Bottom sieves with trapezoidal perforation have a direction arrow, which indicates the direction of rotation of the rotor (counterclockwise). When inserting a bottom sieve with trapezoidal perforation, ensure that the direction arrow corresponds the direction of rotation of the rotor.

## 6.5 Inserting the collecting container

The ground material processed in the grinding chamber is discharged via the cyclone outlet or the gravity outlet. Different sizes of collection containers are available depending on the grinding chamber insert used.

Insert the screw-top jar or the collecting vessel for grindings using the grinding chamber insert and the cyclone as follows:
⇨ Screw the screw-top jar or the lid (**20.1**) of the collecting container into the integrated thread of the cyclone outlet (**20**).
⇨ Position the collecting container (**20.2**) underneath the lid and close it using the clamping locks.
***NOTE*** To ensure the functionality of the cyclone, the interface to the collecting container must be airtight.
***NOTE*** The maximum filling quantity of the collection vessels should not exceed 2/3 of the total volume, as this will impair the separation performance of the cyclone.

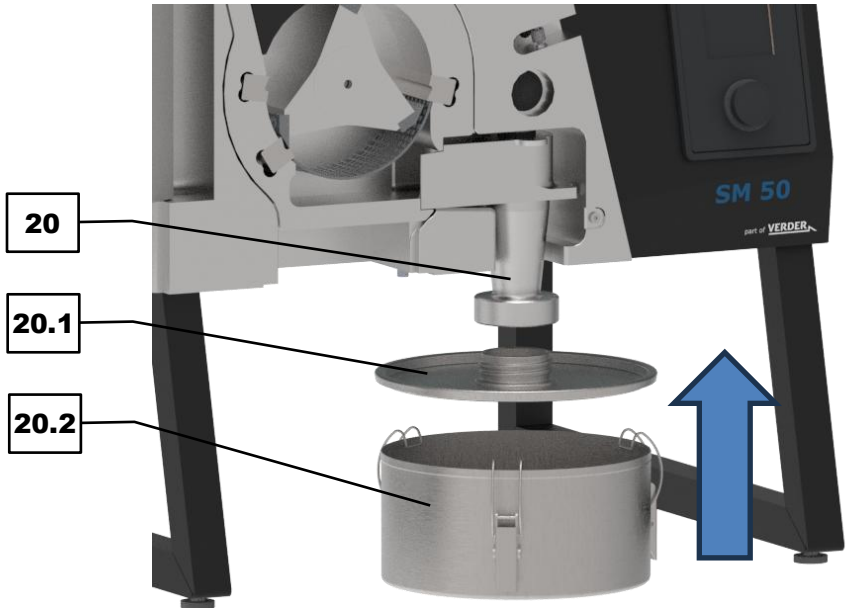



**Fig. 22:** Cyclone outlet, inserting the collecting container

Insert the collecting vessel for grinding processes using the gravity insert as follows:
***NOTE*** The collecting vessel for grinding with the gravity insert can only be used if the gravity outlet has been installed. You can find information on this in the chapter “Initial Commissioning”.
⇨ Position the collecting container (**26.1**) underneath the gravity outlet (**26**) and close it using the clamping locks.

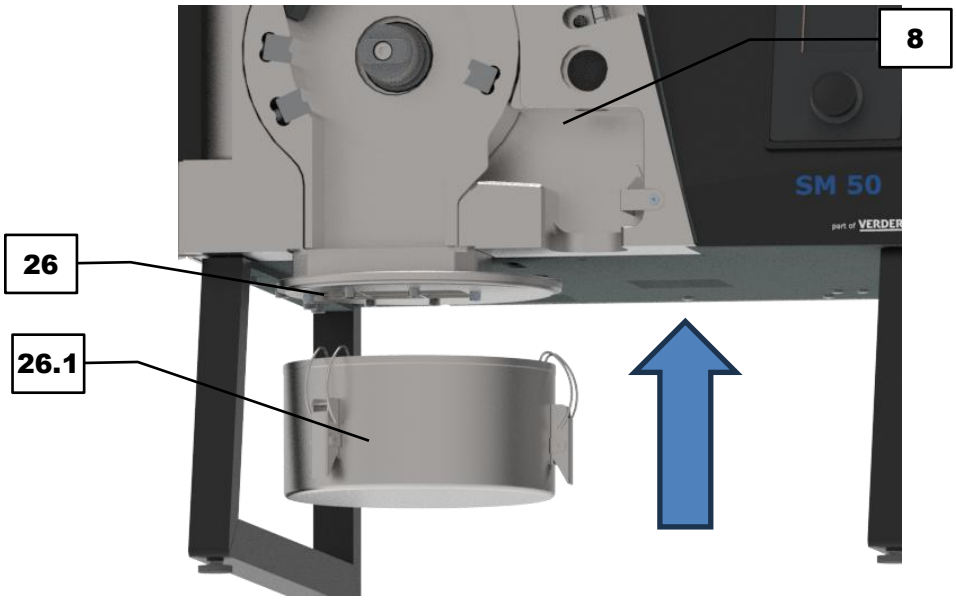



**Fig. 23:** Gravity outlet, inserting the collecting container

## 6.6 Inserting the Rotor

**⚠ CAUTION**

C7.0085

**Cutting injuries**
Sharp cutting edges

- The sharp cutting edges on the rotors and/or the cutting bars in the grinding chamber can lead to hand lacerations.
- **Grasp the rotor only on the hub and do not touch the cutting edges or bars.**
- **Wear cut-resistant safety gloves.**

Before starting the grinding process, the rotor must be inserted into the grinding chamber.
**⚠ CAUTION** Avoid any contact with the blades of the rotor or the cutting bars in the grinding chamber when reaching into the grinding chamber. The sharp cutting edges can cause cut injuries.

Insert the rotor as follows:
***NOTE*** Check the motor shaft for contamination before inserting the rotor. There may not be any grinding residues between the motor shaft and the rotor.
***NOTE*** Ensure that the O-ring is inserted into the inner groove of the rotor.
⇨ Before inserting the rotor, the rotor's O-ring must be greased regularly. Always choose a grease that is compatible with the application, as there is a possibility of contact with the sample.

⇨ We recommend that you lock the rotation of the motor shaft. Select 🔒 in the main menu on the touch display.
⇨ Grip the rotor and position the rear hub towards the grinding chamber.
⇨ For a more comfortable grip, you can use the removal aid included in the scope of delivery. Screw the removal aid into the centrally positioned bore on the front face of the rotor.
⇨ Slide the rotor onto the motor shaft and push it evenly into the grinding chamber until the rotor is flush with the front edge of the grinding chamber insert. The resistance of the O-ring

must be overcome in the process. If necessary, rotate the rotor slightly, so that it slides into the motor shaft mount.

Remove the rotor as follows:
⇨ Grasp the rotor and pull it off the motor shaft. For a more comfortable grip, you can use the removal aid.
⇨ Maintain the alignment of the rotor while pulling it out to avoid jamming.

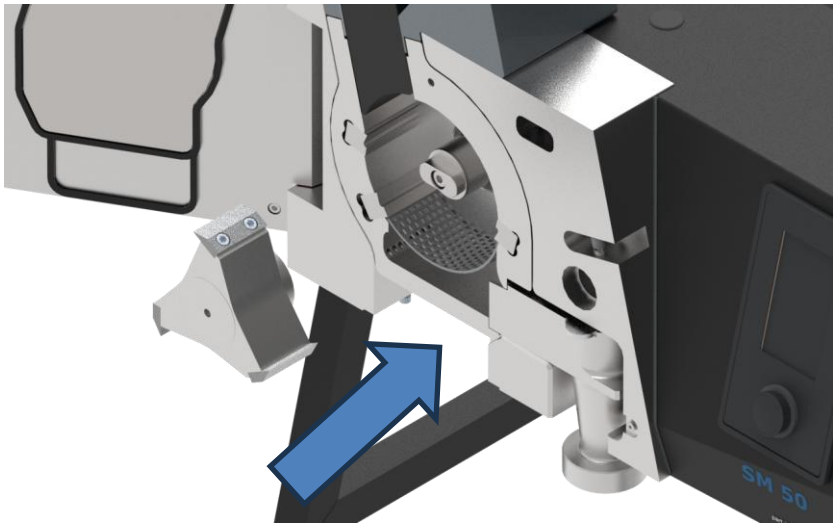



**Fig. 24:** Inserting the rotor

## 6.7 Starting the grinding process

**⚠ CAUTION**

C8.0006

**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**

C9.0010

**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**

C10.0026

**Danger! Risk of burns and injury due to explosion**

Mixing of different sample materials

– Successive sample preparations of different materials may cause undesirable chemical reactions that can lead to fires or explosions causing injury.

- **Do not grind any sample materials in this device where the chemical reactivity may be increased by contact with a previously crushed substance.**
- **If in doubt, clean the device and all components used before grinding any other sample material.**
- **Observe the safety data sheets of the sample materials.**

**⚠ CAUTION**

C11.0004

**Risk of injury**

Explosive or flammable samples

– Samples can explode or catch fire during the grinding process.

- **Do not use any samples in this device that carry a risk of explosion or fire.**
- **Take note of the safety data sheets for the sample material.**

**⚠ 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.**

***NOTICE***

N11.0018

**Motor blockage**

The material being ground clogs the rotor

– Blockages can damage mechanical components.

- **Feed material only while the device is running.**
- **Dose the material feed to suit the properties of the material.**

**NOTICE**

N12.0003

**Damage to mechanical components**
Rotor blockage

- When feeding coarse, solid sample material, blockages can occur due to the high intake capacity of the rotor.
- **In case of blockage, switch off the appliance immediately and remove the blocking sample material.**
- **Reduce the feed of sample material to the feed hopper.**
- **Fill coarser and more solid sample material slowly and gradually into the feed hopper.**
- **Carry out a pre-crushing of the sample material.**

**NOTE** Check that the cutting gap is greater than 0.3 mm before each grinding process with the parallel cutting rotor.

Check the cutting gap as follows:
**⚠ CAUTION** Avoid any contact with the blades of the rotor or the cutting bars in the grinding chamber when reaching into the grinding chamber. The sharp cutting edges can cause cut injuries.
⇨ Open the door.
⇨ Unlock the motor in the main menu on the touch display. Afterwards, the rotor can rotate freely on the shaft.
⇨ Rotate the rotor by hand until the rotor blades are aligned with one of the cutting bars of the grinding chamber insert.
⇨ Press the grinding chamber insert against the rear wall of the housing to prevent it from tilting slightly forward.
⇨ Check the cutting gap of all **three** cutting bars! To do so, insert the feeler gauge included in the scope of delivery between the blade and the cutting bar. The minimum dimension over the entire length should be 0.3 mm.

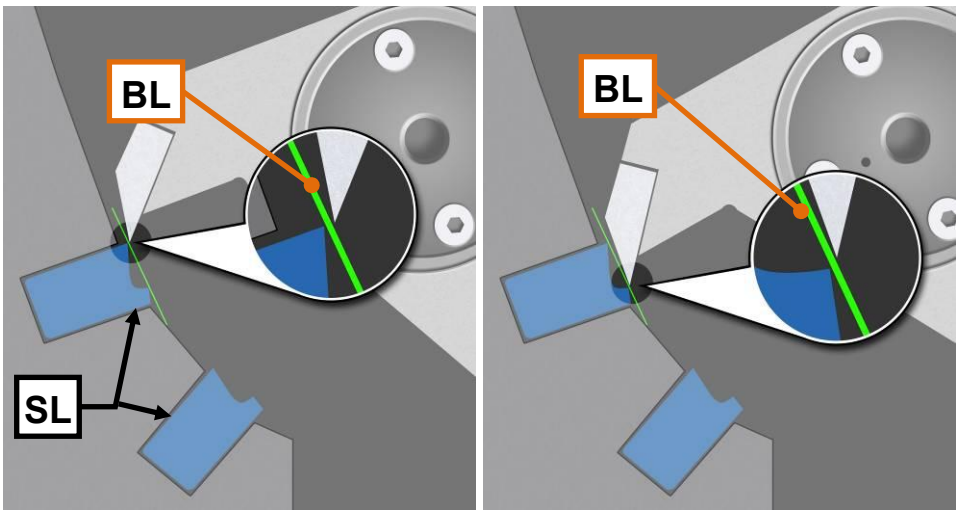



**Fig. 25:** Cutting gap inspection for the parallel cutting rotor

⇨ Since each cutting bar has two cutting edges, both must be checked. The cutting edge with the smallest distance between the blade and the cutting bar defines the cutting gap (**SP1/2**). The second cutting edge may have a larger cutting gap width.

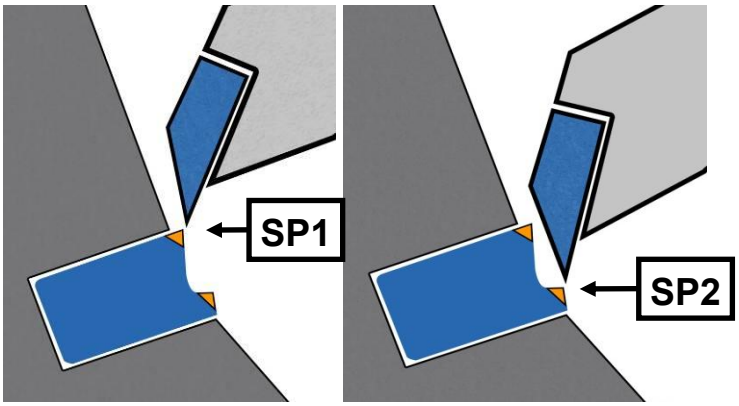



**Fig. 26:** Cutting gap between the blade and the cutting bar

***NOTE*** The adjustment of the cutting gap is described in the Maintenance chapter of this manual.

**⚠ CAUTION** The grinding process must only be started when a grinding chamber insert is in place.

To start the grinding process, proceed as follows:
⇨ Switch on the device. Enter the settings for the grinding process on the display and start the device. If necessary, switch on the connected dust extractor.
⇨ Press down the plastic slider (**8**) fully to unlock the funnel flap.
⇨ Open the funnel flap (**10**) and fill the material to be ground into the funnel (**1**).
⇨ Close the funnel flap. Slowly pull the plastic slider (**8**) upwards to clear the path to the grinding chamber.
⇨ If necessary, move the flap slider (**9**) to convey the material towards the plastic slider.
***NOTE*** Avoid pushing the slider forcefully. Blockages can damage mechanical components. In most cases, the weight of the slider is sufficient to push the grinding material into the grinding chamber. If this is not the case, the grinding material can be gently pushed down with the slider, within the performance limits of the device.
⇨ Slowly press the plastic slide (**8**) all the way down.
⇨ If no more grinding noises can be heard, additional material to be ground can be added to the grinding chamber via the funnel as described previously.
➔ The ground material processed in the grinding chamber falls into the collection container.
***NOTE*** Observe the maximum fill level of the collection containers.

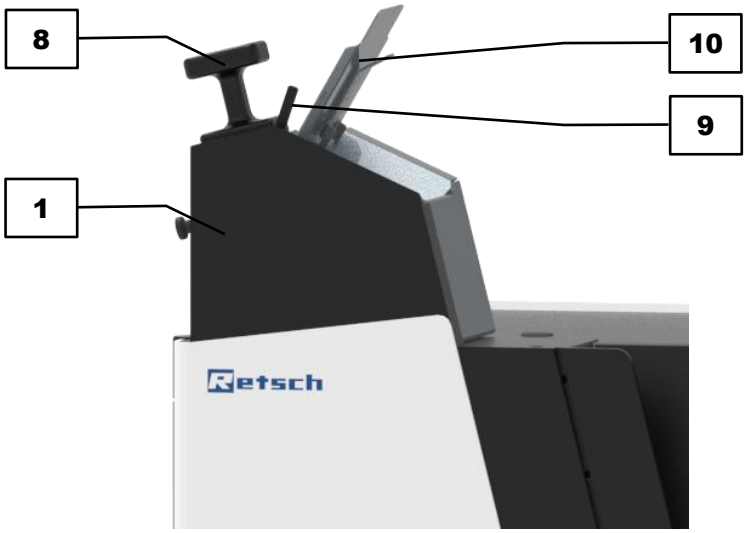



**Fig. 27:** Feed material

## 6.8 Stopping the grinding process

***NOTE*** The device must only be stopped once there is no grinding material left in the grinding chamber. The rotor can become blocked and mechanical components may be damaged.

***NOTE*** If grinding is carried out in cyclone operation, the vacuum cleaner should continue to run for a few seconds (approx. 5 sec.) after the rotor has come to a stop, in order to discharge the sample as effectively as possible.

Stop the grinding process using the touch display controls.

## 6.9 Removing the sample material

**⚠ CAUTION** C12.0005

**Burns**

Heating of the sample material during grinding

- Hot surfaces on the collecting receptacle or the grinding chamber can cause burns.
- Hot sample material in the collecting receptacle can cause burns.

- **Allow the hot sample material to cool down before removing the collecting receptacle and opening the door.**
- **Wear protective gloves.**

***NOTICE*** N13.0007

**Handling foodstuffs, pharmaceuticals and cosmetic products**

Products processed

- Foodstuffs, pharmaceuticals and cosmetic products that have been processed on the device may no longer be eaten, used or put into circulation,.
- **Dispose of these substances according to applicable directives.**

To remove the ground material after the grinding process, proceed as follows:

➔ The grinding process has been completed successfully. There is no more material to be ground in the grinding chamber.

⇨ Detach the collection container from the outlet used.

⇨ Remove the ground material from the collection container.

# 7 Device control

The device is controlled by using the touch display in combination with the rotary push button.

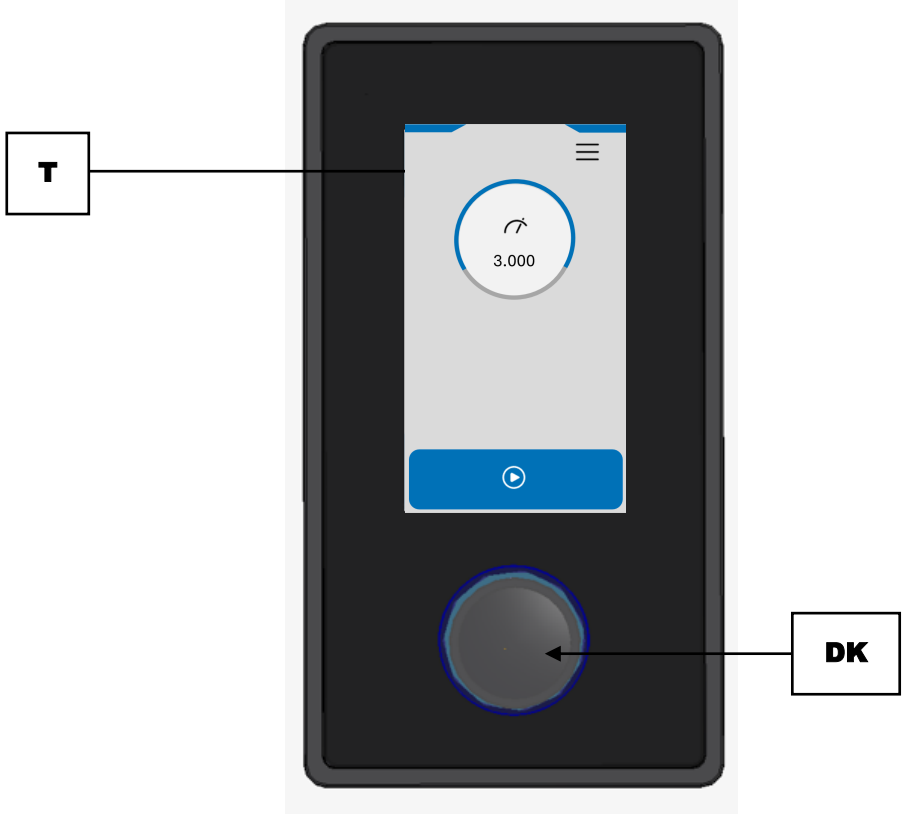



**Fig. 28:** Touch display and rotary push button

| | Control element | Function |
|---|---|---|
| T | Touch display | Touch display for selecting the function elements. |
| DK | Rotary push button | For configuring the grinding process parameters and system settings. |

ⓘ Only the function elements that can currently be selected and configured are displayed or active.
The background of the rotary push button lights up in different colours (white, blue or red), depending on the selectable function elements on the touch display.

## 7.1 Menu interface on the touchscreen

The menu interface on the touch display is divided into the following areas:

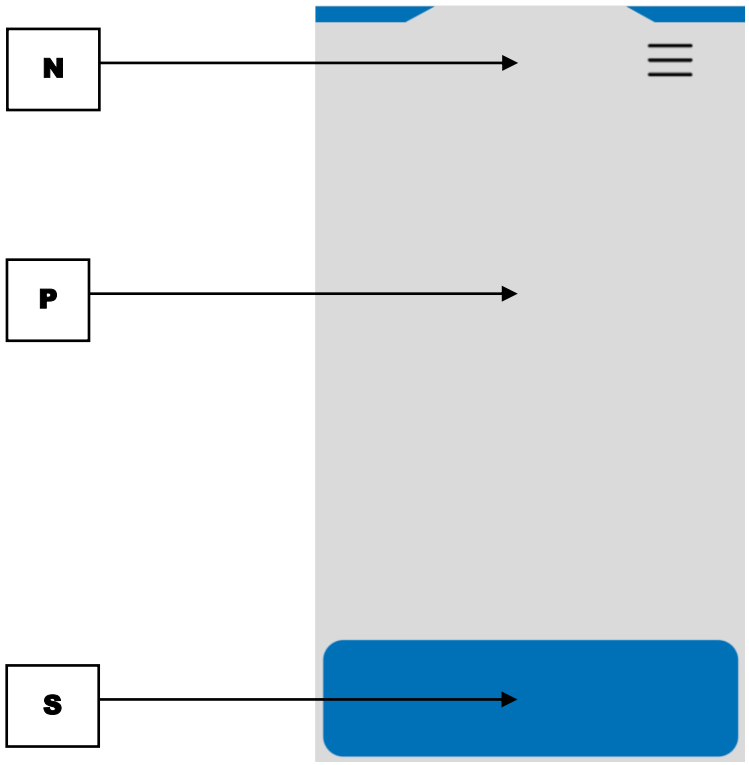



**Fig. 29:** Menu interface on the touch display

| | Area | Function |
|---|---|---|
| N | Navigation | The following menu views can be accessed via the overlay menu:<br>• Main menu<br>• Device information<br>• QR code operating manual<br>• System settings<br>The main menu is also available as a direct selection in the menu views. |
| P | Parameters | The parameters for the grinding process are configured and displayed in this area during grinding:<br>• Speed |
| S | Control | The function elements in this area are used to display the device status, control the device, and save settings:<br>• Start and stop the comminution process<br>• Locking and unlocking the motor<br>• Saving the settings |

## 7.2 Function elements

Function elements are selected via the touch display and configured using the rotary push button.

ⓘ Only the function elements that can currently be selected and configured are displayed or active.
The background of the rotary push button lights up in different colours (white, blue or red), depending on the selectable function elements on the touch display.

| Element | Description | Function |
|---|---|---|
|  | Main menu | Open the main menu.<br>The parameters for the grinding process can be configured and the rotor can be started via the main menu. |
|  | Open the appliance door | After switching on the device, the prompt to open and close the device door appears on the touch display.<br><br>ⓘ By opening and closing the device door once, the device is ready for operation. |
|  | Overlay menu | Menu for switching to the menu views: Main menu, device information, MyRetsch and system settings. |
|  | Rotational speed in rpm | Set the rotational speed per minute from 500 to 4,000 rpm. |
|  | Start | Start the comminution process. |
|  | Stop | Stop the comminution process. |
|  | Motor locked | The motor and, as a result, the rotation of the motor shaft is locked. This prevents the rotor, which sits on the motor shaft, from rotating. |
|  | Motor unlocked | The motor and, as a result, the rotation of the motor shaft is unlocked. |
|  | Device information | Display of the specific device information. |

| Element | Description | Function |
|---|---|---|
|  | QR code operating manual | Displays the QR code for accessing the device's operating manual. |
|  | System settings | Display and configuration of the specific device system settings. |
|  | Save | Save the selected setting. |
|  | Signal transmitter on/off | Setting the signal transmitter on/off |
|  | Brightness | Adjusting the display brightness. |
|  | Calendar | Setting the date. |
|  | Time | Setting the time. |
|  | Speed release | Setting the maximum speed, which is available in the main menu. |

## 7.3 Main menu

In the main menu, additional menu views can be accessed, the parameters for the grinding process can be configured and the rotor can be controlled. The speed can only be set when the function element is highlighted in white.
The function elements can be selected either with your finger via the touch display or by pressing the rotary push button. The background of the rotary push button lights up depending on the active function element as follows:

- Main menu (after switching on with the door closed): off
- Main menu before the comminution process is started: blue
- Main menu while the comminution process is running: red

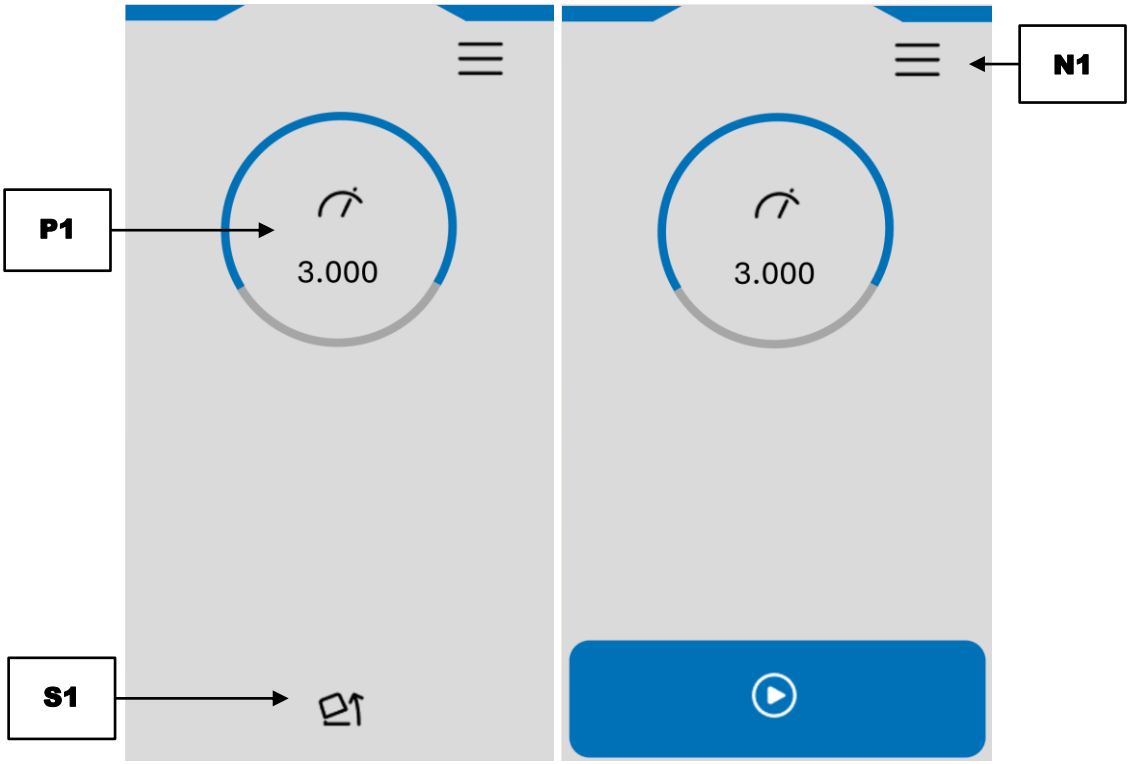



**Fig. 30:** Main menu, after switching on with the door closed (left) and when speed setting is not possible (right)

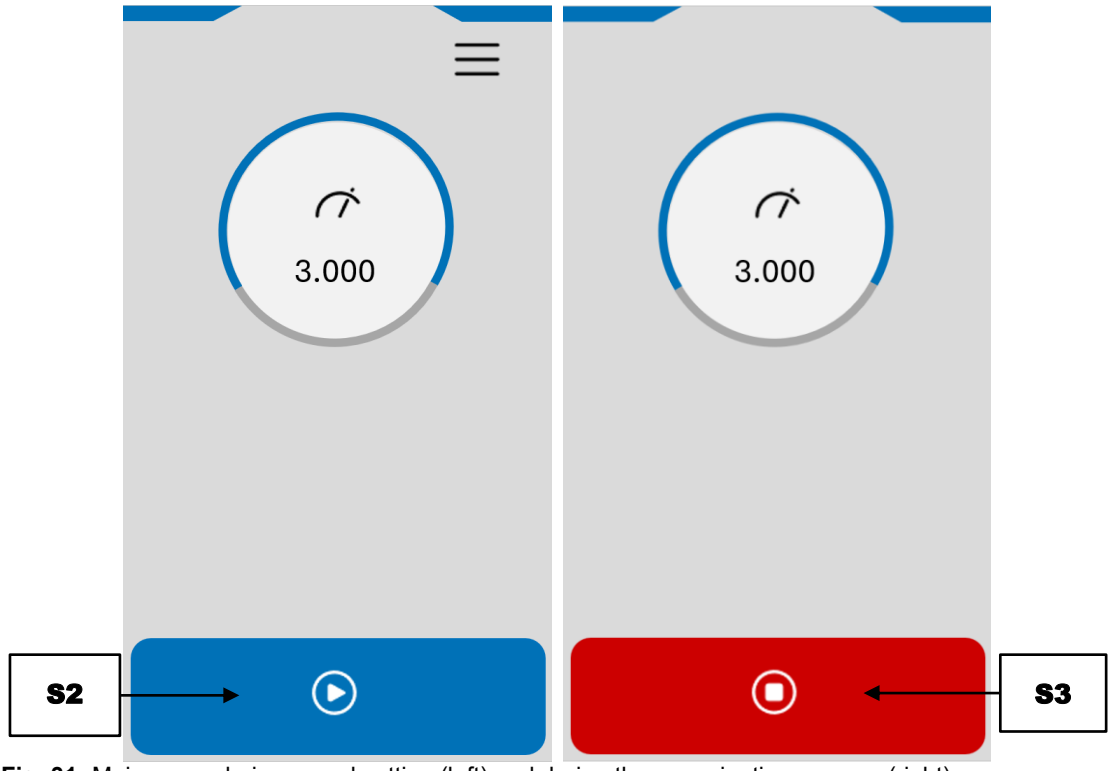



**Fig. 31:** Main menu during speed setting (left) and during the comminution process (right)

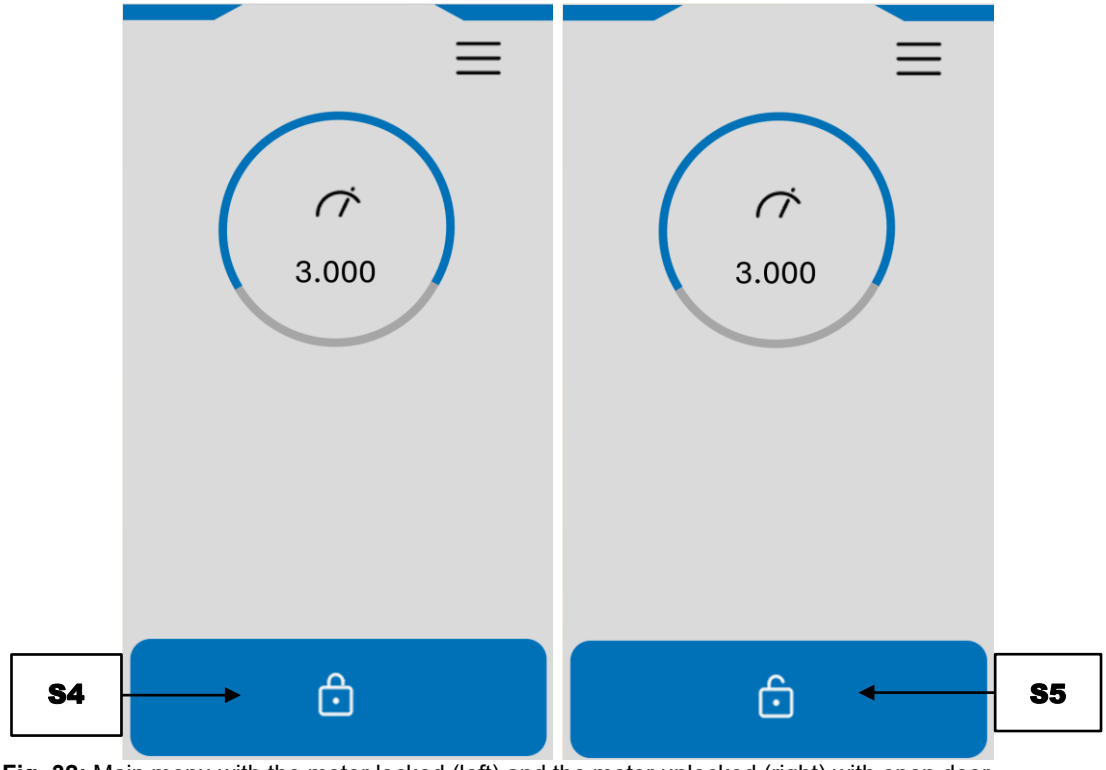



**Fig. 32:** Main menu with the motor locked (left) and the motor unlocked (right) with open door

| | Element | Function |
|---|---|---|
| N1 | Overlay menu | Access to the navigation menu. |
| P1 | Rotational speed in rpm | After selection via the touch display, the rotations per minute can be set using the rotary push button. The speed set is visualised as a number and a blue circle. |
| S1 | Open the appliance door | After switching on the device, the device door must be opened and closed once. |
| S2 | Start the comminution process | Starts the rotor rotation in the grinding chamber. |
| S3 | Stop the comminution process | Stops the rotor rotation in the grinding chamber. |
| S4 | Motor locked | The motor and, as a result, the rotation of the motor shaft is locked. The rotor cannot be rotated manually. |
| S5 | Motor unlocked | The motor and, as a result, the rotation of the motor shaft is unlocked. The rotor can be rotated manually. |

## 7.4 Controlling the grinding process

The comminution process is controlled using the function elements.

Starting the comminution process

Stopping the comminution process

### 7.4.1 Starting the grinding process

⇨ Press to start the rotor. The selection can be made via the touch display or by pressing the rotary push button.

➔ As long as the target speed has not been reached, the blue circle indicating the speed achieved is displayed in orange or yellow.

➔ The function element Start changes to the function element Stop .

### 7.4.2 Stopping the grinding process

⇨ Press to stop the rotor. The selection can be made via the touch display or by pressing the rotary push button.

## 7.5 Overlay menu

The overlay menu can be accessed from all menu views.

⇨ Press .

⇨ Press the menu view desired.

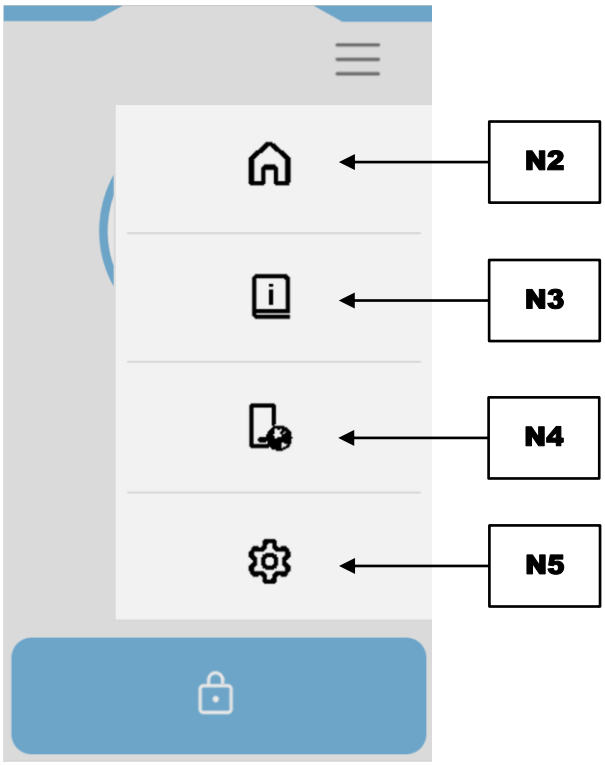



**Fig. 33:** Overlay menu

| | Element | Function |
|---|---|---|
| N2 | Main menu | Closing the overlay menu and accessing the main menu. |
| N3 | Device information | Display of the specific device information. |
| N4 | QR code operating manual | Display the QR code for the device operating manual. |
| N5 | System settings | Display and configuration of the specific device system settings. |

### 7.5.1 Device information

The following device information can be viewed in this menu view:

- Serial number
- Display (Program control)
- Firmware (Device control)
- Operating hours (interval of 10 hours)
- IP address
- Update

ⓘ The operating hours recorded are the process time of the device, i.e. the sum of the times between the starting and stopping of a grinding process. The time cannot be manipulated.

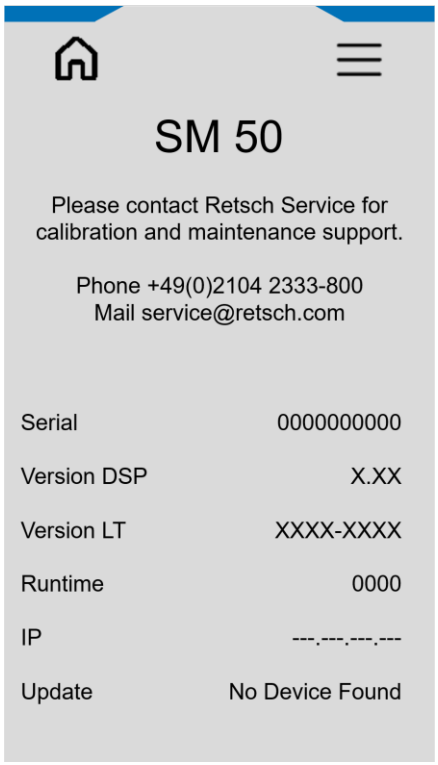



**Fig. 34:** Device information

### 7.5.2 Software Update

To update the software, proceed as follows:
⇨ Insert the USB storage device into the USB interface.
ⓘ While the USB storage device is being read, the message “Device scanning…” is displayed.
If a valid firmware file is found, the version is displayed in blue text.
⇨ Press the valid software version to perform an update.
⇨ Wait until the transfer and installation are complete.
ⓘ The touch display will restart. This may take a few seconds.

ⓘ A suitable USB storage device must be inserted into the USB interface.

- The USB storage device must be formatted with a FAT32 file system.
- USB 3.0 storage devices are not supported.
- Only the software to be installed may be located in the root directory. The device automatically detects the new software.

## 7.6 QR code for the operating manual

The QR code for accessing the device's operating manual is displayed in this menu view. Scan the QR code using a smartphone or other device equipped with a camera and the corresponding function.
The QR code directs the user to the download area, where all of the language versions of the device's operating manual available can be downloaded.


**Fig. 35:** QR code for the operating manual

## 7.7 System settings

The system settings can be viewed and modified in this menu view:

- Brightness
- Signal transmitter on/off
- Time
- Date
- Speed release

⇨ Press the desired category to make a setting. Use the rotary push button of the touch display to do so.

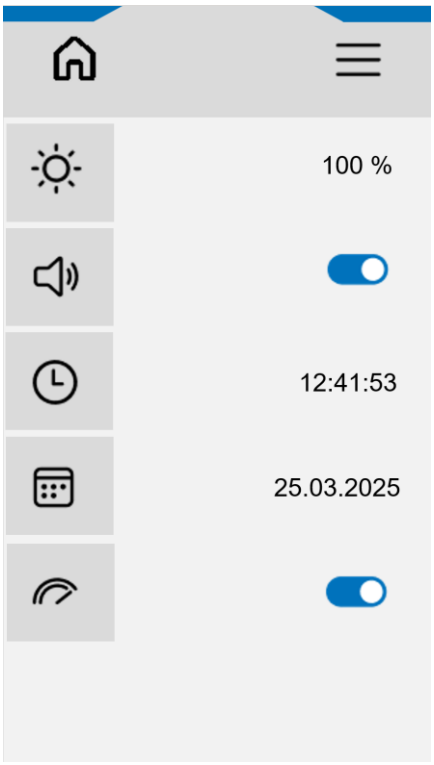


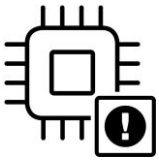
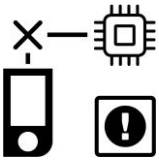
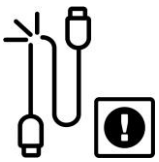

**Fig. 36:** System settings

The speed release is activated by default and allows a maximum adjustable speed for a comminution process of 4,000 revolutions per minute.
If the speed release is deactivated, the maximum adjustable speed for a comminution process is reduced to 3,000 revolutions per minute.
The speed range above 3,000 revolutions per minute is marked by a red line in the main menu. Increased noise levels may occur in this range.

# 8 Error Messages and Information Notes

## 8.1 Error Messages

Error messages inform the user about detected device or programme errors. In the event of an error message, a fault has occurred, in which the operation of the device or the programme is automatically interrupted. Such faults must be resolved before next startup.

| Error code | Description | Measures |
|---|---|---|
| **E13**  | Drive overheated | • Turn off the main switch and wait 30 seconds before turning the device on again.<br>• Allow the engine to cool before restarting.<br>• If the error persists, contact the Retsch GmbH service department. |
| **E20**  | Control error | • Turn off the main switch and wait 30 seconds before turning the device on again.<br>• If the error persists, contact the Retsch GmbH service department. |
| **E25**  | Display error | The connection to the display is interrupted.<br>• Turn off the main switch and wait 30 seconds before turning the device on again.<br>• If the error persists, contact the Retsch GmbH service department. |
| **E26**  | Failure Frequency converter | The communication with the frequency converter is interrupted or faulty.<br>• Turn off the main switch and wait for 30 seconds before turning the device on again.<br>• If the error persists, contact the Retsch GmbH service department. |
| **E50**  | Safety circuit error | A safety function has been interrupted.<br>• Turn off the main switch and wait 30 seconds before turning the device on again.<br>• If the error persists, contact the Retsch GmbH service department. |
| **E80**  | Failure USB interface | An update was carried out via the settings menu. No USB stick is connected or the USB stick does not contain any information.<br>• Turn off the main switch and wait for 30 seconds before turning the device on again.<br>• If the error persists, contact the Retsch GmbH service department. |

# 9 Servicing

**⚠ CAUTION** C13.0015

**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!**

**⚠ CAUTION** C14.0013

**Risk of injury**
Improper repairs

– Unauthorised and improper repairs can cause injuries.
- **Repairs to the device may only be carried out by Retsch GmbH , an authorised representative or by qualified service technicians.**
- **Do not carry out any unauthorised or improper repairs to the device!**

This chapter contains descriptions on cleaning and servicing the device.

| | |
|---|---|
| ⓘ | This Manual does not contain repair instructions. All repairs must be conducted by Retsch GmbH, an authorised representative or by Retsch service technicians. |

**⚠ CAUTION** The device must always be switched off and disconnected from the mains before any interventions for cleaning and maintenance purposes can be performed.

## 9.1 Cleaning

**⚠ WARNING** W8.0003

**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!**

**⚠ CAUTION**

C15.0031

**Risk of injury**
Cleaning with compressed air

- When using compressed air for cleaning purposes dust and remnant of the sample material can be flung around and injure eyes.
- **Always wear safety glasses when cleaning with compressed air.**
- **Observe the material safety data sheets of the sample material.**

**⚠ CAUTION**

C16.0024

**Risk of burns and scalds**
**from heated sample material and/or inside the grinding chamber**

- During the grinding process, the grinding chamber and the sample material may become very hot.
- **After the grinding process has been completed, it must be ensured that the sample material is only handled with protective gloves.**
- **Never open the hot grinding chamber!**
- **Allow the grinding chamber to cool down to room temperature before opening it.**

**NOTE**

N14.0005

**Cross-contamination due to sample residues**
Mixing of residual sample residues

- Residual sample residues in the device may lead to cross-contamination during the next grinding process.
- **Clean the device thoroughly after each use.**

To guarantee the reliability and operational safety of the device, it must be cleaned as necessary and at least once a month.

| | |
|---|---|
|  | Use a damp cloth and gentle cleaning agent to remove stubborn deposits. |

### 9.1.1 Cleaning the outside of the device

⇨ Clean the housing of the device with a damp cloth and, if necessary, a household cleaning agent. Make sure that no water or cleaning agent gets into the interior of the device.

⇨ Only use neutral cleaning agents. Do not use solvent-based cleaners! Acetone is not permitted!
Test cleaning products on an inconspicuous spot.

### 9.1.2 Cleaning the inside

**NOTE** Remaining sample residues may lead to cross-contamination during the next grinding process.

The interior of the device can be cleaned conveniently by removing all of the components that can be taken out without tools. Clean the interior as follows:
⇨ Open the door (**3**). Switch off the device using the main switch.
⇨ Remove all of the components inserted (rotor, grinding chamber insert and cyclone). If necessary, remove the plug (access to the vacuum cleaner connection) above the cyclone.
⇨ The plastic slide can be fixed in the upper position for easier handling by tightening the locking screw. Pull the plastic slide all the way up to the upper end position. Turn the locking screw approximately 90°, so that it engages in a lower position. To release, pull out the locking screw and turn it approximately 90°, so that it engages again in the upper position.
⇨ Clean the interior and dust extraction connection using a damp cloth, brush, paintbrush, compressed air or a vacuum cleaner.

Clean the components as follows:
⇨ Remove all of the individual parts inserted.
⇨ Clean the components (rotor, grinding chamber insert, cyclone, sieve and collection container) using a paintbrush, brush, compressed air, vacuum cleaner or under running water.
**NOTE** Careful drying of the individual parts is recommended, as any remaining water may mix with the sample during the next comminution process.

Some components must be disassembled using tools for cleaning.
⇨ Dismantle the door insert, the cover plate on the underside of the machine and the funnel as described in the previous chapters.
⇨ Clean the door insert and cover plate using a damp cloth, brush, paintbrush, compressed air or a vacuum cleaner.
**NOTE** The door insert in the heavy metal-free steel 1.0570 material variant is not corrosion-resistant and will start to rust over time. The use of a corrosion protection oil, such as Perigol VCI 230, is recommended. The item is already treated with this oil when delivered.

### 9.1.3 Cleaning the feed hopper

⇨ Open the door. Switch off the device using the main switch.
⇨ The plastic slide can be fixed in the upper position for easier handling by tightening the locking screw. Pull the plastic slide all the way up to the upper end position. Turn the locking screw approximately 90°, so that it engages in a lower position. To release, pull out the locking screw and turn it approximately 90°, so that it engages again in the upper position.
**⚠ DANGER** Never operate the device without the funnel installed and the plastic slider inserted!
⇨ Alternatively, the plastic slide can be removed completely from the funnel. To do so, loosen the locking screw using the open-ended spanner supplied by turning it counterclockwise. Remove the locking screw and the plastic slide.
⇨ Clean the funnel with compressed air or wipe it with a damp cloth.
⇨ After cleaning, reinsert the plastic slide and secure it with the locking screw.

## 9.2 Maintenance

**CAUTION** C17.0013

**Risk of injury**
Improper maintenance

– Unauthorised and improper maintenance may cause injuries.
- **The device may only be serviced by Retsch service technicians or an authorized representative.**
- **The settings for the service range may only be adjusted by Retsch service technicians or an authorised representative.**
- **Do not perform any unauthorised or improper maintenance on the device!**

The SM 50 is maintenance-free.
No maintenance work needs to be carried out if the device is used as intended.

## 9.3 Wear

**CAUTION** C18.0013

**Risk of injury**
Improper repairs

– Unauthorised and improper repairs can cause injuries.
- **Repairs to the device may only be carried out by Retsch GmbH , an authorised representative or by qualified service technicians.**
- **Do not carry out any unauthorised or improper repairs to the device!**

In order to ensure the reliability and operational safety of the device, the following components must be checked at least every six months in terms of any signs of wear and tear and, if required, any broken components shall also be replaced.

Interchangeable accessories may wear to varying degrees, depending on the frequency of use and the samples to be comminuted.
The rotor blades, the grinding chamber insert and the cutting bars, the door insert and the sieves should be checked regularly for wear and replaced if necessary.
All existing seals (replaceable accessories and those inside the device) should also be checked regularly for wear and replaced if necessary.

### 9.3.1 Adjusting the cutting bars

**CAUTION** C19.0060

**Cuts**
Sharp cutting edges

– The sharp cutting edges of the rotor cutting bars in the grinding chamber and of the stator cutting bars can leads to cuts on hands.
- **Do not touch the rotor cutting bars and the stator cutting bars by the sharp cutting edges.**
- **Wear cut-resistant protective gloves.**

As the cutting bars in the grinding chamber insert and the rotor blades wear over time, the quality of the grinding result may change or the grinding process may take more time. The distance between the cutting bar and the blade is referred to as the cutting gap. A cutting gap width of at least 0.3 mm is recommended. Check the width of the cutting gap as described in the previous chapter.

Adjust the cutting bars as described below.
***NOTE*** Do not set the cutting gap to less than 0.3 mm. Contact between the cutting bars and blades can damage mechanical components.
***NOTE*** The tightening torque of the screw must be 7 Nm. The secure fit of the cutting bars is not ensured otherwise.
⇨ Place the grinding chamber insert (**17** or **21**) on a stable work surface and insert the adjustment aid (**17.1**) centrally. The adjustment aid is designed to ensure that the recommended cutting gap of 0.3 mm is maintained when the cutting bars touch the adjustment aid.

To increase the cutting gap, proceed as follows:
⇨ Loosen the set screws (**23.1**), which are accessible from the outside of the grinding chamber insert, evenly at an angle by turning them counterclockwise. Clamp the cutting bar (**23**) against the set screws by tightening the screw (**23.2**) clockwise. If necessary, check the gap with the feeler gauge and repeat the procedure as required.

To reduce the cutting gap, proceed as follows:
⇨ Loosen the screw (**23.2**) by turning it counterclockwise. Adjust the set screws (**23.1**) evenly at an angle by turning them clockwise. Clamp the cutting bar (**23**) against the set screws again by tightening the screw (**23.2**) clockwise. If necessary, check the gap with the feeler gauge and repeat the procedure as required.

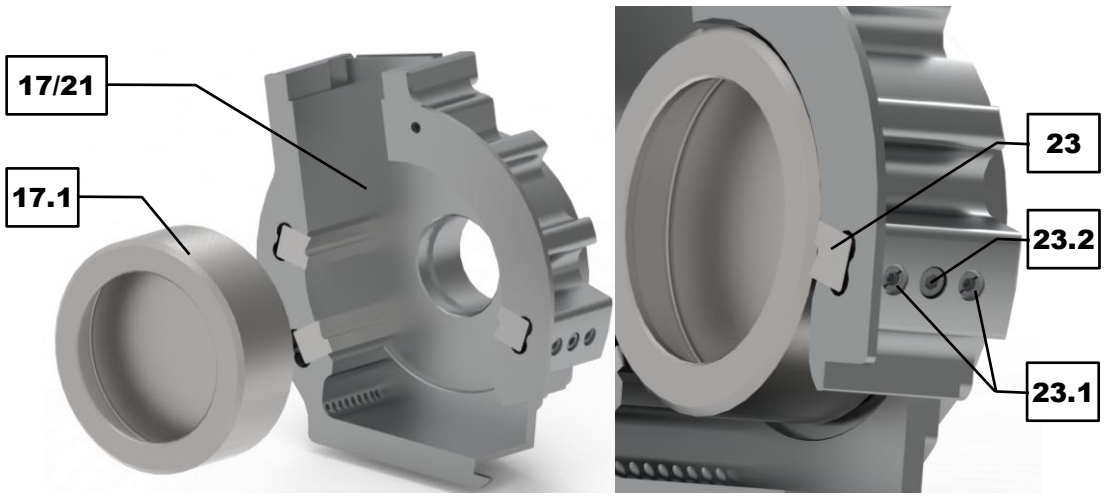



**Fig. 37:** Inserting the adjustment aid and adjusting the cutting bars

### 9.3.2 Replacing the O-ring on the rotor

An O-ring is inserted into the inner groove of the rotor, which wears out over time and with use. Replace the O-ring as follows:
⇨ Remove the old O-ring (**22.1**) from the inner groove of the rotor (**22**). If necessary, use an elongated object to help loosen the O-ring.
⇨ Insert the new O-ring into the inner groove of the rotor. Lightly greasing the rotor makes insertion easier.
***NOTICE*** It is mandatory that an O-ring is used when using the rotor. Otherwise, the rotor will not sit correctly on the shaft and damage may occur inside the device.

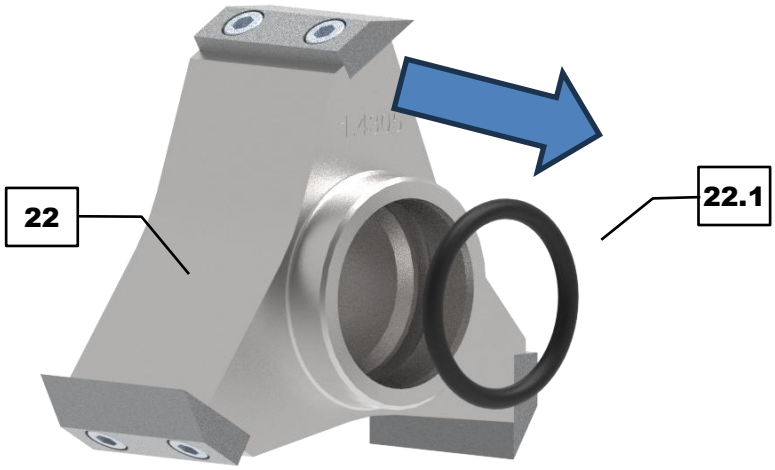



**Fig. 38:** Replacing the O-ring on the rotor

### 9.3.3 Replacing the seal on the cyclone

The cyclone has two seals that wear out over time and with use. One V-shaped seal is attached to the air outlet channel, while the other seal is located in the threaded receptacle. Replace the seals as follows:
⇨ Remove the old V-shaped seal (**19.1**) from the air outlet channel of the cyclone outlet (**19**).
⇨ Place the new V-shaped seal flush on the air outlet channel.

⇨ Remove the old seal (**19.2**) from the threaded socket of the cyclone outlet (**19**). If necessary, use an elongated object to help loosen the seal.
⇨ Insert the new seal into the threaded socket. The seal must sit evenly in the threaded socket. It is mandatory that the seals are inserted when using the cyclone outlet. Otherwise, the separation performance of the cyclone may be reduced.

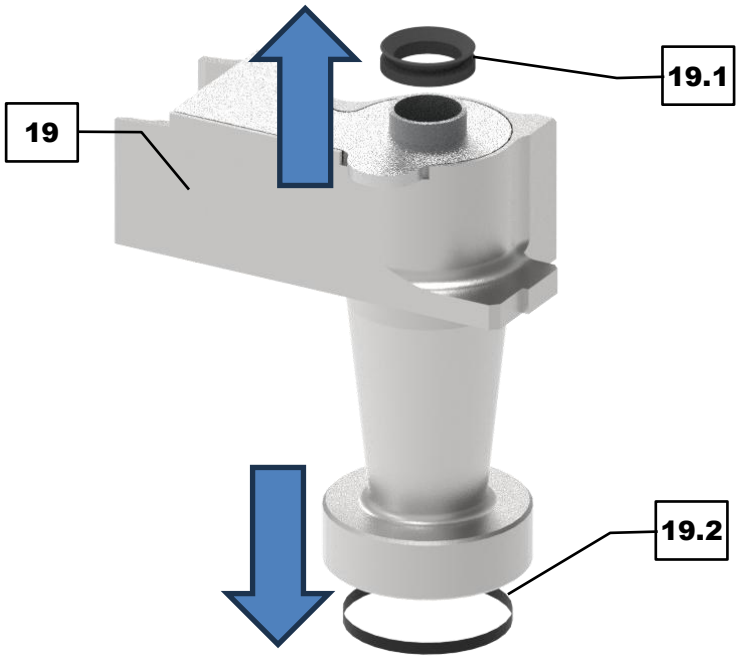



**Fig. 39:** Replacing the seals on the cyclone

## 9.4 Returning for repair and maintenance


**Fig. 40:** 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.

# 10 Accessories

Information about available accessories and the corresponding manuals can be found directly on the Retsch GmbH (https://www.retsch.com) website under the "Downloads" section for the device.

Information about parts subject to wear and tear and small accessories can be found in the complete catalogue for the Retsch GmbH, likewise available on the website.

In the event of questions about spare parts, please contact the representative for Retsch GmbH in your country or contact Retsch GmbH directly.

# 11 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.

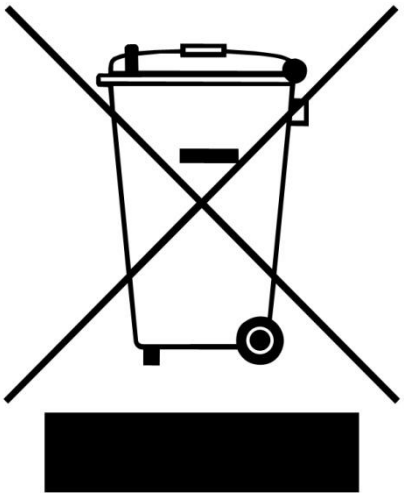


**Fig. 41:** Disposal label

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.

# 12 Index

# EU Declaration of Conformity

**Translation**

# CUTTING MILL

**SM 50 | 20.720.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 61010-1 | Safety Regulations for Electrical Measurement, Control, Regulation and Laboratory Devices |
| DIN EN 13683 | Garden equipment – Integrally powered shredders/chippers – Safety |
| 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**

Applied standards, in particular:

| | |
|---|---|
| DIN EN IEC 63000 | Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances |

**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, 04/2025

D. Szczesny

Dr. David Szczesny, Managing Director

CE