Operating instructions

DISK MILL

PULVERISETTE 13 *premium line*

Valid as of: 13.3020/00100 Valid as of: 13.3040/30100 Valid as of: 13.3050/45100

Read the instructions prior to performing any task!

Translation of the original operating instructions

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Certifications and CE conformity

Certification

Fritsch GmbH has been certified by the SGS-TÜV Saar GmbH.

An audit certified that Fritsch GmbH conforms to the requirements of the DIN EN ISO 9001:2015.

CE Conformity

The enclosed Conformity Declaration lists the guidelines the FRITSCH instrument conforms to, to be able to bear the CE mark.

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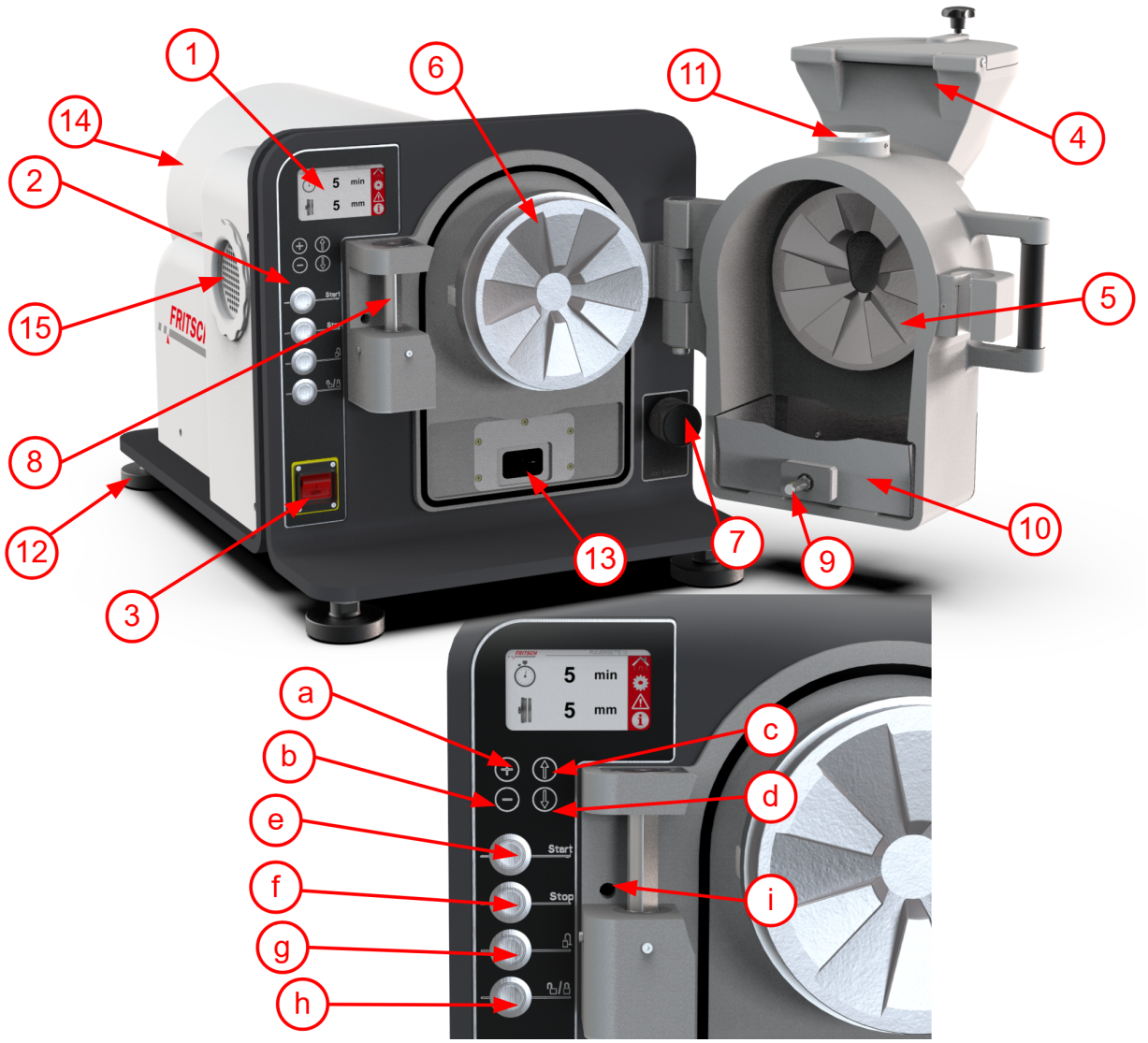

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2 Safety information and use

2.1 Requirements for the user

This operating manual is intended for persons assigned with operating and monitoring the Fritsch the PULVERISETTE 13 premium line. The operating manual and especially its safety instructions are to be observed by all persons working on or with this device. In addition, the applicable rules and regulations for accident prevention at the installation site are to be observed. Always keep the operating manual at the installation site of the the PULVERISETTE 13 premium line.

People with health problems or under the influence of medication, drugs, alcohol or exhaustion must not operate this device.

The the PULVERISETTE 13 premium line may only be operated by authorised persons and serviced or repaired by trained specialists. All commissioning, maintenance and repair work may only be carried out by technically qualified personnel. Qualified personnel are persons who, because of their education, experience and training as well as their knowledge of relevant standards, regulations, accident prevention guidelines and operating conditions, are authorised by those responsible for the safety of the machine to carry out the required work and are able to recognize and avoid possible hazards as defined for skilled workers in IEC 364.

In order to prevent hazards to users, follow the instructions in this manual.

Malfunctions that impair the safety of persons, the the PULVERISETTE 13 premium line or other material property must be rectified immediately. The following information serves both the personal safety of operating personnel as well as the safety of the products described and any devices connected to them: All maintenance and repair work may only be performed by technically qualified personnel.

This operating manual is not a complete technical description. Only the details required for operation and maintaining usability are described.

Fritsch has prepared and reviewed this operating manual with the greatest care. However, no guarantee is made for its completeness or accuracy.

Subject to technical modifications.

2.2 Scope of application

The PULVERISETTE 13 premium line is a disk mill for fine grinding by batches or continuously fine grinding of hard-brittle to medium-hard solids from the field of mining and metallurgy, geology and mineralogy, and the glass and ceramics industry.

The feed size maximum is 20 mm per edge; the final fineness that can be achieved ranges from about 12 mm (greatest gap width) to 0.05 mm (smallest gap width) depending on the set gap width.

The material throughput of the disk mill lies in the range of 20 to 150 kg/h. This depends on the setting of the output gap as well as the bulk weight and the comminution characteristics of the sample.

2.2.1 Operating principle

The comminution of the material sample is done in a grinding chamber, which is sealed dust-proof to the outside, in which two roughly meshed grinding disks work against each other. The movable grinding disk is driven by a powerful, slowly running gear motor.

The grinding stock is filled through a lockable funnel into the centre of the fixed grinding disk and is ejected after comminution from the gap between the two disks by pressure or shear stress. The gap width determines the mean particle feed size of the grinding stock. The grinding gap can be precisely set down to 0.05 mm by the plus/minus keys on the control panel. The gap distance can be viewed on the display (1).

During grinding by batches, the grinding stock is collected in a grinding stock container inserted into the instrument (volume: 2 l). The closed construction prevents dust from escaping. A dust exhaust system can be attached optionally. For cleaning, the front housing is swivelled open horizontally, providing access to the grinding chamber.

2.3 Obligations of the operator

Before using the the PULVERISETTE 13 premium line, this manual is to be carefully read and understood. The use of the the PULVERISETTE 13 premium line requires technical knowledge; only commercial use is permitted.

The operating personnel must be familiar with the content of the operating manual. For this reason, it is very important that these persons actually receive the present operating manual. Ensure that the operating manual is always near the device.

The the PULVERISETTE 13 premium line may exclusively be used within the scope of applications set down in this manual and within the framework of guidelines put forth in this manual. In case of non-compliance or improper use, the customer assumes full liability for the functional capability of the PULVERISETTE 13 premium line and for any damage or injury arising from failure to fulfil this obligation.

By using the the PULVERISETTE 13 premium line the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the the PULVERISETTE 13 premium line.

Neither compliance with this manual nor the conditions and methods used during installation, operation, use and maintenance of the the PULVERISETTE 13 premium line can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

The applicable accident prevention guidelines must be complied with.

Generally applicable legal and other obligatory regulations regarding environmental protection must be observed.

2.4 Information on hazards and symbols used in this manual

Safety information

Safety information in this manual is designated by symbols. Safety information is introduced by keywords that express the extent of the hazard.

DANGER!
This symbol and keyword combination points out a directly hazardous situation that can result in death or serious injury if not avoided.

WARNING!
This symbol and keyword combination points out a possibly hazardous situation that can result in death or serious injury if not avoided.

CAUTION!
This symbol and keyword combination points out a possibly hazardous situation that can result in slight or minor injury if not avoided.

NOTICE!
This symbol and keyword combination points out a possibly hazardous situation that can result in property damage if not avoided.

Special safety information

To call attention to specific hazards, the following symbols are used in the safety information:

Safety information and use

DANGER!

This symbol and keyword combination points out a directly hazardous situation due to electrical current. Ignoring information with this designation will result in serious or fatal injury.

DANGER!

This symbol and keyword combination designates contents and instructions for proper use of the machine in explosive areas or with explosive substances. Ignoring information with this designation will result in serious or fatal injury.

DANGER!

This symbol and keyword combination designates contents and instructions for proper use of the machine with combustible substances. Ignoring information with this designation will result in serious or fatal injury.

WARNING!

This symbol and keyword combination points out a directly hazardous situation due to movable parts. Ignoring information with this designation can result in hand injuries.

WARNING!

This symbol and keyword combination points out a directly hazardous situation due to hot surfaces. Ignoring information with this designation can result in serious burn injuries due to skin contact with hot surfaces.

Safety information in the procedure instructions

Safety information can refer to specific, individual procedure instructions. Such safety information is embedded in the procedure instructions so that the text can be read without interruption as the procedure is being carried out. The keywords described above are used.

Example:

1. Loosen screw.
2.

CAUTION!
Risk of entrapment at the lid.

Close the lid carefully.

3. Tighten screw.

Tips and recommendations

This symbol emphasises useful tips and recommendations as wells as information for efficient operation without malfunction.

2.5 Device safety information

Please observe!

- Only use original accessories and original spare parts. Failure to observe this instruction can compromise the safety of the machine.
- Accident-proof conduct is to be strictly followed during all work.
- Comply with all currently applicable national and international accident prevention guidelines.

CAUTION!
Wear hearing protection!
If a noise level of 85 dB(A) is reached or exceeded, ear protection should be worn to prevent hearing damage.

WARNING!
The maximum accepted concentration (MAC) levels of the relevant safety guidelines must be observed; if necessary, ventilation must be provided or the machine must be operated under an extractor hood.

DANGER!

Explosion hazard!

– When grinding oxidizable substances, e.g. metals or coal, there is a risk of spontaneous combustion (dust explosion) if the share of fine particles exceeds a certain percentage. When grinding these kinds of substances, special safety measures must be taken and the work must be supervised from a specialist.
– The PULVERISETTE 13 premium line is not explosion protected and is not designed to grind explosive materials.

- Do not remove the information signs.

NOTICE!

Immediately replace damaged or illegible information signs.

- Unauthorised alteration of the the PULVERISETTE 13 premium line will void Fritsch's declaration of conformity to European directives and void the guarantee.
- Only use the the PULVERISETTE 13 premium line when it is in proper working order, as intended and in a safety- and hazard-conscious manner adhering to the operating manual. In particular, immediately rectify any malfunctions that could pose a safety hazard.
- If, after reading the operating manual, there are still questions or problems, please do not hesitate to contact our specialised personnel.

2.6 Protective equipment

Protective equipment is to be used as intended and may not be disabled or removed.

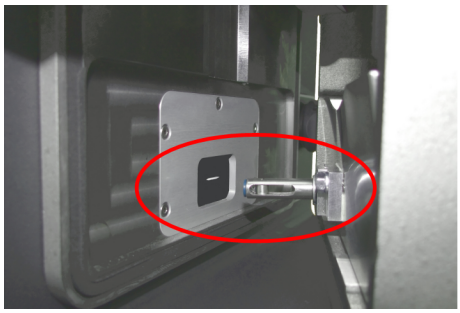
All protective equipment is to be regularly checked for integrity and proper functioning.

The disk mill features many safety devices:

1. The funnel (4) is protected against being reached into by a grid.

2. A sensor (i) monitors the closing of the grinding chamber before operation and prevents the disk mill from starting up when the chamber is open.

3. A second protective device checks whether the grinding chamber has been closed by a motorized locking mechanism.



4. The locking switch (13) pulls in the grinding stock container after grinding starts and locks it with the lock pin that is attached to the container (9). The locking switch monitors whether the device has been properly closed during operation. It also prevents a start-up when the disk mill is open.

The disk mill does not start up when the grinding chamber is open or the grinding stock container is missing.

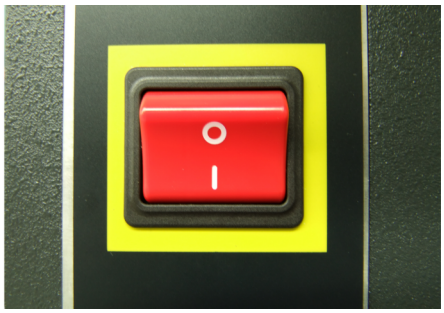
2.7 Hazardous points

CAUTION!

- Crushing hazard at the funnel cover
- Crushing hazard when closing the grinding chamber
- Crushing hazard when the cover of the dust extraction system is removed during operation!

2.8 Electrical safety

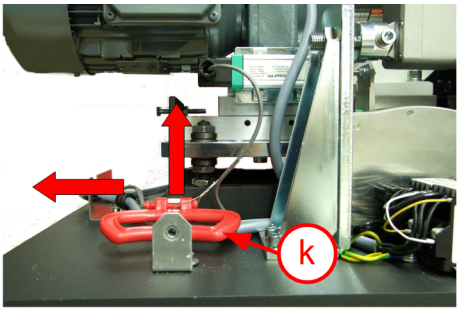
2.8.1 General information



The disk mill is switched on and off by the main switch (3).

- When the switch is pressed to I (On):
  Disk mill is activated and can be started by the Start button (e) if the grinding chamber is closed and the grinding stock container is also inserted.
- When the switch is pressed to O (Off) during grinding:
  The disk mill comes to a standstill and is completely deactivated.

2.8.2 Protection against restart



The device shuts down if there is a power outage.

- The mill comes to a standstill within seconds.
- Grinding stock container can only be opened by an emergency release (k) on the inside of the device. For that, the housing cover (14) needs to be removed as follows. (See also *Chapter 4.3 'Setting up' on page 18*).
  - Open the housing cover (14) by releasing the quick release screws attached on both sides.
  - Once the quick release screws are loosened, pull the housing cover (14) back a few centimetres and then lift it off.
- The emergency release (k) on the inside of the device can then be seen.
- To release the grinding stock container, pull the emergency release (k) backwards until the lock pin (9) of the grinding stock container (10) is released.
  Quite a bit of effort is needed for the release.
- Afterwards, the emergency release can be simply snapped back in and the housing cover closed. At the next start of a grinding, the grinding stock container is drawn in as usual.

NOTICE!

The grinding chamber cannot be opened when the grinding chamber lock is closed and the device is switched off.

When electrical power returns, the disk mill does not start up by itself.

- The mill is secured against restarting.
- The motor is restarted by pressing the Start button (e) and the mill begins working.

3 Technical data

3.1 Dimensions

52 x 105 x 63 cm (width x depth x height)

3.2 Weight

228 kg without grinding disks (net)

246 kg with grinding disks made of tungsten carbide

3.3 Operating noise

Emissions value of workplace according to DIN EN ISO 3746:2005 L_{Pa} = 68.9 dB(A). The noise level measurement was conducted with the grinding stock: sand, grain size 0.5 - 2mm.

3.4 Voltage, current consumption, power consumption

Voltage	400V / 3~ 50Hz	230V / 3~ 60Hz
Current consumption	3.2 A	5.6 A
Power consumption	1830 W under high load (significantly less under normal application)	1800 W under high load (significantly less under normal application)

The device can only be operated on a three-phase power system.

Transient overvoltage according to overvoltage category II permitted.

(See also *Chapter 4.5 'Electrical connection' on page 20*)

3.5 Electrical fuses

A thermal circuit breaker (motor protection switch) is integrated into the main switch (3) and triggers in case of overheating; after a brief cooling period, it is ready to be restarted.

3.6 Protection class

IP 21

3.7 Material

- Maximum feeding size approx. 20 mm (depending on the material)
- Minimum feed quantity 20 - 30 ml
- Grinding by batches with collecting container (max. 2 l)
- Maximum throughput 150 kg/h during continuous grinding

3.8 Final fineness

The final fineness lies between 0.05 and 12 mm.

4 Installation

4.1 Transport

The device is delivered on a transport pallet with a wooden cover. We recommend using a forklift or pallet truck for transporting the packed device.

DANGER!
Do not step under the transport pallet during transport.

WARNING!
Improper lifting can lead to personal injury or property damage. The machine is only to be lifted with suitable equipment and by qualified personnel.

The guarantee excludes all claims for damage due to improper transport.

4.2 Unpacking

- Pull out the nails that fasten the cover to the transport pallet. The cover is the wooden box that has been placed over the transport pallet.
- Lift the cover off of the transport pallet.

CAUTION!
Crushing hazard!
Always lift with 2 persons.

- Compare the contents of the delivery with your order.

4.3 Setting up

DANGER!
Do not step under the transport pallet during transport.

To set up the disk mill, you need a crane or a different suitable transport device as well as 2 harnesses (not included in the scope of delivery) that are at least 40 cm long and have a capacity of 500 kg.

CAUTION!
The weight of the disk mill is approx. 260 kg with grinding disk and transport palette.

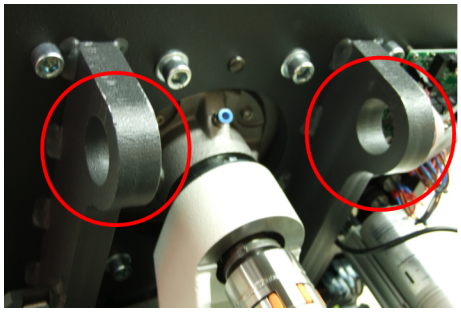
NOTICE!
Place the disk mill on a flat, stable surface. It may be screwed to this or a base plate.

1. The disk mill is screwed from below to the transport palette using 3 screws. Loosen the screws with a spanner (17 mm).

2. Open the housing cover (14) by releasing the quick release screws (X) attached on both sides.

3. Once the quick release screws are loosened, pull the cover (14) back a few centimetres and then lift it off.

4. Two eyelets for attaching the harnesses can then be seen.



5. Lash the harness to a crane or another hoist.
6. Next lash the harness to the two eyelets provided for this.
7. Using the crane, bring the disk mill to the desired position. Make sure the device does not swing while it is being transported.
8. Remove the harness.
9. Replace the housing cover (14) and screw it tight.

4.4 Ambient conditions

WARNING!

Mains voltage!

- The device may only be operated indoors.
- The surrounding air may not carry any electrically conductive dust.
- Maximum relative humidity 80% for temperatures up to 31°C, linearly decreasing down to 50% relative humidity at 40°C.

- The room temperature has to stay between 5 - 40°C.
- Altitudes up to 2000 m
- Degree of pollution 2 according to IEC 664.

4.5 Electrical connection

Before establishing the connection, compare the voltage and current values stated on the type plate with the values of the power supply system to be used.

CAUTION!

Ignoring the values on the type plate may result in damage to the electrical and mechanical components.

4.5.1 Adapting to the mains

The PULVERISETTE 13 *premium line* is delivered with a connection voltage adapted to the electrical system of your country.

5 Initial start-up

The disk mill is delivered with a mounted grinding disk. Check the gap width before the first grinding. (See *Chapter 6.4 'Setting the gap width' on page 25*). After the disk mill has been set up as described in *Chapter 4.3 'Setting up' on page 18* and the mains plug has been plugged into the mains socket, the device is ready for operation.

Switch on the device only after all work described from *Chapter 4 'Installation' on page 18* has been carried out.

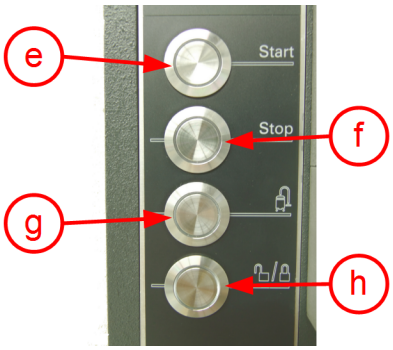
CAUTION!

- Grinding disks must not touch each other.
- The device may be operated only when the grinding disks have been mounted and fixated.
- Smallest gap width 0.05 mm

5.1 Switching on

Switch main switch (3) to I. The display (1) switches on and the Stop button (f) lights up red. If the grinding chamber is locked, the unlocking/locking button (h) lights up green.

5.2 Function check



Once the grinding chamber is closed and the grinding stock container is inserted, the device can be started by the Start button (e). The disk mill starts up. Press the Stop button (f) then and the machine comes to a stop. Continue with *Chapter 6 'Using the device' on page 22*.

5.3 Switching off

Switch main switch (3) to 0. The device switches off completely.

6 Using the device

WARNING!
If the grinding elements used are not original accessories, we provide no guarantee and exclude all liability for damage to the device.

WARNING!
Make sure before starting the machine that the grinding disks have been mounted properly and that there are not any loose parts inside the device. Failure to observe this provision will void the guarantee and releases us from liability for any resulting damage to the device or personal injury.

CAUTION!
- Grinding disks must not touch each other.
- The device may be operated only when the grinding disks have been mounted and fixated.
- Smallest gap width 0.05 mm

CAUTION!
Make sure the suction flange lid or the connection piece (order no.: 13.3250.00) sits firmly so that the dust extraction system can be used. Never reach into the opening of the suction flange during the grinding!

CAUTION!
The device may not be run unsupervised.

NOTICE!
Grinding disks are worn down during grinding. That is why the grinding gap needs to be checked and readjusted if necessary depending on the use and the degree of wear. This is done as described in *Chapter 6.3 'Setting the zero point' on page 23* and *Chapter 6.4 'Setting the gap width' on page 25*.

6.1 Control panel

- When the grinding chamber is open, the button (h) for locking the grinding chamber is not lit.
- The button (h) flashes green as the grinding chamber closes by motor and continues flashing until it is closed. Then it stays lit green.
- During the start-up, the Start button (e) flashes green. Once the device is running, it stays lit green.
- When the device is stopped, the Stop button (f) flashes until the wheel has come to a standstill. At standstill, it is lit red.
- If a dust extraction system is attached, the button (g) lights up green when it is activated.
- The +/– keys (a,b) are used for setting values (timer and gap width).
- The arrow keys (c,d) serve to switch between the setting options on the start screen and for clicking the error list.

6.2 Menu navigation

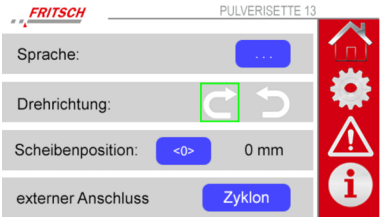
Menu selection

1. The start screen is used for:

– Setting the grinding time in minutes

– Setting the gap width between the grinding disks

– on the right side for navigating between the submenus



2. In the Settings menu you can:

– Set the language → Language

– Change the direction of rotation of the movable grinding disk (6) → Direction of rotation

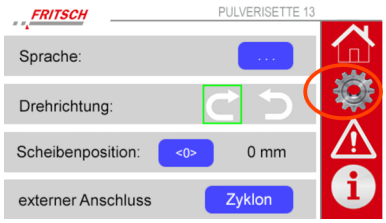
– Disk position for checking the current position

– Define the "zero point" → Set 'zero'

6.3 Setting the zero point

The zero point is the gap width at which the fixed and the movable grinding disks rub each other lightly; thus there is no gap. Starting from this zero point, all other gap widths are controlled.

Whenever the grinding disks are exchanged, the zero point needs to be reset. Grinding disks may have different thicknesses depending on the wear.

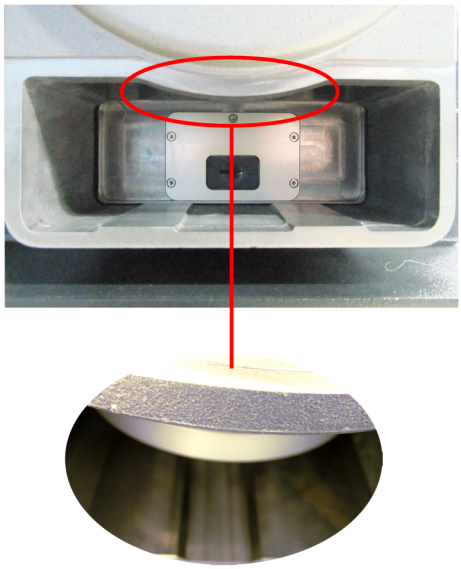


1. To switch from the "Start screen" menu to the "Settings" menu press the gearwheel on the touch screen.

2. Lock the grinding chamber and take out the grinding vessel.

3. Remove the suction flange lid (11). Watch the two grinding disks through this opening as they are moved together. Only a minimal gap of light should be visible between both disks.

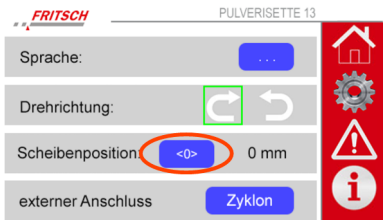
During the movements for the zero point setting, no gap values are shown on the display. You can hear the mechanical sound of the setting motor and see through the suction flange (11) how the movable grinding disk (6) is moved.



4.

CAUTION!
Crushing hazard between the grinding disks!

To check, as the zero point is being adjusted, reach into the opening of the grinding vessel and turn the movable grinding disk by hand. While turning, reduce the gap with the – key (b) until a slight rubbing of the two disks can be felt and heard.



5. Once the smallest gap width has been set and a minimal friction of the disks can be felt, this can be defined as the zero point. Press the *'OK'* button at *'set 'Zero''* on the touch screen. The disk position above it is set to *'0'*.

6. Put the grinding vessel back in.

6.4 Setting the gap width

Setting the gap width is done in the start screen. First the zero point needs to be set (see *Chapter 6.3 'Setting the zero point' on page 23*) to prevent damage to the grinding disks.

Set the gap width as follows:

1. Close the grinding chamber.
2. Press the set number in the lower area of the start screen.
3. Use the +/– keys on the control panel to enlarge (+) the gap dimension or reduce (–) it.
4. The gap dimension between the disks sets itself automatically when:

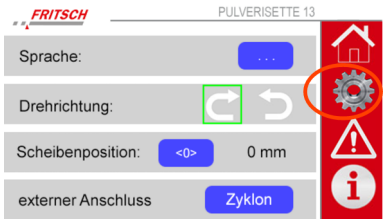
   - the menu item is exited or

   - the grinding process is started by the Start button (e).

NOTICE!

Grinding disks are worn down during grinding. That is why the grinding gap needs to be checked and readjusted if necessary depending on the use and the degree of wear. This is done as described in *Chapter 6.3 'Setting the zero point' on page 23* and *Chapter 6.4 'Setting the gap width' on page 25*.

6.5 Revers mode



If the grinding disks are worn on one side, the direction of rotation can be changed.

1. Switch from the start menu to the setting window.
2. Press on the respective button in the *'direction of rotation'* line to turn the movable grinding disk anti-clockwise or clockwise.

NOTICE!

Grinding disks are subjected to natural wear after longer use and need to be replaced when necessary. If you notice that the grinding disks are worn on one side, they do not need to be replaced right away. You can change the drive motor's direction of rotation by using the Reverse setting. After that, the abrasive edges on the back side of the grinding disk are utilised. At this point at the latest, replacement grinding disks should be ordered. (See *Chapter 9.2 'Exchanging the grinding disks (5 + 6)' on page 38*)

6.6 Setting the grinding time

1. Press the set number of the grinding time on the start screen.
2. Use the +/– keys on the control panel to extend (+) the grinding time or reduce (–) it. The maximum timed grinding duration that can be set is 60 minutes.

6.7 Language change

1. Press the button at *'Language'*.
2. A further window is opened in which you can select the respective flag.

   ⇨ Once you have pressed the flag the start screen is loaded in the selected language.

6.8 Grinding with grinding disks of zirconium oxide

When grinding with zirconium oxide grinding disks, certain work precautions need to be observed:

1. Precise setting of the zero gap. The disks may under no circumstances touch each other during the grinding. The local heating promptly causes tension fissures at the circumference. These fissures appear very quickly and are easily detected.
2. Local heating can also occur if you fill in so much material that a comminution of a bed of material takes place constantly on the outer edges of the grinding disk (grinding gap completely filled with sample material). This leads to tension fissures at the grinding disk's circumference and even its breaking.
3. The hardness of the zirconium oxide grinding disk is 8.5 Mohs (HV1350). No harder sample material may be comminuted (maximum Mohs hardness of 7), because this causes the outer edges of the grinding disk to break.
4. Proceed very cautiously when grinding with zirconium oxide grinding disks. You should pre-crush the grinding stock in a first pass with a larger gap width, before achieving the desired fineness with the smallest gap in a second pass. Proceed in the same way if no information about the grindability of your material is available. (If necessary, carry out a preliminary test with small sample quantities). The grinding disks have a progressing breakage geometry. Rough comminution takes place in the inner area and fine comminution takes place in the outer area of the grinding disk. The stress is greatest in the area of the fine comminution. The described breakage could occur here with very hard sample materials.
5. The adhesive used to glue the fastening bolts into the zirconium oxide grinding disks has a temperature resistance of up to 80 °C. The grinding disks should therefore not be heated to above 80 °C so that a firm seat in the mount is ensured.
6. Please observe the operating instructions concerning the mounting and removing of the grinding disks. *Chapter 9.2 'Exchanging the grinding disks (5 + 6)' on page 38*

NOTICE!

Fritsch GmbH guarantees that it delivers zirconium oxide grinding disks of only the utmost quality.

Used grinding disks that are cracked at the circumference, chipped or completely broken cannot be recognised for claims.

6.9 Adding material

DANGER!

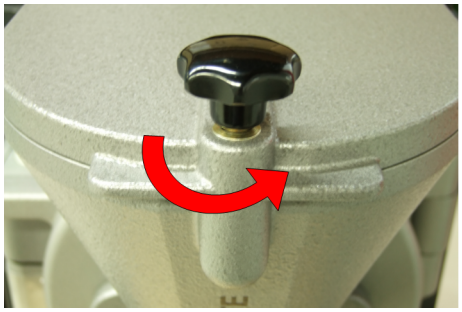
Explosion hazard!

– When grinding oxidisable substances, e.g. metal or coal, there is a risk of spontaneous combustion (dust explosion) if the proportion of fine particles exceeds a certain percentage. When grinding these kinds of substances, special safety measures must be taken and the work must be supervised by a specialist.
– The device is not explosion-protected and is not suitable for grinding explosive materials.

CAUTION!

Switch the device on before filling material into the funnel.

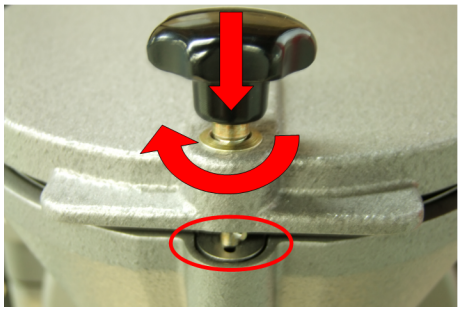
Before switching on the device, make sure that the grinding chamber is closed and that the grinding stock container is not wedged in, but is inserted straight into the drawer.



1. The funnel's lid is secured by a quarter-turn quick closer. To open the lid, turn the quick closer a quarter turn anti-clockwise.

2. Fill sample into the funnel

3. Only fill in so much material that the funnel's lid can still be closed.



4. To close the lid, you have to press the pins on the quick closer into the grooves on the funnel and lock it by a quarter turn clockwise.
5. Observe the grinding process (grinding sound) and determine the optimal filled in quantity. Repeat this for each new material.
6. Do not refill more material until the grinding sound has lowered.
7. Maximum fed in quantity depends on the grindability of the material and the collecting volume of the grinding stock container.
8. Put large lumps of material (up to 20 mm per edge) into the funnel singly; close and secure the lid.

6.10 Taking samples

Depending on the quantity of the ground material, be sure to use both hands when taking out the grinding stock container. Hazard of tipping!

6.11 Final fineness

The final fineness that can be achieved depends on the selected gap width (approx. 0.05 mm to approx. 12 mm). The gap width determines just one dimension of the individual particles in the fine ground material. For example, breaking material may well contain greater dimensions in one extension direction. Normally however, with this type of material, the amount of samples with larger dimensions in this extension direction is also reduced significantly after a second grinding pass.

7 Accessories

7.1 Dust extraction

- 43.9070.00 Dust exhaust system, dust category "M" (43.9060.00 Dust exhaust system, dust category "H")
- 43.9051.00 Polyester filter set (pack of 2)
- 43.9052.00 Plastic bag (pack of 5)
- 43.9055.00 Paper filter bag (pack of 5)

Dust exhaust attachment

DANGER!

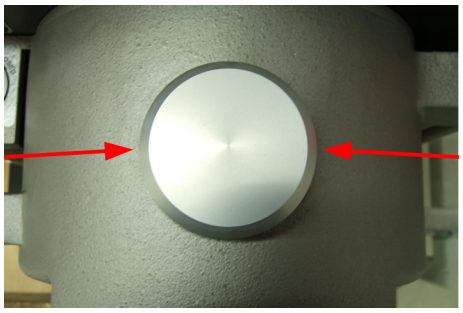
Mains voltage!

– Before beginning with maintenance and assembly work, disconnect the mains plug and protect the device against being unintentionally switched back on!

– Indicate maintenance and assembly work with warning signs.

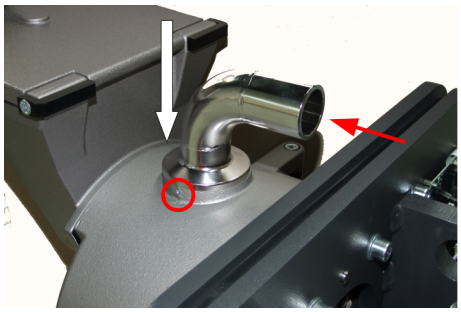
NOTICE!

To avoid damage to the device, use the supplied control box when using a dust exhaust system.



1. The suction flange lid (11) is affixed with 2 threaded pins M5. Loosen them.

2. Remove the lid.



3. Insert the adapter (order no. 13.3250.00) for the dust exhaust onto the exposed opening of the grinding chamber and fixate with the threaded pins.

⇨ Place the exhaust hose onto the opening.

4. Connect the control box (86.5500.00) on the back side of the disk mill with the connection cable (22.1870.00) to the exhaust connection.

5. Afterwards, plug the mains plug of the dust exhaust into the control box and the mains plug of the control box into the socket.

6. Switch on the dust exhaust on the dust exhaust system.

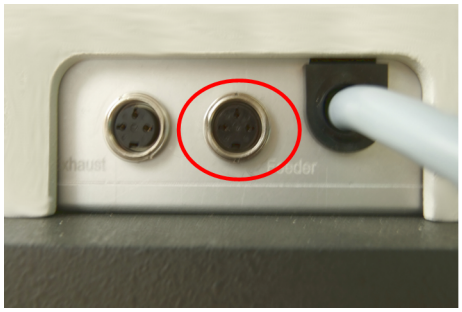
7. Connect the disk mill to the mains again and turn the main switch (3) to I (On).

8. The dust exhaust can be switched on and off at the control panel when the disk mill is ready for operation only when the grinding chamber is open. (Dust exhaust button)

NOTICE!
When using without the control box, do not switch the dust exhaust on during grinding, as otherwise grinding stock may be sucked off as well.

After the grinding, the dust exhaust system which is connected to the control box is activated for 5 seconds to suck off the fine dust.

7.2 Dosed sample feeding with the LABORETTE 24 vibratory feeder



To ensure a steady dosed feeding in of the sample material, you can employ the LABORETTE 24 vibratory feeder in combination with the PULVERISETTE 13 *premium line* . The feeder can be attached over the feeder connection on the disk mill's back side. During grinding, it feeds the sample material automatically to the device.

CAUTION!
Be careful when combining the PULVERISETTE 13 *premium line* and the LABORETTE 24 for grinding as sample material may fly out of the funnel of the disk mill. During grinding therefore, only so much material should be fed via the channel so that the funnel of the PULVERISETTE 13 *premium line* is filled half full and no sample material can escape from the grinding chamber. Afterwards, set the feeding, so that the fill level in the funnel of the disk mill remains constant.

7.3 Comminution of coarse material in combination with the Jaw Crusher PULVERISETTE 1 *premium line*

For comminution of coarse material for the subsequent use in the disk mill, it is used in combination with the Jaw Crusher PULVERISETTE 1 *premium line*.

The comminution is done in this combination in a single pass with 95 mm (or 65 mm) feed size up to an average particle feed size (d_{50}) of 0.05 mm.

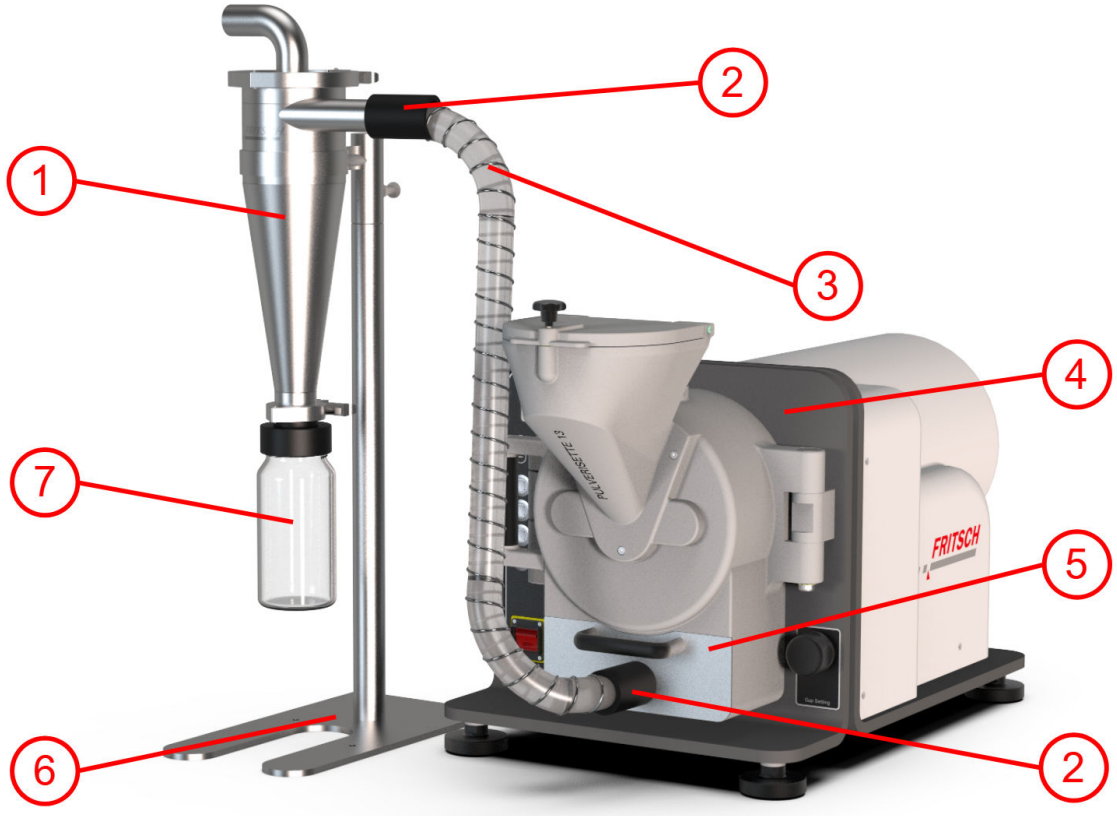
The jaw crusher is placed on a mounting rack (order no. 43.6000.00) over the disk mill. The material roughly crushed in the jaw crusher passes via a hopper directly into the funnel of the disk mill.

CAUTION!

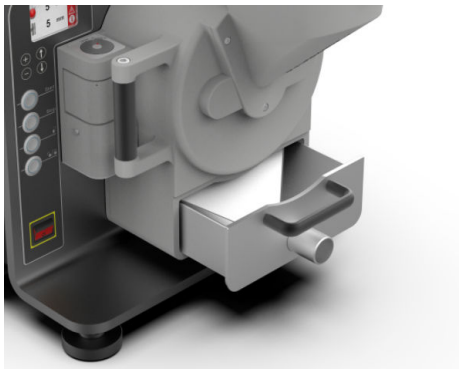
Feed in only as much sample material into the jaw crusher as the PULVERISETTE 13 *premium line* itself can grind. (Depends on gap width, comminution by batches with collection container: max. 2 L sample material)

7.4 Sample exhaust system with cyclone separator

For sample exhaustion with the high-performance cyclone separator in combination with the PULVERISETTE 13 *premium line*, you need the device for sample exhaustion (13.3330.00).



1 45.8010.00 - Cyclone separator
2 45.5986.15 - 2x Bushing
3 45.5980.00 - Hose
4 13.3000.00 - PULVERISETTE 13 *premium line*
5 13.3125.00 - Exhaust drawer
6 45.8015.00 - Stand
7 83.3250.00 - 1 l Glass



1. Position the exhaust drawer into the PULVERISETTE 13 *premium line* as can be seen in the illustration and push it all the way to the back.

2. Connect the exhaust drawer to the connection of the high-performance cyclone separator.

3. Switch on the exhaust system before you begin with the comminution.

To automate this step, use the control box (86.5500.00) and activate the cyclone under Settings. During a comminution, the cyclone is automatically activated and deactivated after stopping.

8 Cleaning

DANGER!

Mains voltage!

- Before beginning with cleaning work, disconnect the mains plug and protect the device against being unintentionally switched back on!
- Do not allow any liquids to flow into the device.
- Indicate cleaning work with warning signs.
- Put safety equipment back into operation after cleaning work.

NOTICE!

The grinding disk holder and the housing are made of spheroidal graphite cast iron. This steel cast is not stainless. If you comminute sample material that is slightly moist, then after the grinding, you need to dry off the back side of the grinding disks, the inner side of the grinding disk holder and all parts of the housing that comes into contact with the samples. If you do not do this, then you can count of corrosion.

8.1 Sucking off dust after a grinding

After the grinding process has ended, you can suck off the dust that has accumulated during grinding. Install the dust exhaust as described in *Chapter 7.1 'Dust extraction' on page 30*.

NOTICE!

When using without the control box, do not switch the dust exhaust on during grinding, as otherwise grinding stock may be sucked off as well.

8.2 Grinding chamber

Open the grinding chamber to clean it. Use a narrow and/or wide brush and a vacuum cleaner to clean out the grinding chamber. If necessary, you can also apply liquid cleansers (alcohol, benzine). Watch for possible corrosion though when using water-based fluids. Be sure to dry out the disk mill thoroughly.

WARNING!

Danger of poisoning and fire!

When using flammable or noxious cleansers, be sure to observe the valid safety regulations (MAK values) and clean the disk mill in a well-ventilated safety area if necessary.

8.3 Housing

The outside of the machine can be cleaned with a soft, damp cloth when it is in the switched off state. A solution of water and a mild detergent can be used for that.

Do not use solvents for cleaning.

8.4 Cleaning the funnel

In special cases, the funnel can be dismantled and cleaned as described in point 4 ↬ *Chapter 9.2 'Exchanging the grinding disks (5 + 6)' on page 38*. When grinding with the same sample material, it is sufficient to clean the funnel from dirt with a brush and a vacuum cleaner. For more intensive cleaning, the protective grid can be removed by loosening the 4 vertical screws M3. Wipe off the funnel with a moist cloth.

CAUTION!

Remount the grid after cleaning.

Never operate the disk mill without the funnel or funnel grid.

9 Maintenance

DANGER!

Mains voltage

- Before beginning with maintenance work, unplug the mains plug and protect the device against being unintentionally switched back on again!
- Indicate maintenance work with warning signs.
- Maintenance work may only be performed by specialised personnel.
- Put safety equipment back into operation after maintenance or repair work

We recommend keeping a safety logbook Chapter 15 'Safety logbook' on page 54, where all work (maintenance, repairs.....) performed on the device is entered.

The most important element of maintenance is regular cleaning!

Functional part	Task	Test	Maintenance interval
Grinding chamber sensor	Start-up block	Open the grinding chamber; start; error message	Before each use
Grinding chamber safety lock	Start-up block	Do not close grinding chamber by motor; start; error message	Before each use
Grinding stock container protective equipment	Start-up block	Grinding stock container not inserted; start; error message	Before each use
Grinding disks gap width	Break function	Test distance	Before each use

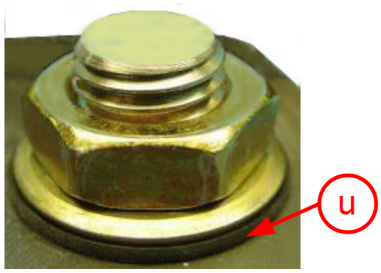
9.1 Grinding disks

The grinding disks wear down after a certain time, depending on the material being crushed. Check their surfaces in regular intervals. For changing the direction of rotation or exchanging the disks, observe the information in *Chapter 6.5 'Revers mode' on page 26* and as follows in *Chapter 9.2 'Exchanging the grinding disks (5 + 6)' on page 38*.

9.2 Exchanging the grinding disks (5 + 6)

CAUTION!
The device has to be connected to the mains to open the grinding chamber and adjust the gap width.

CAUTION!
- Crushing hazard when exchanging the grinding disks.
- Secure the grinding disks against falling while exchanging them.



CAUTION!
Clean the holder and the back of the disks thoroughly before installing the new disks. This is very important in particular when employing the ZrO_2 and WC+Co disks, so that the disks are seated without tension and parallel to each other.

When using the ZrO_2 grinding disks:

When tightening the screws, it is important that the tightening torque is not too great (see table) and is the same for both screws.

The ZrO_2 grinding disks come with rubber washers (l) that are placed under the steel washers. The nuts are then tightened until the rubber washer is slightly squeezed out by the steel washer. This ensures a tightening torque of approx. 20 Nm.

All other grinding disks (as pictured above) are fastened with two hexagon screws M20 x 35 and with a washer and a spring ring.

NOTICE!
Hold the grinding disks firmly during the exchange and do not drop them. This can cause disks made of zirconium oxide to break or splinter.

Tools needed:

- Size 30 socket with locking handle (T and K)
- Locking spanner (B)
- SW30 spanner (R)
- Hexagon socket set (I)

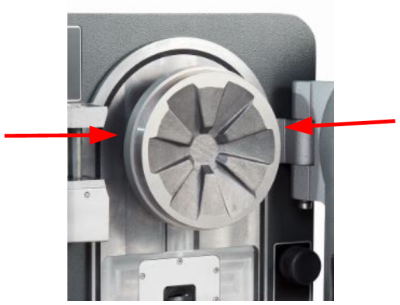
DANGER!
Make sure that the mains plug is disconnected from the mains after step 6.

1. Connect the device to the mains.

2. Switch main switch (3) to I (ON).

3. *To ensure better access to the hexagon screws on the back of the movable grinding disk, the grinding gap should be adjusted to the smallest width. (See Chapter 6.4 'Setting the gap width' on page 25).*

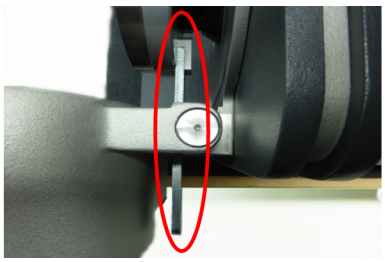
4. Afterwards, press the release button (h) on the control panel.



5. The grinding chamber lock (8) is released. Open the grinding chamber now. The grinding disks become visible. The movable grinding disk (6) is fastened to the back with 2x M30 hexagon screws.

6. Switch the device off at the main switch (0).

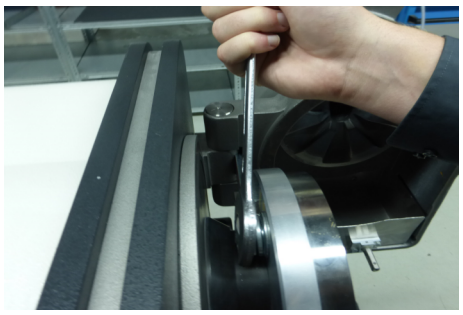
DANGER!
Disconnect the mains plug from the mains and secure the device against being unintentionally switched back on.



7. Then use the locking spanner (B) to secure the support disk of the movable grinding disk.

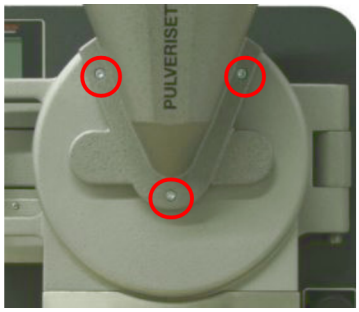
To do this, the locking spanner has to be pushed through the hinge of the open grinding chamber.

NOTICE!
Hold the grinding disks firmly during the exchange and do not drop them. This can cause disks made of zirconium oxide to break or splinter.



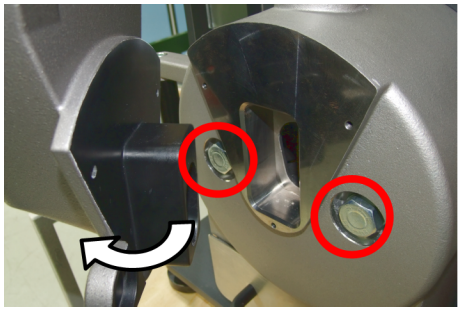
8. **CAUTION!**
Crushing hazard when exchanging the grinding disks. Make sure that the grinding disk does not fall on the floor.

Use the spanner (R) to unscrew the hexagon screws at the top of the back of the movable grinding disk. Turn the disk 180 degrees and unscrew the other hexagon screw. Remove the grinding disk.



9. The funnel (4) needs to be removed so that the fixed grinding disk (5) can be dismantled.

10. For this, remove the 3 marked cylinder screws.



11. Take the funnel off towards the front by tugging it.

⇨ The fastening screws of the fixed grinding disk become visible.

12.

CAUTION!
Crushing hazard when exchanging the grinding disks. Make sure that the grinding disk does not fall on the floor.

Loosen the 2x M20 fastening screws using the locking handle (K). Hold the grinding disk firm. Remove the hexagon screws and take off the grinding disk.

13. Now take the movable replacement grinding disk (6) and secure it by hand with the 2 hexagon screws. Then tighten with the spanner (R).

14. Remove the locking spanner (B) and close the grinding chamber manually.

15. By using the setting screw to adjust the gap (7), enlarge the gap with a maximum of 3 turns to the left.

16. Open the grinding chamber and slide the locking spanner as far as possible through the hinge of the grinding chamber.

Depending on the wear on the old grinding disks, the position of the retracted movable grinding disk may mean that the locking spanner will not fit behind it any more. From point 14, positioning behind the movable grinding disk is no longer necessary. The locking spanner should be used to secure the door of the grinding chamber for simpler handling when inserting the fixed grinding disk and the funnel.

17. Insert the fixed replacement grinding disk and fixate it with the hexagon screws. Fasten the disk with the locking handle (K).

Be careful when opening it to insert the fixed replacement grinding disk.

18. Insert the funnel again in the reverse order of what is shown under point 11 and screw it tight with 3 cylinder screws. (See point 9 to 11)

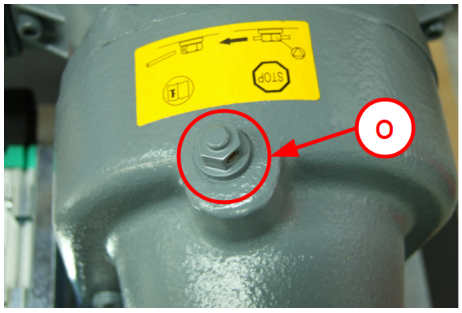
19. Remove the locking spanner (B) again and close the grinding chamber manually.

20. Connect the mains plug, turn the device on and lock the grinding chamber by pressing the locking button (h).

21. The zero point needs to be specified again. (See *Chapter 6.3 'Setting the zero point' on page 23*).

Material	Reference value for max. tightening torque (Nm)	Density g/cm³	Abrasion resistance	Use for material to be crushed	Order number fixed disk:	Order number movable disk:
Hardened steel cast 11-12% Cr	**at least 50**	7,9	Good	Hard, brittle sample material	13.1100.09	13.1110.09
Manganese steel 12-13% Mn	**at least 50**	7,9 - 8	Good	Hard, brittle sample material	13.1120.23	13.1130.23
Tungsten carbide 90.3% WC + 9.5% Co	**at least 50**	14,8	Very good	Hard, abrasive sample material	13.2000.08	13.2010.08
Zirconium oxide 94.5 % ZrO2	**approx. 20**	6,0	Extremely good	Medium-hard, abrasive sample material for iron-free grinding	13.2100.27	13.2110.27

9.3 Gear oil exchange



The gears of the motor are filled with gear oil at delivery (ISO VG 220 Ord. no.: 85.0110.00). To change the transmission oil, there is a filler screw (o) at the top of the gear housing. To access it, the housing cover needs to be removed as explained in *Chapter 4.3 'Setting up' on page 18*.

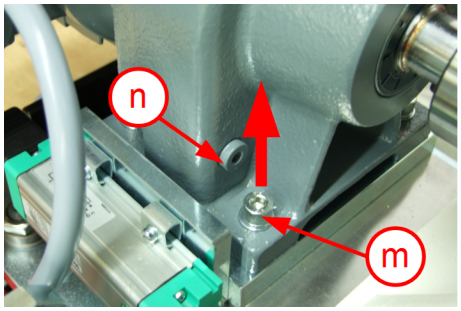
The oil needs to be changed after about 5 years.

9.3.1 Carrying out a gear oil exchange

1. Have the PULVERISETTE 13 *premium line* run for about 15 minutes so that the gear oil inside warms up and drains better.
2. Remove the mains plug.

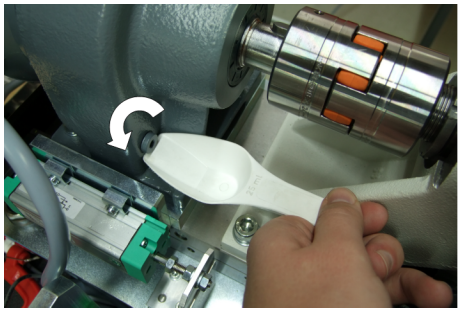
DANGER!
Disconnect the mains plug from the mains and secure the device against being unintentionally switched back on.

3. Disassemble the hood. (See *Chapter 4.3 'Setting up' on page 18*).

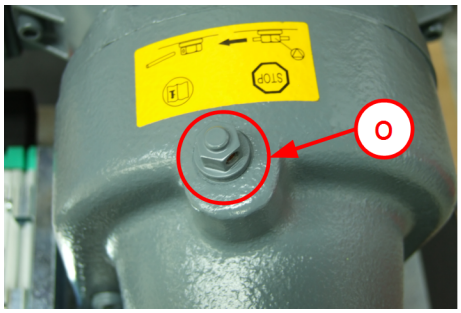


4. Remove the motor fastening screw (m) under the oil drain screw (n) with a hexagon socket screw key M10.

There is about 0.22 litres of ISO VG 220 gear oil in the gears.

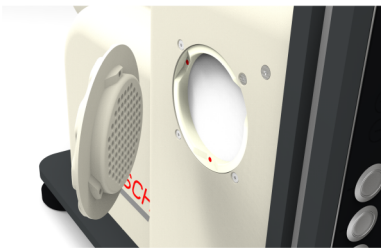


5. Hold a flat container under the oil drain screw (n) and unscrew it with a no. 5 hexagon socket screw key until oil flows out.
6. Allow the oil to drain from the gears completely (about 0.22 L). Keep the size of the collecting container in mind and empty during the process if necessary; for this, screw the oil drain screw back in.
7. Once the gear oil has been emptied completely, remove the drain screw.
8. Clean up any gear oil that spills with a paper towel and clean the contact surface of the drain screw.
9. Screw the drain screw and sealing washer back in firmly.
10. Remount the motor fastening screw.



11. Afterwards, the filling screw (o) can be removed.
12. Insert a funnel into the bore and fill the gears with 0.22 litre ISO VG 220 gear oil, (order no.: 85.0110.00).
13. Screw in the filling screw (o) with a clean seal.
14. Mount the housing cover.

9.4 Intake filter



The intake filter on the left side of the device should be removed once a week and sucked off, depending on the frequency of the grinding.

To do this, proceed as follows:

1. Open the cover of the filter on the left side of the housing. The cover is held by 3 magnets.
2. Remove the filter and suck it off.

> *If the fine dust filter is heavily soiled, it needs to be replaced.*

3. Re-insert the filter and close the cover.

10 Repairs

DANGER!

Mains voltage!

- Before beginning with repair work, unplug the mains plug and protect the device against being unintentionally switched back on.
- Indicate repair work with warning signs.
- Repair work may only be performed by specialised personnel.
- Put safety equipment back into operation after maintenance work.

10.1 Error display

The main screen shows two kinds of error messages:

1. Malfunctions cause the device to be switched off immediately and the warning symbol flashes quickly. Press the warning triangle to show the list of errors with information about the error.
2. If a warning occurs, this is indicated by a slowly flashing warning triangle in the right edge of the display. Press the warning triangle to access the list of errors here too.

In the list of errors, malfunctions are displayed in "red", while warnings are displayed in "yellow". Press "OK" to mark the errors as seen and delete them from the list once they have been rectified.

The following malfunctions and warnings can be displayed:

Fault description	Cause	Remedy
Message *'Please close grinding chamber'*	Door interlock started although grinding chamber door is not closed	■ Close the door of the grinding chamber ■ Check proximity switch on grinding chamber rear wall for function
Message *'runtime error grinding chamber close'*	Grinding chamber lock does not reach the desired position (open/closed) in the specified time	■ Check whether the drive motor is free to move and is running. ■ Check whether the end positions are correctly defined in the setup
Message *'no drawer available'*	Mill was started although no drawer is inserted	■ Insert drawer ■ Readjust the spike of the drawer if necessary.

Fault description	Cause	Remedy
Message *'unable to close drawer'*	Drawer latch cannot lock the drawer properly	■ Insert drawer correctly ■ Readjust the spike of the drawer if necessary. ■ Clean drawer chamber
Message *'Contactor K1 unable to open'*	Internal error in the control of the main drive	Do not use the mill any more - Contact Fritsch Service
Message *'Contactor K2 unable to open'*	Internal error in the control of the main drive	Do not use the mill any more - Contact Fritsch Service
Message *'Contactor K1 unable to close'*	Internal error in the control of the main drive	Do not use the mill any more - Contact Fritsch Service
Message *'Contactor K2 unable to close'*	Internal error in the control of the main drive	Do not use the mill any more - Contact Fritsch Service
Message *'contactorfailure'*	Internal error in the control of the main drive	Do not use the mill any more - Contact Fritsch Service
Message *'unable to open drawer'*	Drawer latch cannot unlock the drawer properly	■ Restart the unit to open the lock again. ■ Use the emergency release of the safety lock, then clean the lock and drawer chamber.
Message *'Runtime Error motor grinding chamber'*	Grinding gap adjustment does not reach the desired position (open/closed) in the specified time	■ Check whether the drive motor is free to move and is running. ■ Check whether the end positions are correctly defined in the setup ■ Check free movement by handwheel
Message *'failure safety switch drawer'*	Safety limit switch inside the safety interlock without function	Do not use the mill any more - Contact Fritsch Service

10.2 Checklist for troubleshooting

Malfunction	Possible cause	Rectify fault
Mill does not start up	No connection to mains	Plug in mains plug
	Mains switch off	Switch on mains switch
	Protection switch of the grinding chamber is open	Close the grinding chamber properly
	Protection switch of the grinding stock container is open	Insert the grinding stock container properly
	Thermo switch has triggered	Wait until device has cooled down
	Fuse in control circuit	Have fuse replaced by qualified technician

Malfunction	Possible cause	Rectify fault
Disks do not rotate	Gap width at 0	Set the gap width. See *Chapter 6 'Using the device' on page 22*
	Sample material blocking the disk	Open grinding chamber and remove sample material
Mill stops running during operation	Overload! Switching off by motor protection switch (main switch)	Cool off mill, remove grinding stock, reduce infeed of grinding stock
	Grinding chamber overfilled, jamming of grinding stock that is too large/hard	Open grinding chamber and empty
Mill has poor grinding result	Grinding disk worn down	Reverse direction of rotation or replace grinding disk. See *Chapter 6 'Using the device' on page 22* or *Chapter 6 'Using the device' on page 22*
	Grinding disks not installed parallel	Dismantle grinding disks, clean holder and install again (See *Chapter 6 'Using the device' on page 22*)
Grinding stock escapes	Grinding chamber and grinding stock container seals are soiled or defective	Clean or replace seals
	Collecting container overflow (max. 2 L)	Take out the container and clean the interior
Error message, grinding stock container	Grinding stock container not accepted	Slide the container in centrally
	Soiling of the container guide	Cleaning
After STOP, no release of the grinding stock container	Lock release mechanism of the grinding stock container is defective	Unlock with the emergency release on the inside of the device, see *Chapter 2.8.2 'Protection against restart' on page 14*. Contact Fritsch
Automatic gap adjustment not possible	Control panel defective	Replace control panel
	Gap adjustment defective	Contact Fritsch Temporary solution of the problem with the setting screw (7) on the right, bottom front side. Set the precise gap width manually.
	Disks are stuck	Turn loose with the help of the setting screw (7). Readjust the zero point.
Error message	Gap width, grinding chamber, grinding stock container	Press STOP button

11 Examples of comminution tasks

- Particle feed size 20 mm
- Feed quantity 1 kg
- Material sorted from hard to medium-hard

Grinding stock	Grinding duration (min.)	Gap adjust-ment (mm)	Particle feed size analysis (µm)		Throughput kg/h
			90%<	50%<	
Basalt	2,1	1,0		600	28
	3,5	0,1	220	60	17
Clinker	1,5	1,0		800	36
	10,0	0,1	220	60	6
Slate	1,4	1,0		1500	45
	2,2	0,1	250	90	27
Hard coal	3,5	1,0		800	17
	13,5	0,1	250	100	4
Coke	5,3	1,0		400	11
	9,0	0,1	400	200	5
Lime-stone	2,0	1,0	1000	420	30
	6,3	0,1	210	100	10
Thomas meal (potash)	1,3	1,0	1000	350	45
	2,3	0,5	350	150	26
Pumice stone	1,7	1,0	1100	450	35
	5,0	0,1	150	30	12

12 Disposal

It is hereby confirmed that FRITSCH has implemented the directive 2002/95/EC of the European Parliament and Council from 27th January 2003 for the limitation of the use of certain dangerous substances in electrical and electronic devices.

FRITSCH has registered the following categories according to the German electrical and electronic equipment act, section 6, paragraph 1, clause 1 and section 17, paragraphs 1 and 2:

Mills and devices for the preparation of samples have been registered under category 6 for electrical and electronic tools (except for large stationary industrial tools).

Analytical devices have been registered under category 9, monitoring and control instruments.

It has been accepted that FRITSCH is operating only in the business-to-business area. The German registration number for FRITSCH is WEEE reg. no. DE 60198769

FRITSCH WEEE coverage

Since the registration of FRITSCH is classified for bilateral transactions, no legal recycling or disposal process is described. FRITSCH is not obliged to take back used FRITSCH devices.

FRITSCH declares it is prepared to take back used FRITSCH devices for recycling or disposal free of charge whenever a new device is purchased. The used FRITSCH device must be delivered free of charge to a FRITSCH establishment.

In all other cases FRITSCH takes back used FRITSCH devices for recycling or disposal only against payment.

13 Guarantee terms

Guarantee period

As manufacturer, FRITSCH GmbH provides – above and beyond any guarantee claims against the seller – a guaranty valid for the duration of two years from the date of issue of the guarantee certificate supplied with the device.

Within this guarantee period, we shall remedy all deficiencies due to material or manufacturing defects free of charge. Rectification may take the form of either repair or replacement of the device, at our sole discretion. The guarantee may be redeemed in all countries in which this FRITSCH device is sold with our authorisation.

Conditions for claims against the guarantee

This guarantee is subject to the condition that the device is operated according to the instructions for use / operating manual and its intended use.

Claims against the guarantee must include presentation of the original receipt, stating the date of purchase and name of the dealer, together with the complete device type and serial number.

For this guarantee to take effect, the answer card entitled "Securing of Guarantee" (enclosed with the device) must be properly filled out and despatched without delay after receipt of the device and be received by us within three weeks or alternatively, *online registration* must be carried out with the above-mentioned information.

Reasons for loss of the guarantee

The guarantee will not be granted in cases where:

- Damage has arisen due to normal wear and tear, especially for wear parts, such as: Crushing jaws, support walls, grinding bowls, grinding balls, sieve plates, brush strips, grinding sets, grinding disks, rotors, sieve rings, pin inserts, conversion kits, sieve inserts, bottom sieves, grinding inserts, cutting tools, sieve cassettes, sieve and measuring cell glasses.
- Repairs, adaptations or modifications were made to the device by unauthorized persons or companies.
- The device was not used in a laboratory environment and/or has been used in continuous operation.
- Damage is present due to external factors (lightning, water, fire or similar) or improper handling.
- Damage is present that only insubstantially affects the value or proper functioning of the device.
- The device type or serial number on the device has been changed, deleted, removed or in any other way rendered illegible
- The above-mentioned documents have been changed in any way or rendered illegible.

Costs not covered by the guarantee

This guarantee excludes any costs for transport, packaging or travel that accrue in the event the product must be sent to us or in the event that one of our specialist technicians is required to come to your site. Any servicing done by persons not authorised by us and any use of parts that are not original FRITSCH accessories and spare parts will void the guarantee.

Further information about the guarantee

The guarantee period will neither extend nor will a new period of guarantee begin in the event that a claim is placed against the guarantee.

Please provide a detailed description of the type of error or the complaint. If no error description is enclosed, we shall interpret the shipment as an assignment to remedy all recognisable errors or faults, including those not covered by the guarantee. Errors or faults not covered by the guarantee shall in this case be rectified at cost.

We recommend reading the operating manual before contacting us or your dealer, in order to avoid unnecessary inconvenience.

Ownership of defective parts is transferred to us with the delivery of the replacement part; the defective part shall be returned to us at buyer's expense.

NOTICE!

Please note that in the event that the device must be returned, the device must be shipped in the original Fritsch packaging. Fritsch GmbH denies all liability for any damage due to improper packaging (packaging not from Fritsch).

Any enquiries must include a reference to the serial number imprinted on the type plate.

14 Exclusion of liability

Before using the product, be sure to have read and understood this operating manual.

The use of the product requires technical knowledge; only commercial use is permitted.

The product may be used exclusively within the scope of applications set down in this operating manual and within the framework of guidelines put forth in this operating manual and must be subject to regular maintenance. In case of non-compliance, improper use or improper maintenance, the customer assumes full liability for the functional capability of the product and for damage or injury arising from violating these obligations.

This operating manual has been prepared to the best of our knowledge and checked for accuracy at the time of printing. FRITSCH GMBH assumes no guarantee or liability whatsoever for the accuracy or completeness of the contents of this operating manual, including but not limited to the implied warranties of merchantability and fitness for a particular purpose, unless liability is expressly prescribed by applicable laws or jurisprudence.

FRITSCH GMBH expressly reserves the right to modify and/or update this operating manual without prior notice. The same applies to modifications and improvements to the products described in this operating manual. It is the responsibility of the user to ensure that they have the current version of this operating manual. For more information, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55473 Idar-Oberstein.

Not all parts shown here are necessarily installed in the product. The buyer is not entitled to delivery of these parts. If interested, please contact your local FRITSCH GMBH distributor or Fritsch GmbH, Industriestr. 8, D-55743 Idar-Oberstein.

FRITSCH GMBH takes the greatest care to ensure that the quality, reliability and safety of your products are continuously improved and adapted to the state of the art. The supplied products as well as this operating manual conform to the current state of the art when they leave the sphere of influence of FRITSCH GMBH.

By using the product the customer agrees with this and recognizes that defects, malfunctions or errors cannot be completely excluded. To prevent risk of damage to persons or property or of other direct or indirect damage, resulting from this or other causes, the customer must implement sufficient and comprehensive safety measures for working with the product.

Fritsch GmbH excludes any liability, warranty, or other obligation to compensate for damages, regardless of whether this liability, warranty, or other obligation is explicit or implicit, contractual or arising from unlawful acts or prescribed contractually, by law, or otherwise. In no event shall the buyer be entitled to any compensation from Fritsch GmbH for any special, direct, indirect, coincidental or consequential damage, including but not limited to lost profits, lost savings, lost sales or financial loss of any kind or for compensation of third parties, for down-times, for lost goodwill, for damage to or replacement of equipment and property, for costs or restoration of materials or goods related to the product or the use of our products, for other damage or injury to persons (including fatal injuries) or similar. The above exclusion of liability is limited by mandatory liability as prescribed by laws or jurisprudence. Liability for negligence is excluded in all cases.

No permission is given expressly, implicitly or otherwise for the use of patents, brands or other copyrights. We also assume no liability for copyright infringements or infringements of the rights of third parties arising from the use of this product.

Neither compliance with this operating manual nor the conditions and methods used during installation, operation, use and maintenance of the product can be monitored by Fritsch GmbH. Improper execution of the installation can result in property damage and thus endanger persons. Therefore, we assume absolutely no responsibility or liability for loss, damage or costs that result from errors at installation, improper operation or improper use or improper maintenance or are in any way connected to these.

15 Safety logbook

Date	Maintenance / Repair	Name	Signature

Date	Maintenance / Repair	Name	Signature

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