Operating instructions

VIBRATING CUP MILL

PULVERISETTE 9

Valid as of: 09.500x/00229

Read the instructions prior to performing any task!

Translation of the original operating instructions

Certifications and CE conformity

Certification

Fritsch GmbH has been certified by the TÜV-Zertifizierungsgemeinschaft e.V.

TGA-ZM-05-08-00

ISO 9001

An audit certified that Fritsch GmbH conforms to the requirements of the DIN EN ISO 9001:2008.

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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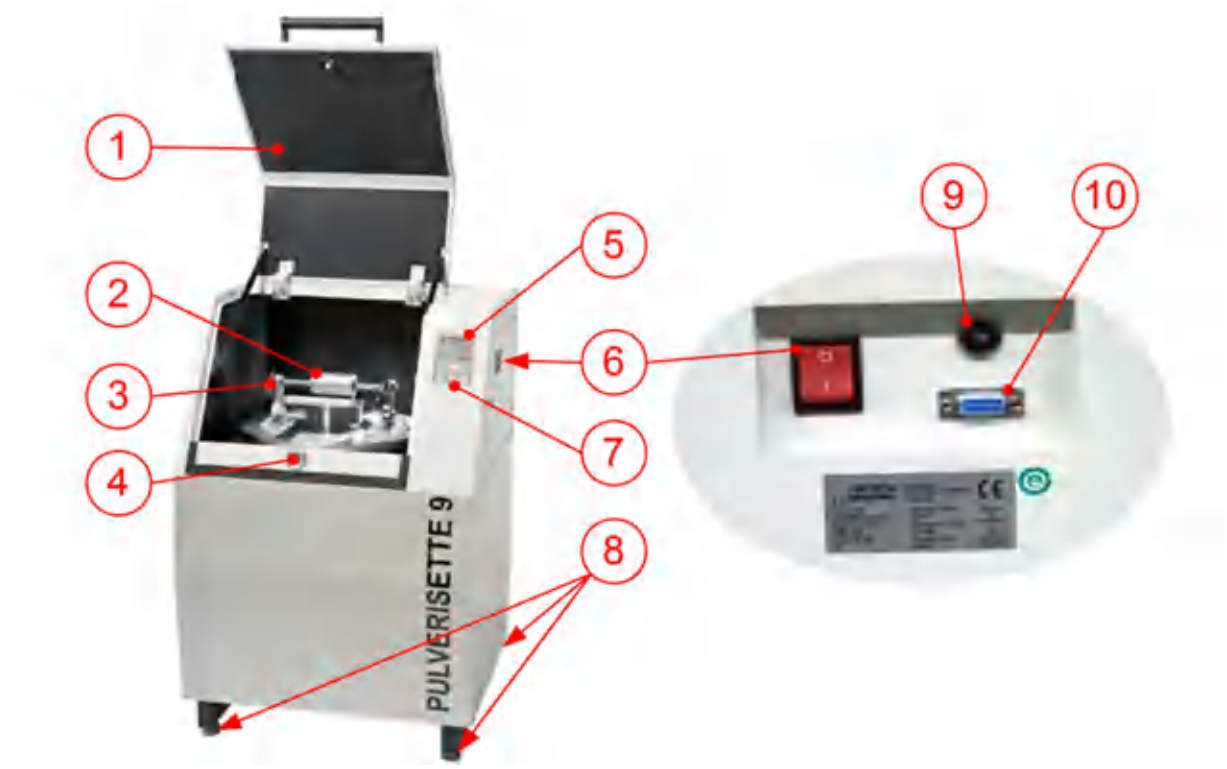
1 Basic structure



1 Hood
2 Eccentric tensioning roller
3 Clamping
4 Hood lock
5 Display
6 Main switch
7 Control panel
8 Height-adjustable device feet
9 Excess current protection switch
10 RS232 interface

a Up arrow key (menu navigation)
b Down arrow key (menu navigation)
c Minus key (menu navigation, changing the parameters)
d Plus key (menu navigation, changing the parameters)
e Start key
f Stop key

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 of the PULVERISETTE 9. 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 of the PULVERISETTE 9.

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

The of the PULVERISETTE 9 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 of the PULVERISETTE 9 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 vibrating cup mill is a mill for quick, dry or wet fine grinding by batches of brittle to very hard sample materials, e.g. from the fields of mining (coals, ores, minerals), metallurgy (slags, cast samples), ceramic industries, cement and construction material industry, agriculture and forestry.

2.2.1 Operating principle

The vibrating cup mill functions according to the principle of vibratory milling. This means that the grinding set is clamped on a vibrating structure and the grinding bodies (puck and rings) in it are accelerated by centrifugal forces and the grinding stock is comminuted by impact and friction. The grinding sets (made of hardened steel, hardmetal tungsten carbide or agate) are closed by the inserted seal so that losses are avoided during wet or dry grinding.

Various speeds of the powerful drive motor are available; 600 - 1500 rpm in steps of 50 rpm. This allows the grinding effect to be adjusted to practical requirements. When using the grinding set made of agate, which is sensitive against impact, speeds higher than 750 rpm are limited automatically to 750 rpm.

NOTICE!

The grinding set made of agate may be run only at a maximum speed of 750 rpm. (Risk of destruction of the grinding set!)

2.3 Obligations of the operator

Before using the of the PULVERISETTE 9, this manual is to be carefully read and understood. The use of the of the PULVERISETTE 9 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 of the PULVERISETTE 9 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 9 and for any damage or injury arising from failure to fulfil this obligation.

By using the of the PULVERISETTE 9 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 of the PULVERISETTE 9.

Neither compliance with this manual nor the conditions and methods used during installation, operation, use and maintenance of the of the PULVERISETTE 9 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.

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

Special safety information

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

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.

Further designations

To emphasise procedure instructions, results, lists, references and other elements, the following designations are used in this manual:

Designation	Explanation
1., 2., 3. ...	Step-by-step procedure instructions
⇨	Results of steps in the procedure
	References to sections in this manual and relevant documentation
■	Lists without a specific order
[Button]	Operating elements (e.g. push button, switch), display elements (e.g. signal lamps)
„Display“	Screen elements (e.g. buttons, function key assignment)

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 9 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 of the PULVERISETTE 9 will void Fritsch's declaration of conformity to European directives and void the guarantee.
- Only use the of the PULVERISETTE 9 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 vibrating cup mill is equipped with a safety lock that also protects the operator.

It locks the hood (1) during operation and prevents the vibrating cup mill from being started when the hood is open:

- The hood cannot be opened during operation.
- The device will not start when the hood is open.

2.6.1 Modes for opening the hood (1)

- The hood (1) is locked when the vibrating cup mill is in operation. To open the hood, press the STOP (f) key on the control panel (7). The hood opens once the motor has come to a standstill.
- Auxiliary release:

DANGER!

Mains voltage!

Before beginning the release, disconnect the mains plug and secure the device against being unintentionally switched back on!

If there is a power failure during operation, the hood can be opened as follows.

1. Use the supplied triangular key to open the door on the right side of the device.

2. A red release grip can be found there that is attached to the housing by a cylinder screw.
3. Use a SW 4 hex key to loosen and remove the cylinder screw that holds the release grip. Put the screw aside.
4. Take a hold of the release grip and slowly pull the lock of the hood open by the cable.
5. Once the hood is unlocked, the release grip can be reattached in the housing by the cylinder screw.
6. The next time the device is switched on, the hood lock (4) is returned automatically to its start position and work can continue.

2.7 Hazardous points

CAUTION!

Crushing hazard

– when closing the hood!
– when clamping the grinding set!

2.8 Electrical safety

2.8.1 General information

- After the STOP key (f) is pressed, the vibrating cup mill runs out. Once the motor stands still, the hood (1) can be opened.
- When using the grinding set made of agate, the speed is limited automatically to 750 rpm.
- Switch off (0) the main switch (6) if the mill will be idle for a longer period of time (e.g. overnight).

2.8.2 Protection against restart

In case of power failure during operation or after disconnecting from the mains, the hood (1) is locked. The hood lock (4) is automatically released when power returns.

For safety reasons, the vibrating cup mill does not restart by itself.

2.8.3 Overload protection

In case of an overload of the vibrating cup mill, a motor current monitor reduces the speed automatically or in case of a blockage, the drive switches itself off directly.

3 Technical data

3.1 Dimensions

1220 x 770 x 760 mm (height x depth x width)

3.2 Weight

267 kg (without grinding set)

280 kg (with 250 ml grinding set made of tungsten carbide)

3.3 Operating noise

Emissions value of workplace according to DIN EN ISO 3746:2005 LPa = 81 dB(A).

The value was measured in a sound-proof room with a 250 ml steel grinding set at 1500 rpm.

The value changes depending on the grinding set used or the grinding stock used and set speed. The size and consistency of walls, floor and ceiling of the room also have and influence.

3.4 Voltage

The vibrating cup mill is delivered in 110 V or 220 V depending on the country. Operation with a different voltage is not permitted.

3.5 Current consumption

Max. 15 A at 100 V mains voltage

Max. 14 A at 115 V mains voltage

Max. 8 A at 230 V mains voltage

Max. 8 A at 240 V mains voltage

3.6 Power consumption

Max. 1500 W at 100 V mains voltage

Max. 1610 W at 115 V mains voltage

Max. 1840 W at 230 V mains voltage

Max. 1920 W at 240 V mains voltage

3.7 Electrical fuses in the control device

- Excess current protection switch (9) 15 A (drawer on the side)

(See *Chapter 9.1 „Checklist for troubleshooting“ on page 39*).

3.8 Material

- The feed amount depends on the size of the grinding set used and is maximum 50, 100 or 250 ml.
- The feed size also depends on the type and size of the grinding set and is maximum 7 or 12 mm.

3.9 Final fineness

Up to 10 - 20 µm.

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.

- Lift the vibrating cup mill off the transport pallet. The mill stands on two hollow profiles with 4 device feet (8). It can be lifted by a fork lift and taken from the transport pallet.
- Place the vibrating cup mill on a flat, stable surface of an interior room. It does not have to be fastened to the surface.

NOTICE!
Never operate of the PULVERISETTE 9 while it is standing on the transport pallet!

- Make sure that the vibrating cup mill is easily accessible.
- The room temperature should be between 0 and 40 °C.
- **If the floor is uneven, the machine needs to be levelled by the adjustable device feet (8) so that the machine stands vertically and secure.**

4.4 Transport securing devices

NOTICE!
Remove the transport securing devices before commissioning the mill.

1. 2 cylinder screws M10x150 are used as transport securing devices as well as the securing plates on both sides. They are located on the left and right next to the brackets of the clamping device (3).

2. Use the supplied hex key (SW8) to loosen and remove them.

Remove the securing plates!

3. Afterwards, press the two supplied plastic plugs (g) into the mounting bore holes of the transport securing devices.
4. Save the transport securing devices.

4.5 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.

4.6 Electrical connection

DANGER!

Provide short-circuit protection!

Risk of damage due to short-circuits.

– Make sure that the socket is connected to a mains line protected with a residual current circuit breaker.

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

CAUTION!

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

Operate the vibrating cup mill only with a grinding set!

- Plug the supplied power cord to the right side of the device.
- Switch on (I) the main switch (6) on the right-hand side.

- You can load and start the mill now as described in *Chapter 6 „Using the device“ on page 23*.

NOTICE!

Fritsch mills are speed controlled. The devices are equipped for this with frequency converters. In order to comply with the EMC directive, many measures must be taken to prevent operational transient emissions.

The possible leakage currents resulting from filtering measures can trigger a conventional residual current circuit breaker in the mains line. **This is no defect!**

To prevent this, special residual current circuit breakers, which are adapted for operation with frequency converters, are commercially available.

Operation without a residual current switch is possible, but must be done in accordance with the relevant regulations.

5 Initial start-up

Perform initial start-up only after all work as described in *Chapter 4 „Installation“ on page 18* has been carried out.

5.1 Switching on

Switch main switch (6) to I.

5.2 Function check

NOTICE!
Never operate the device without grinding stock, otherwise the grinding set can be damaged.

- Open the hood (1).
- Fill the grinding set half way with sand and clamp in (see *Chapter 6 „Using the device“ on page 23*).
- Close hood.
- Set the speed to 600 rpm and a grinding duration of 1 minute. Select a pause time of 10 seconds and 2 repeats.
- Press START (e) on the control panel (7).
- The hood is locked and the vibrating cup mill starts up.
- Press STOP (f) on the control panel (7).
- Once the motor stands still, the hood can be opened.

5.3 Switching off

Switch main switch (6) to 0.

6 Using the device

CAUTION!

Before starting the machine, make sure that the grinding set has been clamped correctly and that there are no loose parts inside the device.

Failure to observe this will render void the guarantee, and releases us from liability for any resulting damage to the device as well as for any resulting personal injury.

CAUTION!

If the grinding elements used are not genuine accessories, we assume no guarantee and exclude all liability for damage to the device or for personal injury.

NOTICE!

When using our older grinding sets

- 48.4125.00 grinding set, hardened steel 250ml
- 48.4225.00 grinding set WC+Co 250ml
- 48.1250.00 grinding set, hardened steel 250ml
- 48.2250.00 grinding set WC+Co 250ml

in a PULVERISETTE 9 (09.500x.00), the maximum permissible speed needs to be limited to 1000 rpm. Higher speeds can damage the mill due to the high grinding set weights.

NOTICE!

During grinding, the temperatures in the grinding bowl may get very high.

In encased grinding bowls, the inserts are glued into the casing with a two-component construction adhesive.

The adhesive is resistant to temperatures up to approx. 140 °C. Above 140 °C, the adhesive will liquefy and accumulate below the insert in the casing. When the adhesive cools down, it solidifies and pushes the casing up. That can cause irreparable damage to the insert. The grinding bowl will definitely be rendered unusable.

Above temperatures of 200 °C, the adhesive will be destroyed. The same applies for encased grinding bowl lids.

6.1 Preparing for grinding

Preselect the speed, grinding duration and possible pause times and repeats. A grinding duration of 2 - 4 minutes is sufficient in most cases to achieve a satisfactory grinding result. A longer grinding duration often does not result in a grinding progress for a smaller final fineness. When dry grinding for a longer period, the grinding stock cements to the grinding bodies and they are then rather difficult to clean.

6.1.1 Grinding sets

Useful capacity of the grinding cup	50 ml	100 ml	250 ml
Grinding bodies	1 puck	1 puck, 1 ring	1 puck, 1 ring

6.1.2 Dry grinding

DANGER!

Dust explosion!

There is a risk of spontaneous combustion especially for very fine metal oxides and a thus resulting dust explosion. Mind the external temperature and the pressure that can develop in the grinding bowl during the dry grinding.

NOTICE!

Dry grindings need to be checked in briefer intervals. Longer dry grindings, without pauses and checks, can cause the grinding set to gum up and to become damaged. In particular with agate, the grinding bowl and grinding balls can become damaged after a short grinding time.

At a particle size of less than 20 µm, the surface forces prevail. The grinding stock begins to stick.

Additional dry comminution can be achieved by adding surface-active substances to the material to be ground.

Examples (maximum amount to be added in mass %)

- Stearic acid 2-3 %
- Aerosil (fine-particle silicic acid) 0.5 - 2 %
- Quartz sand ~ 2 %
- Glass powder ~ 2 %
- Glycol (Ethylene glycol) ~ 0.1 - 0.5 % (≙ 5 - 25 droplets)
- Triethanolamine ~ 0.1 - 0.5 %

6.1.3 Wet grinding (grinding in a suspension)

During the transition to grinding in suspension, you can add a liquid auxiliary agent with high boiling point (>80°C) and low vapour pressure.

DANGER!

Explosion hazard! Ignition hazard!

The device is not explosion-protected. If flammable liquids are used, make sure that the heat developing in the grinding bowl does not reach the solvent's boiling point. Program appropriate cooling phases. If the vapour pressure is too high, vapours may escape and ignite. If it can be avoided, we recommend using non-flammable liquids or liquids with a high boiling point. The boiling point should be above 80 °C and above 100 °C for a long grinding duration.

During wet grinding, a higher final fineness can be achieved. During wet grinding though, the pressures and temperatures in the grinding vessel may get very high. Be careful when releasing the clamping device (3); hot steam may escape at high pressure. Open the level slowly; allow the set to cool down in the device.

CAUTION!

Risk of splashing!

During wet grinding, the high temperature may have created overpressure.

Wear protective goggles!

CAUTION!

Burn hazard!

The grinding bowl can become hot during long grinding periods. Allow for cooling time after grinding.

Wear safety gloves!

6.1.4 Filling the grinding set

Filling quantity maximum as specified useable volumes (50, 100 or 250 ml).

Filling quantity minimum 30 % of specified useable volumes.

1. Place all grinding bodies with the rounded edge downwards in the empty grinding cup.
2. Fill grinding stock into the grinding cup between the grinding bodies.
3. Clean grinding stock from the edge of the grinding cup if necessary; clean seal ring in the lid.
4. Put on the lid.

6.1.5 Use of the grinding set

NOTICE!

Check the firm fit of the grinding set after the insertion. In case the set can be turned or moved, place the included metal plate under the rubber disk and check for a firm fit again after the clamping. (See *Chapter 6.1.6 „Clamping the grinding set“ on page 28*)

NOTICE!

Never use grinding bodies and grinding sets or different materials, because otherwise the grinding set may become damaged.

*Always insert **all** pucks and rings according to the table above.*

With steel sets, always insert the ring with the outer radius downwards. In the grinding vessel, there is also a radius at the base.

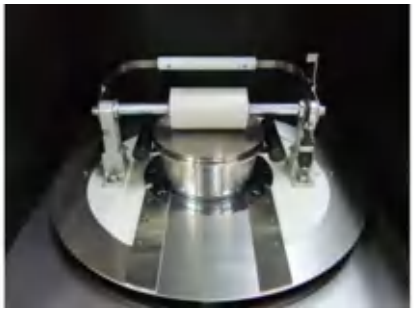
Grinding vessels	Materials
50, 100 and 250 ml	hardened steel
50, 100 and 250 ml	Chromium-free steel
50, 100 and 250 ml	Hardmetal tungsten carbide

50 and 100 ml	Agate (operate only at 750 rpm)
50 and 100 ml	Zirconium oxide

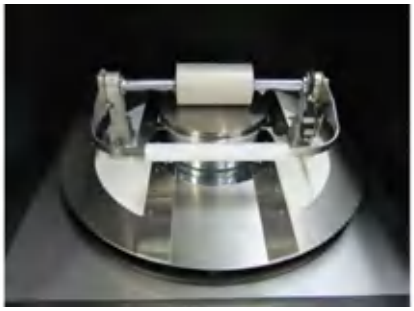
6.1.6 Clamping the grinding set

Check the entire clamping device and the clamp lever for tight fit before every grinding.

Inserting

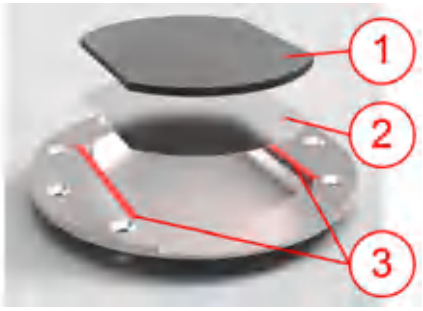


1. Insert the filled grinding set in the front of the mounting and turn if necessary until it is seated properly in the gap so that it cannot turn. Push the lever all the way back.
2. Take hold of the grinding set by the grips at the front and push all the way back under the eccentric tensioning roller.



3. Grip the clamp lever directly over the turning point and turn forward.
4. Grip the clamp lever at the front handle and push all the way to the back. The eccentric is moved over its lowest point and clamps the grinding set tight.
5. A small lever on the right side of the clamp lever presses a safety switch that releases the device only when the clamping device is actuated. In case the clamping device gets loose during the milling, the device shuts down immediately. The device also cannot be switched on without the grinding set inside.
6. Check:

   Some effort is necessary to properly actuate the clamping lever.



7. If the clamping lever can be turned easily, then the grinding set is not clamped properly and moves about in the mount. This causes increased wear at the sides (3) of the lock against rotation, the spring-loaded ball pressure pieces and the tensioning roller.

   The cause for too loose clamping is usually due to high wear and thus a too thin rubber plate (1). The fault can be rectified by replacing the rubber plate with a new one. If this does not help, then the grinding set can be raised by 0.5 mm by placing a spacer (2) (no. 09.5136.10) underneath. (see *Chapter 8 „Maintenance“ on page 37*)

   In rare cases, the eccentric shaft may be bent upwards or the slide bearing sheaths on the left and right of the eccentric shaft may be worn down.
8. If the clamp lever can be pushed down only with difficulty or not at all, then the grinding set is not seated properly in the rear gap. Pull the grinding set forwards once more and then push back to full stop.

CAUTION!

Burn hazard!

The grinding bowl can become hot during long grinding periods. Allow for cooling time after grinding.

Wear safety gloves!

CAUTION!

Risk of splashing!

During wet grinding, the high temperature may have created overpressure.

Wear protective goggles!

9. After the milling process, take hold of the clamp lever's handle and pull up carefully. The grinding set may be very hot and high pressure may have built up in the grinding set.

10. Grip the clamp directly over the turning point then and turn it all the way back.

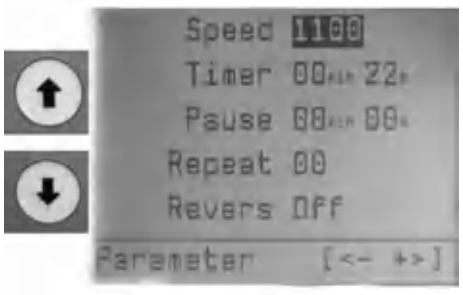
11. The grinding set is pressed upward out of the gap by the ball pressure pieces and can be pulled forward towards the body by the grips.

12. It can happen that the grinding set sticks to the rubber plate and cannot be moved forward because of that. A thin, firm object (such as a knife) can be slid between the rubber plate and the grinding set to loosen the rubber plate. Afterwards, the rubber plate ought to be treated with talcum (bicycle or automotive accessories), which greatly reduces the adhesion. This should be repeated weekly.

The cause for the adhesion is due to the grinding set getting too hot during grinding. The rubber is resistant to temperatures only up to 200 °C. If the rubber becomes blistered, it should be replaced. The grinding set can also stick if it was clamped in for a longer duration.

6.2 Menu navigation

When the menu navigation is in status bar, the + / - keys (c,d) can be used to call up the next or the previous menu structure.



Use the arrow keys (a,b) to switch between the individual parameters.

The + / - keys (c,d) are used to change the values of the parameters. The set parameters are saved by pressing the START key (e).

The saved parameters are available when the main switch (6) is switched on again.

The device can be put into operation by pressing the Start key (e) only from this menu field.

Min - max - limits of the parameters:

Speed: 600 - 1500 rpm (steps of 50)

Timer: 5sec - 60min

Pause: 0 - 60min

Repeats: 99

Reverses: On/Off

6.2.1 Invoke/Save program

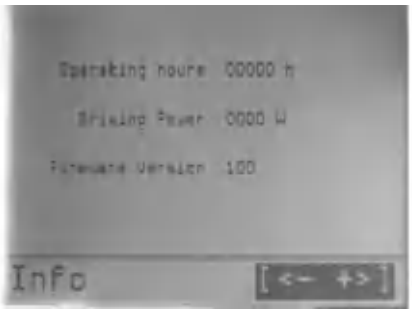
Changing the functions using the arrow keys (a,b).

Program change 1..9 with the + /- keys (c,d); the respectively saved data appears in the **Program** display field. The **Active** display field shows the parameter data from the Parameter menu.

Once the **Load** menu item is active and one of the keys + (d) or - (c) is pressed, the data from the program **No. X** is loaded and displayed in the **Active** display field.

Once the **Save** menu item is active and one of the keys + (d) or - (c) is pressed, the current data is saved in the program **No. X** and displayed in the **Program** display field.

6.2.2 Information display

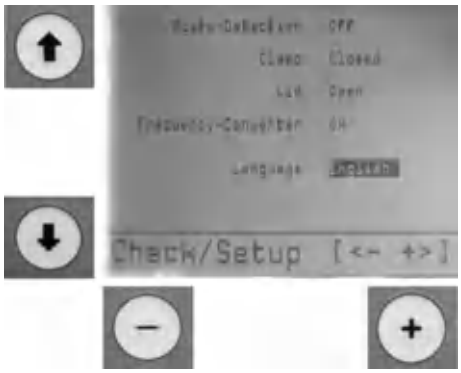


This display shows

- the total operating hours (without pause times).
- the current drive output during operation.
- the version of the controller software.

Changes/Entries are not possible here.

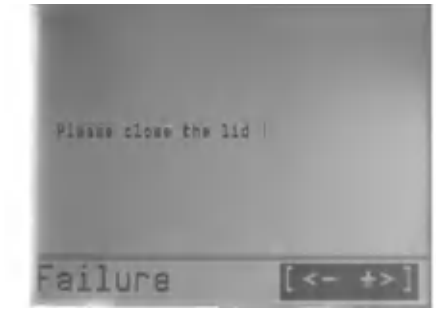
6.2.3 Check/Setup display



Activate the language selection with the arrow keys (a,b).

Use the + / - keys (c,d) to change the display language.

6.2.4 Error display



Operation errors or system messages are reported here in an own display. The window can be closed by any key.

6.3 Operational functions

The timer functions are used to control the grinding process to the second. Likewise, the repeatable cycles for grinding processes and passive cooling phases can be set or also with reversal of direction of rotation in combination with REVERSE.

6.3.1 Speed

The speed of the drive motor (= oscillation frequency of the grinding set) can be set between 600 and 1500 rpm in steps of 50. The speed is constantly readjusted in narrow limits (+/- 1 %), so that the grinding results are very well reproducible. In particular, it is possible with heavy grinding sets that high speeds cannot be reached due to drive overload. This is indicated by a reduced speed display.

Higher speeds increase the percentage of fine particles and shorten the necessary grinding duration.

A low speed protects grinding stock and grinding set.

The speed can be set between 600 and 1500 rpm in steps of 50 rpm.

6.3.2 Pause

In case of a longer grinding duration, the duration of the cooling phase is specified in connection here with REPEAT. 60 minutes are possible at the most; 00 means no pause.

During the pause, the hood (1) remains locked.

6.3.3 Repeat

The combination of the grinding and pause times or REVERSE settings is repeated according to the number entered here. Basically it is valid that the programmed process cycle and then the number of repeats are run in total.

- **Example 1:**
  time = 5min, pause = 3min, repeats = 5 → total 30min grinding, 15min pause (last pause is ignored).
- **Example 2:**
  time = 3min, pause = 4min, repeats = 5, reverse active → total 18min grinding, 20min pause and a reversal of direction of rotation after every cycle.
- **Example 3:**
  time = 1min, pause = 0min, repeats = 19, reverse active → total 20min grinding, no pause and a reversal of direction of rotation after every minute.

6.4 Switching on the vibrating cup mill

Once the filled grinding set has been clamped in securely and the hood (1) has been closed, the vibrating cup mill can be switched on.

1. Select the times of the grinding duration.
2. Press the START key (e) on the control panel (7).
3. The hood (1) is locked and the vibrating cup mill starts.
4. The timer starts running and the remaining time is indicated on the display (5).

CAUTION!
Observe the heating of the grinding stock and grinding set; plan pause times for cooling during longer running times.

6.5 Switching off

1. Press STOP (f) on the control panel (7).
2. Once the motor stands still, the hood (1) is unlocked and can be opened.
3. If the device is not in operation for a long time, switch it off (0) by the main switch (6).

6.6 Cooling

Allow the grinding set to cool to room temperature before restarting the device.

7 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.

7.1 Grinding elements

- Clean the grinding cup and grinding bodies each time after using them:

  Clean them under running water, for example using a brush and a commercially available cleaning agent.
- Half fill the grinding bowl with some sand (1/3 of the useful volume) and water, and run for 2 to 3 minutes (correctly tensioned) in the vibrating cup mill.
- Dry the grinding cup and grinding bodies well after the cleaning.
- For sterilisation in the heat cabinet, only heat up to 100 °C.

NOTICE!

Cool grinding elements made of agate slowly and carefully.

Do not heat agate elements in a microwave under any circumstances (heating is too fast).

They should never be exposed to thermal shocks as this could cause irreparable damage to the parts → They will burst apart explosively.

7.2 Mill

After it has been switched off, the vibrating cup mill can be wiped down with a damp cloth.

8 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 13 „Safety logbook“ on page 45, 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
Clamping system	Fasten the grinding set securely	Check for firm seating	Before each use
		Check both bearing sheaths (DU bushings) of the eccentric shaft. If the bearing sheaths are deformed, replace them.	Weekly or every 10 operating hours
Rubber plate under grinding set	Firm seating of the grinding set	Grinding set sticks to rubber plate. Rub talcum onto rubber plate.	Weekly or every 10 operating hours
	Fasten the grinding set securely	Visual inspection of rubber plate; replace if worn, nominal thickness 5 +/- 0.4mm or place spacer (09.4133.09) underneath.	Check before every use; replace if worn.
Wear bar holder	Secure fit of the grinding set and protection of the holder	Visual inspection of the wear bar	Check after 50 operating hours. Replace if visibly worn.

8.1 Replace wear bar

NOTICE!

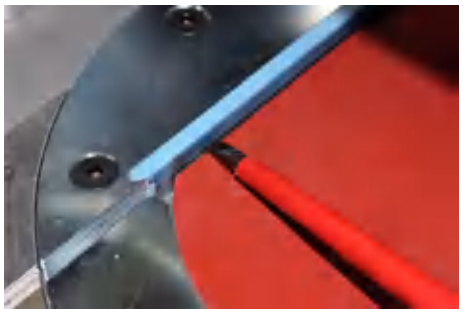
The wear bar serves to protect your grinding set.

The wear bars must be checked at the latest after 50 hours of operation and be replaced if visibly worn. If you detect visible wear on the wear bars after less than 50 hours of operation, check the locking pressure of your system and if necessary, insert a place spacer underneath the rubber disk. This increases the locking pressure and the wear of the bars is reduced.

Failure to observe these maintenance instructions can lead to damage to your grinding set.

Replacement of the wear bar is carried out as follows:

1. First the hood has to be opened and the eccentric clamping device has to be released.
2. If there is a grinding set inserted, take it out.
3. Remove the worn wear bar with the help of a screwdriver by slipping it under the bar and pressing up.
4. Insert the new bars with the rounded edges fitting into the groove and press in.



The wear bars fit very precisely and need to be pressed into the recesses with some force or with the help of a rubber hammer.

9 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.

9.1 Checklist for troubleshooting

Fault description	Cause	Remedy
Mill does not start up	No mains connection	Plug in mains plug
	Main switch (6) off (0)	Switch on (I) main switch (6).
	Timer at 0	Setting the time
	Excess current protection switch (9)	Press the protection switch (9) on the side panel back in.
Grinding set sticks to rubber plate.	Grinding process too long; grinding set got too hot	Rub talcum onto rubber plate or replace it
Grinding stock escapes	Seal in the lid of the grinding set is defective or soiled	Clean seal ring and counter-face on the grinding cup or replace seal ring
Runs unevenly with strong vibrations	Spring of the suspension of the holder broken	Replace the spring
Clamping device can be closed too easily, which means the grinding set is not clamped properly	Rubber plate too thin or worn	Replace rubber plate or place spacers under the rubber plate
	Bearing sheaths of the eccentric shaft are worn down	Replace bearing sheaths

10 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.

11 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.

Guarantee terms

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.

12 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.

Exclusion of liability

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 downtimes, 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.

13 Safety logbook

Date	Maintenance / Repair	Name	Signature

Safety logbook

Date	Maintenance / Repair	Name	Signature

14 Index

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