Operating Instructions for Mortar Mill RM200

Retsch®

Notes on these operating instructions

These operating instructions for the mortar mill, type RM200, give all the necessary information on the areas mentioned in the contents.

They instruct the target group(s) for each of the defined areas, in order to ensure safe handling of the RM200 when used for the intended purpose. Knowledge of the relevant section is an essential precondition for safe, proper use of the machine.

This technical documentation is a reference work and also a set of teaching instructions. The individual sections are complete in themselves.

These operating instructions do not include instructions for repairs. In case of possible defects or necessary repairs please contact your suppliers or Retsch GmbH direct:

Retsch GmbH **www.retsch.com**

Safety

Target group: All persons concerned with the machine in any way.

The RM200 is a modern, highly efficient product of Retsch GmbH, corresponding to state of the art. If the machine is used according to the intended purpose with a knowledge of this technical documentation it is completely safe and reliable to operate.

Safety instructions

As the operating authority it is your duty to ensure that all persons charged with working on the RM200:

- have read and understood all the instructions on safety,
- before beginning work know all the instructions and regulations for the target group relevant to their work,
- have access to the technical documentation for this machine at all times, without problems.
- New personnel should be familiarized with safe, proper handling of the machine before beginning work on the RM200, either by verbal instruction from a competent person or through this technical documentation.
- Improper operation can cause injury to persons or damage to the equipment. You are responsible for your own safety and that of your employees.
- Ensure that no unauthorised persons have access to the RM200.

For your own protection have your employees confirm that they have been instructed in operation of the RM200. The draft of a suitable form is given at the end of the section on safety.

We exclude any claims for damages of any kind for injury to persons and damage to equipment arising from non-observance of the following safety instructions.

Warning signs

Warnings are given by the following signs:

Injury to persons

Damage to equipment

Observe instructions for use

Repairs

These operating instructions do not include repair instructions. For your own safety repairs must be carried out only by Retsch GmbH or an authorised agent (service technicians).

In this case please contact:

The Retsch agency in your country
Your supplier
Retsch GmbH directly

Your service address:

_____

_____

_____

_____

Safety instructions

We exclude any claims for damages of any kind for injury to persons and damage to equipment arising from non-observance of the following safety instructions.

Use according to the intended purpose

Do not make any alterations to the machine and use only spare parts and accessories approved by Retsch.Otherwise the Declaration of Conformity with the European Directives by Retsch loses its validity.Furthermore this will result in the loss of any kind of guarantee claim.

Packing

Please keep the packing material for the duration of the guarantee period since if there is a complaint and the machine is returned with inadequate packing your guarantee claim will be at risk.

Transport

The RM200 must not be knocked, shaken or thrown during transport. Otherwise the electronic and mechanical components can become damaged.

Temperature variations

If temperature variations are high (e.g. during air transport) the RM200 must be protected against condensed water. Otherwise the electronic components can become damaged.

Supplied items

If the delivery is incomplete and / or there is transport damage you must inform the transporter and Retsch GmbH immediately (within 24 hrs). Later complaints may possibly be no longer considered.

Conditions for the place of installation

If the ambient temperature drops below or exceeds these values the electronic and mechanical components can become damaged and performance data are changed to an unknown extent.

At higher atmospheric humidity the electronic and mechanical components can become damaged and performance data are changed to an unknown extent.

Electrical connection

If the values on the type plate are not observed this can result in damage to the electrical and mechanical components.

Installing or changing the mortar

Ensure that the mortar has engaged properly in the groove of the plate.Otherwise the mortar will be damaged when starting the machine.

When removing and opening heated milling cups protective gloves must be worn.Danger of burning the hands.

Installing or changing the pestle

Make sure that the pestle is locked in position. Otherwise it may fall out when the lid is closed and damage the mortar.

Adjusting the Scraper to the Mortar

The scraper can become sharp-edged as a result of sanding and wear during grinding operations. During cleaning in particular there is a risk of injury.

Adjusting the scraper contact pressure

If the scraper pressure is set too high this causes rapid wear of the scraper and contamination of the material to be milled through the scraper material.

If the scraper pressure is set too high this increases the motor load and can cause triggering of the overload protection switch on the rear side of the machine.

Adjusting the milling time

The milling operation can be started only if the lid is closed.

Please take all necessary measures, depending on the dangerousness of your sample, to prevent danger to persons.

Please note that the properties, and therefore the dangerousness of your sample, can change during the milling process.

General

Observe the relevant regulations and guidelines of your country for handling chemicals and hazardous materials. These should be applied when working with the RM200.

Materials

Milling of materials with a risk of fire or explosion in the RM200 is prohibited.

Please take the necessary measures, depending on the dangerousness of your sample, to avoid danger to persons.

Please not that the properties, and therefore the dangerousness of your sample, can change during the milling operation.

Crushing, mixing and milling of samples with grain size < 3mm

Do not charge the materials in batches. The mortar and pestle can become blocked, so that the motor is switched off by the controller to protect it from burning out.

Do not push material through the opening under the cover I with your fingers. Fingers can be squeezed.

Do not introduce any objects through the openings I + J. The mortar, pestle and scraper can become damaged and there is a possible danger of injury.

Crushing, mixing and milling materials of grain size > 3 mm

Do not add the material in batches. The mortar and pestle can become blocked, which leads to switching off of the machine.

Do not push material through the opening under the cover I with your fingers. Fingers can be squeezed.

Security advice for handling liquid nitrogen

Safety goggles and protective gloves should always be worn when handling liquid nitrogen. Liquid nitrogen has a temperature of −196 °C and, if it comes into contact with the skin or eyes, may cause injuries similar to burns or frostbite.

A funnel must be used to fill cooling liquid into the RM 200. Otherwise the cover might be damaged.

Please observe the security advice of the liquid nitrogen supplier. Retsch excludes any liability claims which may result from the use of liquid nitrogen or similar substances.

Cleaning

Do not clean the RM200 with running water. Danger to life through current surgeUse only a cloth moistened with water. Cleaning agents and solvents must not be used – not for cleaning the milling tools either.

Accessories RM200

Do not carry out any modification of the machine and use only spare parts and accessories approved by Retsch. Otherwise the declared Conformity with the European Directives by Retsch will lose its validity. Furthermore this will lead to loss of any kind of guarantee claims.

Wearing parts

These operating instructions do not include repair instructions. For your own safety repairs should be carried out only by Retsch GmbH or an authorised agency and service technicians.

Confirmation

I have taken note of the section „Notes on these operating instructions” and the section on “Safety”.

_____

Signature of operating authority

_____

Signature of service technician

Technical data

Target group: Operating authority, operators
Machine type designation: RM200

Use according to the intended purpose
NOTICE This device is not designed as a production machine and for continuous operation, but as a laboratory device, intended for single-shift intermittent periodic operation of 8 hours per day.

The RM200 is suitable for dry and wet milling of soft, medium hard, hard, pasty and brittle materials, up to a hardness of 9 on the Mohs' scale.

Furthermore quantities of approx. 10 to 190 ml and a max. charging grain size of 8 mm can be ground and homogenised with the RM200, without manual use of force.

A final fineness of down to 0.01 mm (10 µm), and in individual cases even below this value, can be achieved with the RM200.

Do not make any alterations to the machine and use only spare parts and accessories approved by Retsch.

Otherwise the Declaration of Conformity with the European Directives by Retsch loses its validity.

Furthermore this will result in the loss of any kind of guarantee claim.

Emissions

Noise characteristic values :

Noise measurement according to DIN 45635-031-01-KL3
Intensity of sound L_{WA} = 85 dB(A)

Emission value related to workplace L_{pAeq} = 72 dB(A)

Operating conditions:

Material to be milled = quartz sand, grain size < 1 mm

Protective system: IP53

Rated power: 230 Watt

Electromagnetic Compatibility (EMC)

EMC class in accordance with DIN EN 55011: A
The grinding process is monitored by sensitive sensors and signalled accordingly on an LED display. Certain unfavourable network events in industrial environments lead to a false display, which, however, does not correlate with the operating behaviour of the device. This occurrence does not pose a security risk to the device. It is merely a temporary display malfunction. The grinding process is completed as set.

Machine dimensions

Height: 480 mm up to approx. 550 mm with lid opened
Width: 400 mm
Depth: 370 mm up to approx. 510 mm with lid opened

Weight: approx. 24 kg without mortar and pestle

Required floor space

400 mm x 400 mm plus space at the rear for the opened lid. No safety distance required.

Transport and installation

Target group: Operating authority, transporter, operators

Packing

Packing is adapted to the transport route and conforms to generally applicable packaging guidelines.

Please keep the packing material for the duration of the guarantee period since if there is a complaint and the machine is returned with inadequate packing your guarantee claim will be at risk.

Transport

The RM200 must not be knocked, shaken or thrown during transport. Otherwise the electronic and mechanical components can become damaged.

Temperature variations

If temperature variations are high (e.g. during air transport) the RM200 must be protected against condensed water. Otherwise the electronic components can become damaged.

Intermediate storage

Ensure that the RM200 is also stored dry during intermediate storage.

Conditions for the place of installation

Ambient temperature:

5°C to 40°C

If the ambient temperature drops below or exceeds these values the electronic and mechanical components can become damaged and performance data are changed to an unknown extent.

Atmospheric humidity:

Maximmum relative humidity 80% at temperatures up to 31°C,

decreasing linearly down to 50% relative humidity at 40°C.

At higher atmospheric humidity the electronic and mechanical components can become damaged and performance data are changed to an unknown extent.

Installation height:

max. 2000 m above sea level

Installation

Mount the RM200 only on a firm, stable laboratory bench since otherwise vibrations can be transmitted.

Electrical connection

- Voltage and frequency for the RM200 are given on the type plate.
- Ensure that these values correspond to the available power supply system.
- Connect the RM200 to the power supply system using the supplied connection cable.
- Protection by external fusing is to be used when connecting the mains cable to the power supply, according to the regulations at the place of installation.
- The voltage supply to the RM200 must be provided with a fault-current circuit breaker (FI switch).

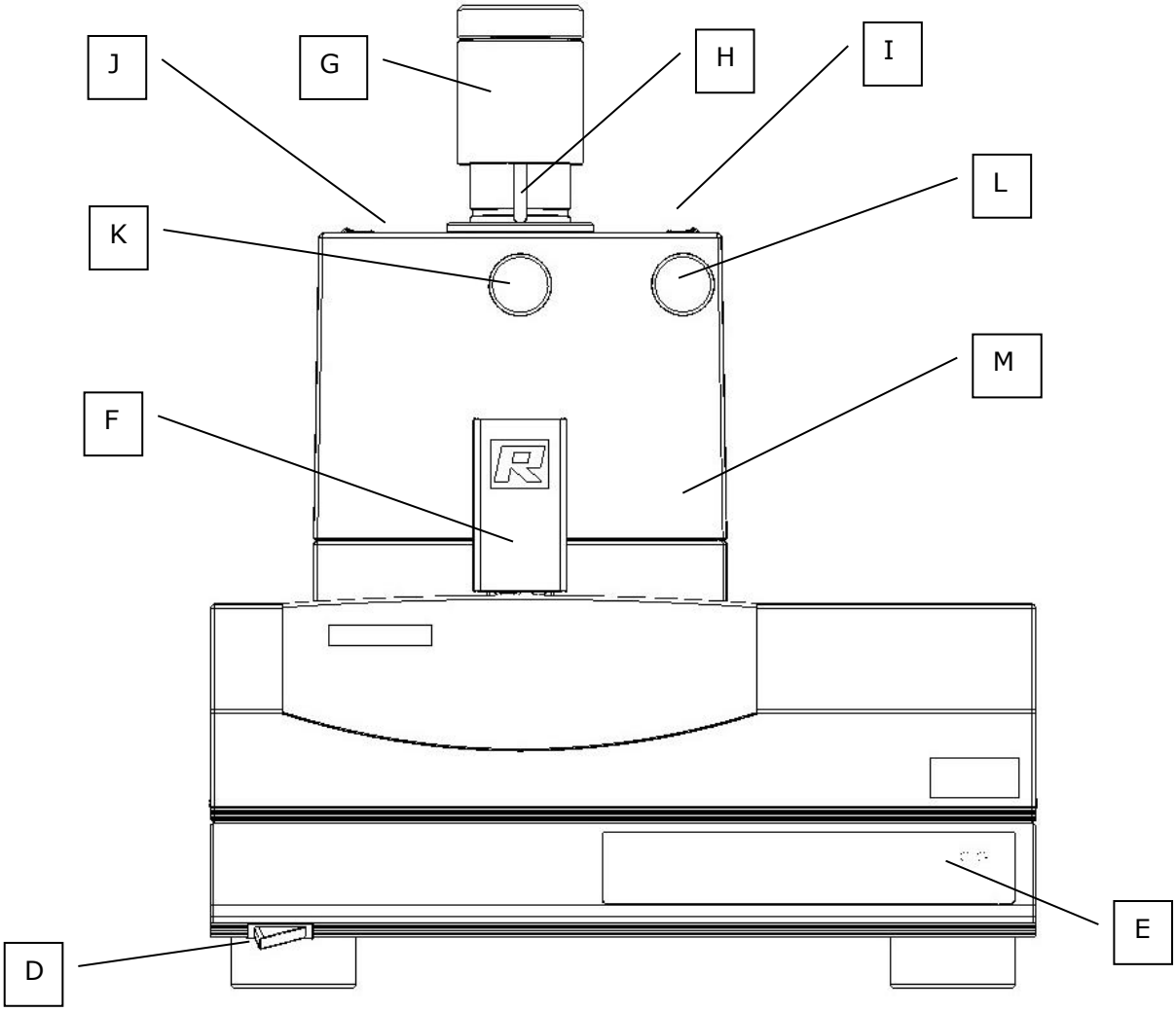
If the values on the type plate are not observed this can result in damage to the electrical and mechanical components.

Operation

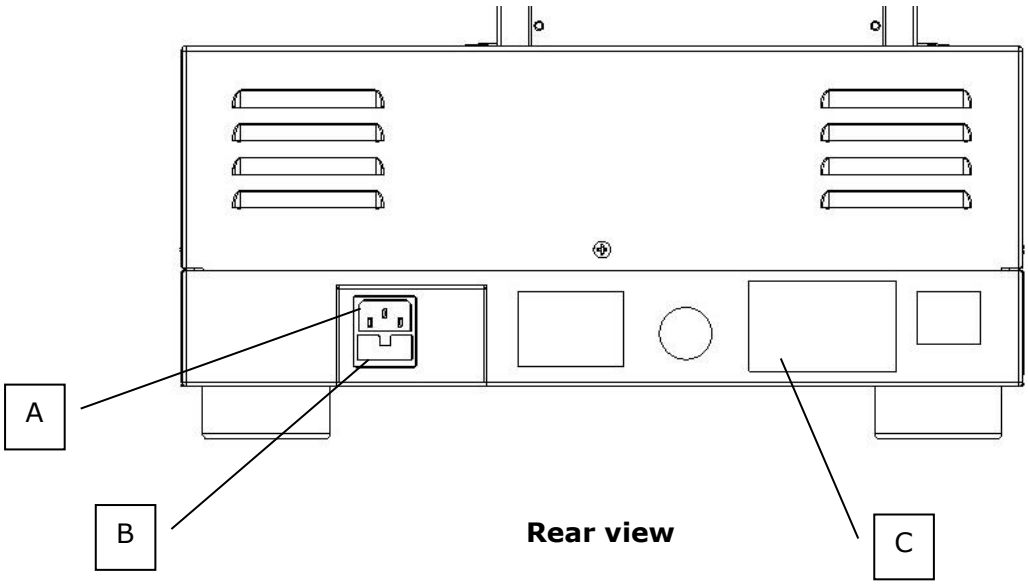
Target group: Operators

Operating elements and operation

Diagram of operating elements:



Front view



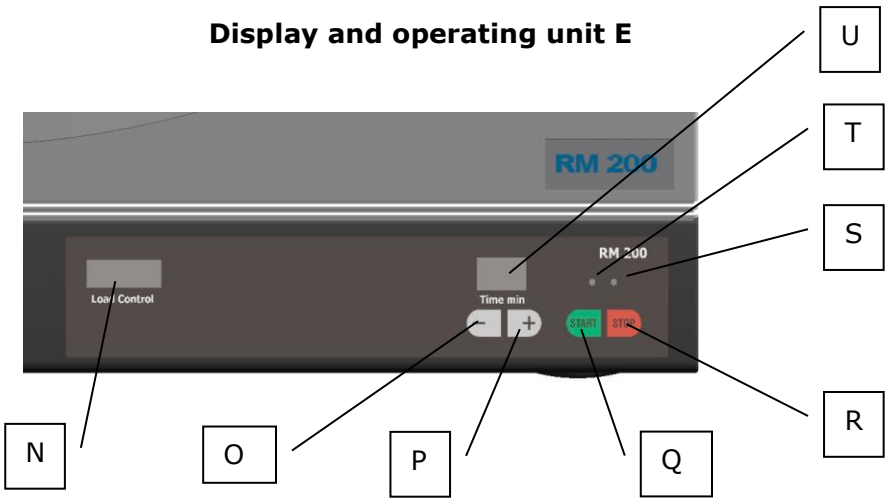
Rear view

Operating elements and their function

General plan

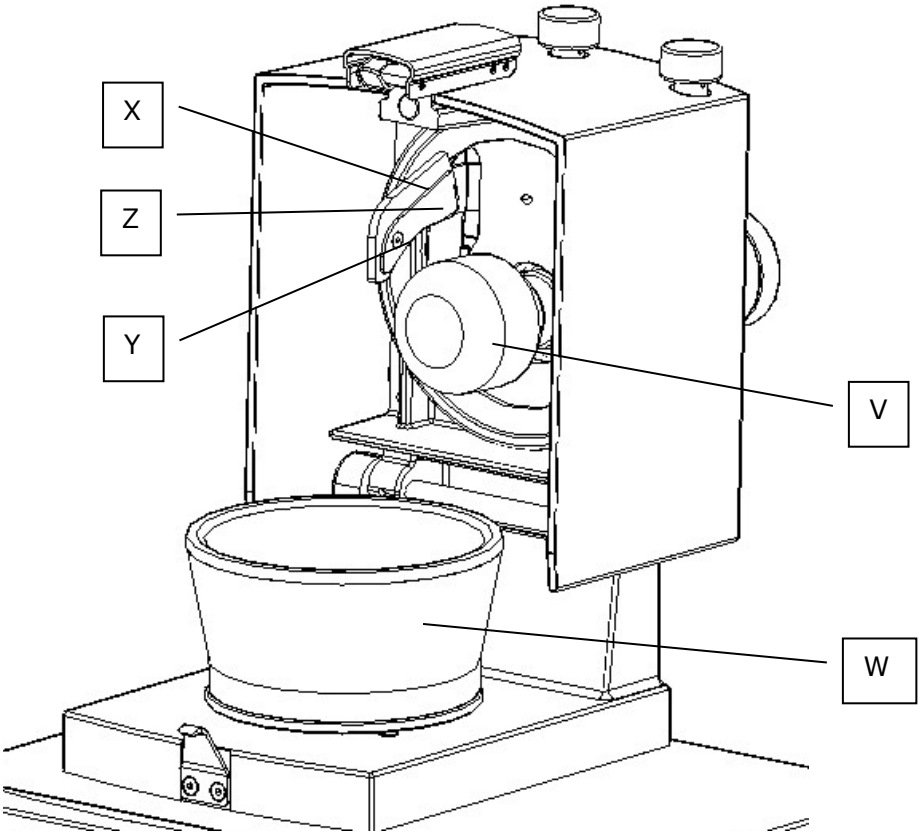
Element	Description	Function
A	Machine socket	Connection for power cable of machine
B	Fuse compartment	Takes two visible type fuses
C	Type plate	Information on the machine and connected loads
D	ON/OFF switch	For switching the RM200 on and off
E	Display and operating unit: For explanations see below	Time preselection and starting / stopping the machine
F	Closing grip	For opening and locking the millling chamber
G	Turning handle – pestle pressure adjustment	Turning alters the pestle contact pressure
H	Scale	Setting guide for pestle pressure
I	Filling opening	Sample material is filled here
J	Viewing window	Viewing possibility during the milling process, particularly for adjusting the scraper
K	Setting knob for scraper	Sets the contact pressure or gap of scraper
L	Pestle setting knob	For adjusting the pestle on the mortar wall
M	Hood	Closes the milling chamber

Display and operating unit E



Element	Description	Function
N	Load Control – load indicator	Shows the actual load of the drive motor. Helps the user to avoid overloading and overload circuit breaking.
	Display = 1 to 4 green LEDs	Loading is OK
	Display = 4 green + 1 yellow LED	Slight overloading. Increasing the load can cause circuit breaking.
	Display = 4 green + 1 yellow + 1 red LED	Overloading! Continuous overloading with the red display switches off the control of the drive.
O	Time – minus button	In the adjusting mode and operating mode: decrease in the adjusted milling time by one minute. Continuous pressing switches off fast running.
P	Time – plus button	In the adjusting mode and operating mode: increase in the adjusted milling time by one minute. Continuous pressing causes fast running.
Q	Start button	Starts the milling operation
R	Stop button	Interrupts or ends the milling operation
S	Red LED	Indicates stand-by mode
T	Green LED	Indicates milling operation
U	Two digit display	Indicates the set milling time or, during operation, the milling time still remaining. Setting range: 1 to 99 minutes plus "- -" for continuous operation.

View of milling chamber



Element	Description	Function
V	Pestle	Crushes and mills the material
W	Mortar	Contains the material to be milled
X	Scraper	Mixes the milled material and scrapes off material adhering to the mortar
Y	Fixing screw for scraper	Holds the scraper with the screwed-on fixing clamp
Z	Fixing clamp for scraper	Clamps the scraper

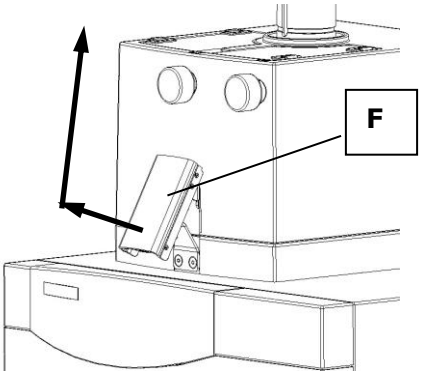


Fig. 1

Installing / changing the milling fittings

If the RM200 has been ordered or supplied with milling fittings the mortar, pestle and scraper will have already been adjusted at the works.

If a new set of milling fittings is installed the pestle and scraper must be readjusted or positioned.

The mortar and pestle should always be made of the same material.

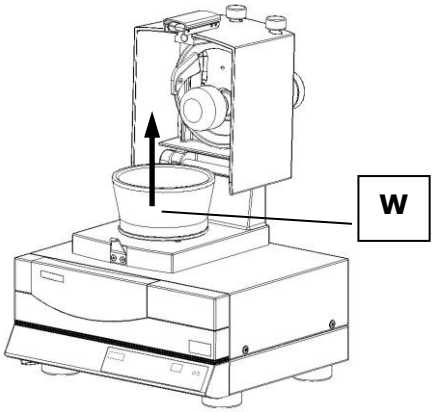


Fig. 2

Installing or changing the mortar

- Hold the closing grip **F** at the bottom and pull. **Fig.1**
- Pull the hood upwards with the grip to open. **Fig.1**
- Remove mortar **W** **Fig.2**
- Place a new mortar in position and lock this in the groove of the plate **Tn** **Fig.3**

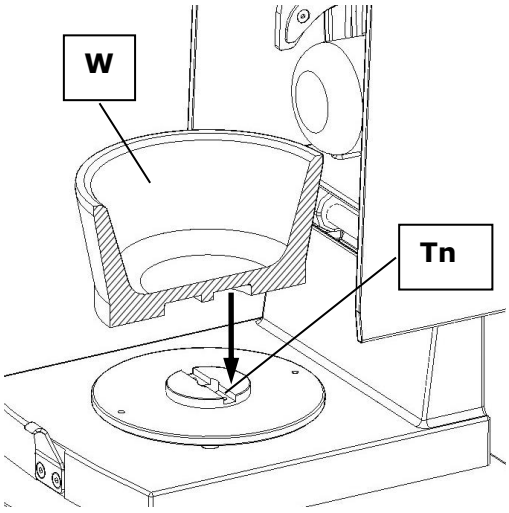


Fig. 3

Ensure that the mortar has engaged properly in the groove of the plate.

Otherwise the mortar will be damaged when starting the machine.

When removing and opening heated milling cups protective gloves must be worn.
Danger of burning the hands.

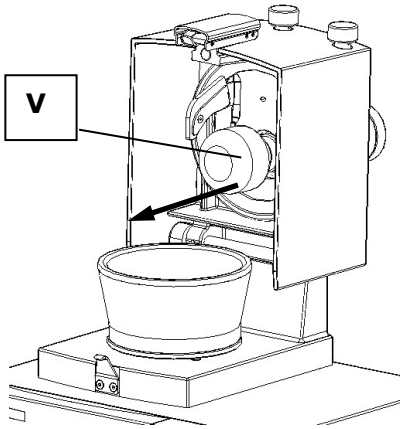


Fig. 4

Installing or changing the pestle

- Remove the pestle **V** horizontally from its holder while holding the hood firmly **Fig.4**

- Insert a new pestle into the holder until it noticeably engages.

- If the pestle does not engage turn this slightly and, if necessary, hold the holder firmly with the other hand so that the locking pins can engage at this position. **Fig.5**

To prevent contact corrosion, take the pestle out of the machine if the machine is idle for a long time.

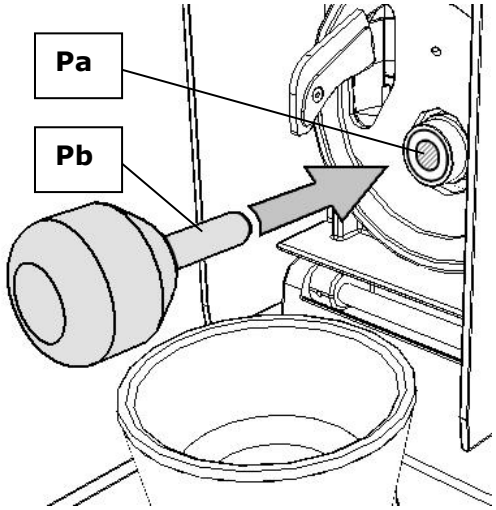


Fig. 4.1

Ensure that the pestle bolt **Pb** is not contaminated.

No dirt should get into the pestle holder **Pa Fig.4.1**

Make sure that the pestle is locked in position.

Otherwise it may fall out when the lid is closed and damage the mortar.

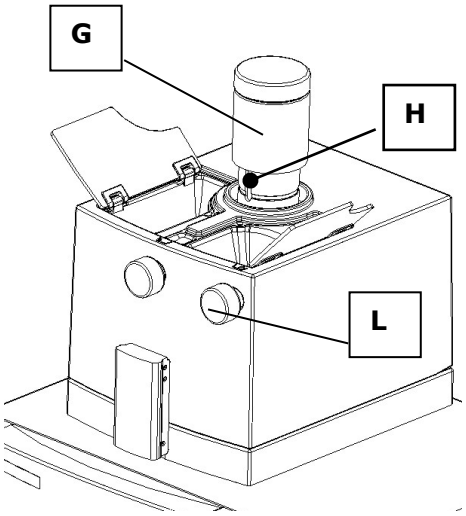


Fig.5

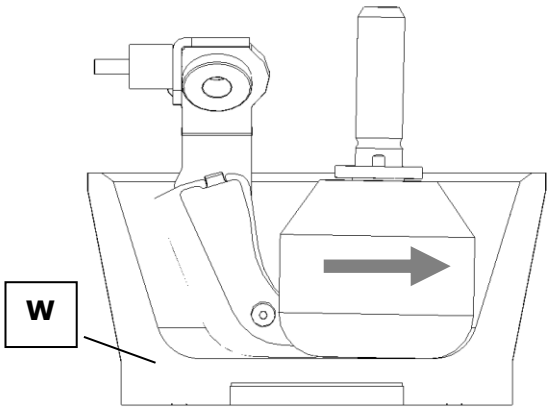


Fig.6

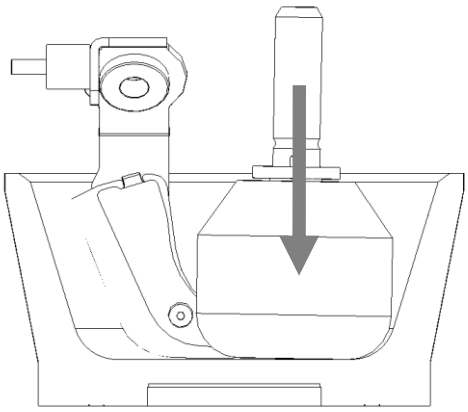


Fig.7

Adjusting the pestle

Fig.5

- The mortar **V** is installed
- The pestle **W** is installed and locked in position
- Close the lid **M** and press the closing grip **F** shut.
- Turn the rotary grip **G** anticlockwise and remove.
- Start the machine by switching on with the on/off switch **D** and pressing the start button **Q**
- Move the pestle forwards. To do this turn the pestle knob **L** to the left until this reaches the stop. The setting range is only a few millimeters for several rotations of the setting knob.
- Then move the pestle backwards again until resistance is felt. To do this turn the pestle knob **L** to the right. **Fig.6**
- In **Fig.6** the optimum setting has been reached since the lower rounded surface of the pestle is now running in the lower rounding of the mortar.
- As soon as the pestle shaft is pressed upwards during the setting process the pestle moves upwards on the mortar wall and setting is no longer optimum. In this case turn the pestle knob back slightly.

Adjusting the pestle pressure

The correct pestle pressure should be determined by carrying out tests and depends on the material to be milled and the required degree of fineness.

Increasing the pressure: Fig.5

- Turn the sleeve **G** clockwise
- This increases the pressing force downwards **Fig.7**
- The value can be read off on scale **H**

Reducing the pressure: Fig.5

- Turn the sleeve **G** anticlockwise
- The values on scale **H** are reduced

The values indicated on scale **H** are only for use as a guide during setting. They can be used as an aid in reproducing the conditions. However, no mathematical conclusion regarding the contact pressure is possible since this depends on the material to be milled.

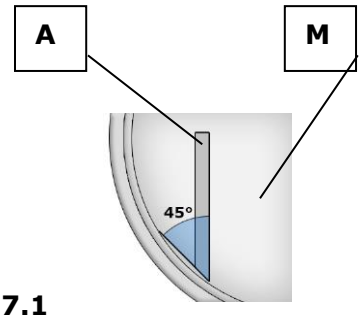


Fig.7.1

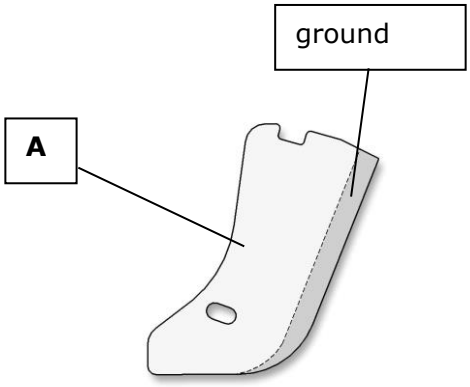


Fig.7.2

Adjusting the Scraper to the Mortar

When re-ordering the scraper or a mortar, it may be necessary that the scraper **A** has to be reground. This depends on the shape or the wear and the tear of the scarper or mortar **M**.

Fig.7.1

Regrinding is necessary in the following cases:

- when the machine is supplied without a mortar or grinding set and when an existing scraper or mortar is used
- when re-ordering a scraper or mortar and using an existing scraper or mortar

The scraper is already sharpened at the factory at an angle of 45° and depends on the shape of the mortar.

Fig.7.1 und **Fig.7.2**

You can use a belt sander, a grindstone or sandpaper to do the grinding.

The scraper can become sharp-edged as a result of sanding and wear during grinding operations. During cleaning in particular there is a risk of injury.

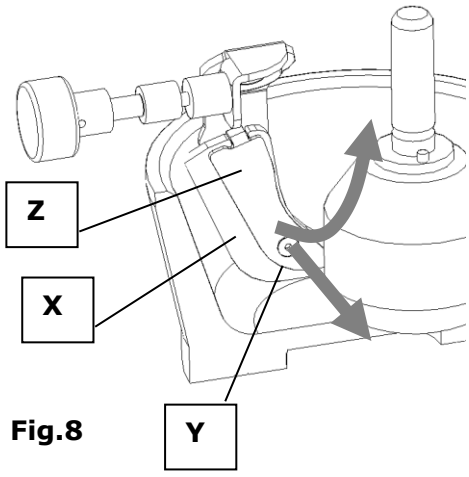


Fig.8

Installing / replacing the scraper

- Open the cover M.
- Flip the cover to the back.
- Loosen the screw **Y** with the supplied screwdriver.
- Remove the retaining screw **Y**.
- Swing out the mounting bracket.
- Remove the scraper.
- Insert the new scraper.
- Hook the mounting bracket **Z** again.
- Turn the screw **Y** loose.
- The scraper can be adjusted by its slot slightly forward or backward.
- Slide the scraper backwards.
- Tighten the screw. Fig.9
- Close the cover.
- Check visually or by sample material if the scraper is applied accurate on the mortar.

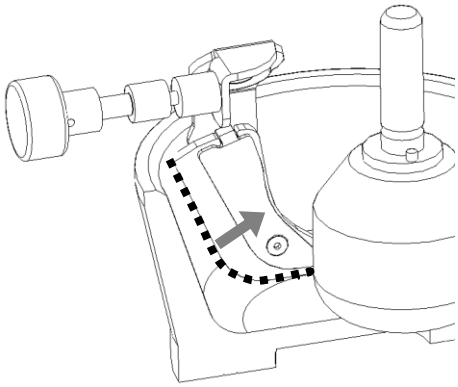


Fig.9

- See also below: "control the scraper adjustment"

If the scraper is not completely touching the bottom of the mortar and the mortar inner wall (dotted line in Fig.8), it must be adjusted again:

- Loosen the screw **Y** again.
- Move the scraper.
- Tighten the screw.
- Check again, visually or with sample material if the scraper is applied accurate on the mortar.

Adjusting the contact pressure

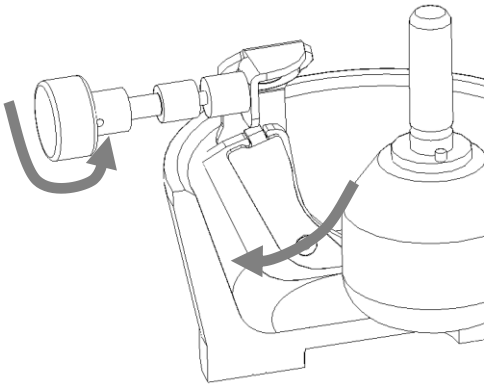


Fig.10

The required contact pressure of the scraper **X** must be determined empirically, depending on the material to be milled and the required degree of fineness.

Increasing the contact pressure: Fig.10

- Turn the scraper adjusting knob **K** anticlockwise

Reducing the contact pressure:

- Turn the scraper adjusting knob **K** clockwise

	If the scraper pressure is set too high this causes rapid wear of the scraper and contamination of the material to be milled through the scraper material.
	If the scraper pressure is set too high this increases the motor load and can cause triggering of the overload protection switch on the rear side of the machine.

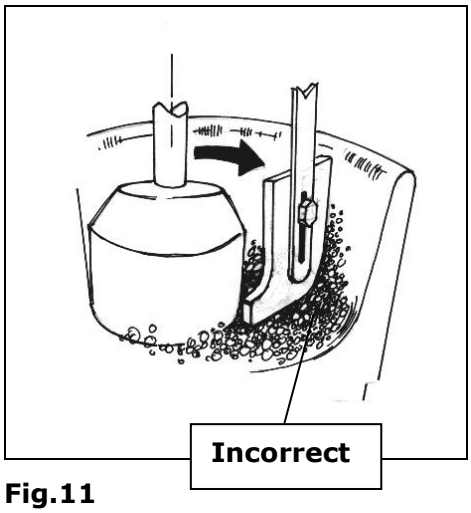


Fig.11

Checking the scraper setting
The scraper fulfils its function only if adjustment of the contact pressure and contact with the bottom of the mortar is optimum.

This can best be assessed by carrying out a neutral milling operation.

Control milling operation
We recommend the following mixture as neutral milling material:

e.g. 4 – 5 teaspoons of powder sugar

5 – 10 ml water

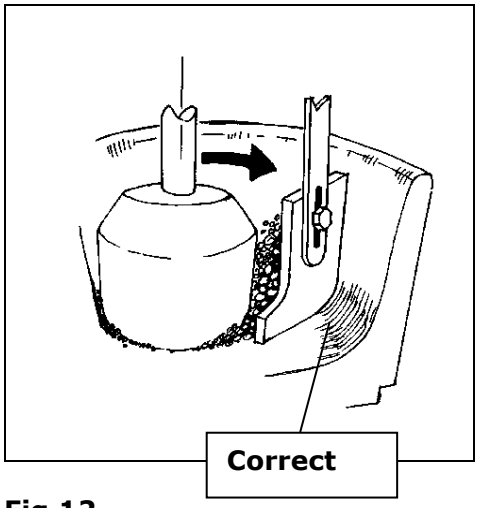


Fig.12

• Close the lid with the mortar empty and press the closing grip shut.

• Turn the rotary grip **G** to setting **„0"** of scale **H**

• Switch on the machine, start the operation by pressing the start button **Q.**

• Add the powder sugar through the right-hand window opening **I** of the lid, then pour in the water.

A pasty mixture is formed which does not adhere to the inside wall or to the bottom of the mortar if the scraper has been adjusted correctly.

See **Fig.11 and 12**

For visually checking look through the left-hand window **J**

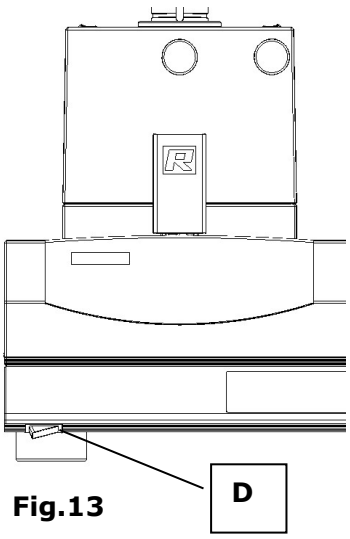


Fig.13

Adjusting the milling time

The milling time can be adjusted with the display and operating unit **E**

• Switch on the RM200 with switch **D. Fig.13**

Preselecting the time

• Set the required milling time with the + / - buttons **O** and **P Fig.14**

• Short pressing of the + or – button changes the milling time by one minute in each case. With longer pressing the display runs through continuously.

If 99 is exceeded the display **U** shows two minus

signs: -- This setting means continuous operation without automatic switching off.

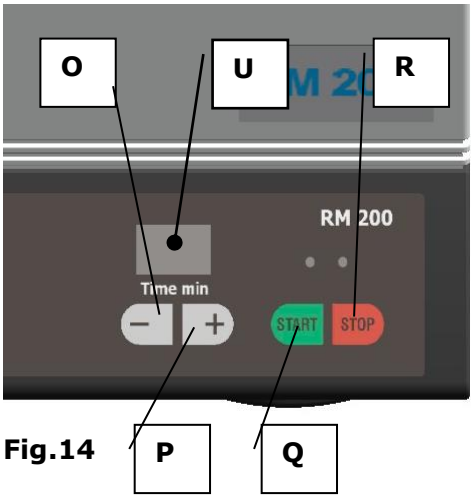


Fig.14

Starting the milling operation

- When the lid is closed:
- The milling operation is started with the start button **Q. Fig.13**
    - The milling time is recorded and the remaining milling time is indicated in display **U.**

	The milling operation can be started only if the lid is closed.
	Please take all necessary measures, depending on the dangerousness of your sample, to prevent danger to persons.
	Please note that the properties, and therefore the dangerousness of your sample, can change during the milling process.

Stopping the milling process

• Press the stop button **R**. **Fig.14**

Pressing the button once interrupts the milling operation in order that, for example, the material to be milled can be assessed. The remaining milling time is still visible in the display **U**. By repressing the start button the mill continues to run until the milling time has completely elapsed.

• Pressing the stop button twice stops the milling operation and the machine is then in the stand-by mode.

• By pressing the start button the display is reactivated and the milling time is reset to the last start value.

During the milling operation the time can be adjusted by pressing the + or – button.

The milling operation is automatically ended after the milling time has elapsed. The display is reset to the last started value.

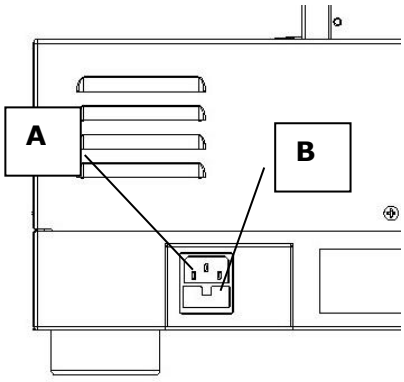


Fig.15

Replacing the machine fuses

The following visible type fuses are required for the RM200:

2 MT 3.15 A for 230V machine

2 MT 6.30 A for 100V to 120V machine

Replacing the fuses Fig.15

- Unplug mains plug from the machine socket **A**
- Unlock and remove the fuse compartment **B** by pressing the locking device upwards.
- Replace the fuses
- Insert fuse holder **B**

Working instructions

Target group: Laboratory assistant

General

The RM200 mills through pressure and friction. This combination of two loading mechanisms enables both soft and hard, brittle material to be crushed, milled and mixed in this machine. Both dry and wet milling operations can be carried out in the RM200.

Materials which are difficult to mill can be made brittle by cooling or can be prepared by mixing with milling auxiliary agents. Please ask your Retsch contact for advice on this.

Observe the relevant regulations and guidelines of your country for handling chemicals and hazardous materials.

These should be applied when working with the RM200.

You should also take into consideration the health protection regulations concerned with the function of health-hazardous dusts, e.g.

- BGR 217* „Handling mineral dust"
- BGI 504-1-1* and BGI 504-1-4* „Dust exposure – industrial preventive medicine"
- BGR 120* „Directives for laboratories"

(* German federal laws)

Materials

The RM200 is suitable for dry and wet milling of materials of all kinds, with the following possible properties:

- soft
- medium hard
- hard
- pasty or
- brittle.

The maximum hardness of the materials can be up to 9 on the Mohs' scale.

Milling of materials with a risk of fire or explosion in the RM200 is prohibited.

Please take the necessary measures, depending on the dangerousness of your sample, to avoid danger to persons.

Please not that the properties, and therefore the dangerousness of your sample, can change during the milling operation.

Quantities from approx. 10 to 190 ml and a max. charging grain size of 8 mm can be milled and homogenised with the RM200, without any manual use of force.

The ideal filling quantity depends on the sample quantity and the properties of the materials to be milled.

Selection of the milling tools depends on the sample material and the subsequent analysis.

Different milling tools have different characteristics, e.g. the materials contained in them, hardness or abrasion resistance.

For reliable analytical results you should select the milling tools in such a way that the milling process is neutral with regard to contamination.

Please ask for advice in case of doubt.

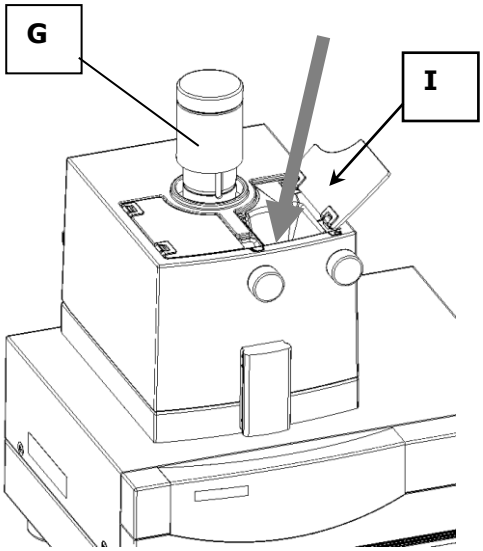


Fig.16

Crushing, mixing and milling of samples with grain size < 3mm

Connect the RM200 to the power supply, switch on and start.

The sample is slowly added to the rotating mortar through the filling opening **I**. For this purpose the right-hand Plexiglass cover **I** is opened. **Fig.16**

The pestle, which is offset in relation to the centre of the mortar, presses on the bottom of the mortar and the material to be milled through spring tension and its own weight.

Through the resulting friction the pestle is also rotated with the mortar and this crushes the material to be milled through pressure and friction. The pressure can be varied by means of the rotary grip **G Fig.16**

The scraper ensures that the sample material is scraped off the inside wall of the mortar, recirculated and refed to the milling gap between the pestle and mortar.

This forced feeding of the material ensures that the complete sample quantity is well mixed and that every particle is continuously fed to the milling and pulverizing process.

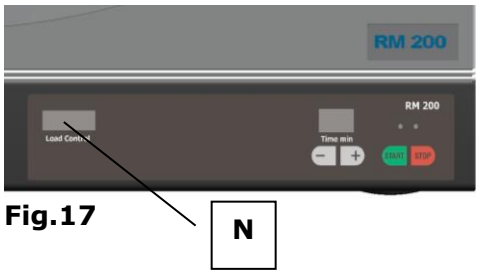


Fig.17

Load Control and safety switch off

The load indicator "Load Control" **N Fig.17** and **18** serves as a guide for the user. It indicates loading of the drive motor in 6 stages. At low to full load 1 to 4 green LEDs light up. At slight overloading a yellow LED lights up in addition.

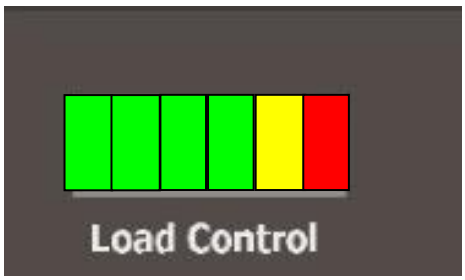


Fig.18

In the case of definite overloading the red LED lights up additionally and thus signals that the machine will soon be switched off. This switch-off takes place when overloading for 90 secs is measured within a short period.

The machine is also switched off if it comes to a standstill for 10 seconds through blockage.

Do not charge the materials in batches.

The mortar and pestle can become blocked, so that the motor is switched off by the controller to protect it from burning out.

Do not push material through the opening under the cover **I** with your fingers.

Fingers can be squeezed.

Do not introduce any objects through the openings **I + J.** The mortar, pestle and scraper can become damaged and there is a possible danger of injury.

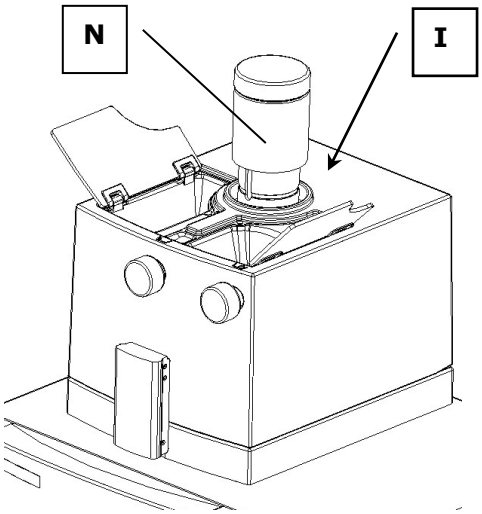


Fig. 19

Crushing, mixing and milling materials of grain size > 3 mm

Close the RM200 and switch on.

Precrushing: Fig.14

- Loosen the rotary grip for adjusting the pestle **G** down to scale setting "0"

The pressure of the pestle on the mortar is now minimum.

- Start the milling operation.
- Add the material to be milled slowly through the charging opening **I**

Fine milling: Fig.14

- Increase the pestle pretension again by turning the rotary grip **G** clockwise.

Do not add the material in batches.

The mortar and pestle can become blocked, which leads to switching off of the machine.

Do not push material through the opening under the cover **I** with your fingers.

Fingers can be squeezed.

Security advice for handling liquid nitrogen

Safety goggles and protective gloves should always be worn when handling liquid nitrogen.

Liquid nitrogen has a temperature of –196 °C and, if it comes into contact with the skin or eyes, may cause injuries similar to burns or frostbite.

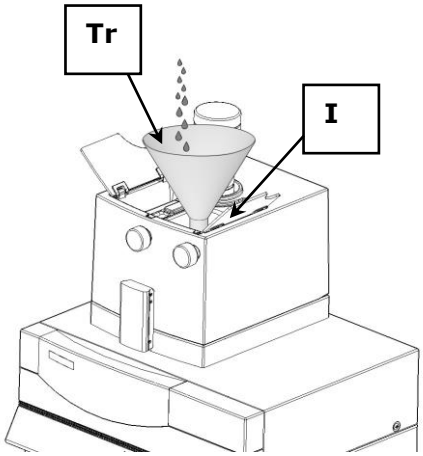


Fig.19.1

Safety goggles also give protection against eye injuries cause by flying fragments of glass from glass containers, which may burst owing to cold tensions.

The RM 200 can also be used for cryogenic grinding. Please note that the cooling liquid must be filled in via a funnel to avoid damages of the cover of the RM 200.

Place a standard funnel **Tr** into the feed opening **I**. Pour liquid nitrogen into the funnel and take care that the liquid does not get in contact with the cover. **Fig. 19.1**

A funnel must be used to fill cooling liquid into the RM 200. Otherwise the cover might be damaged.

Please observe the security advice of the liquid nitrogen supplier.

Retsch excludes any liability claims which may result from the use of liquid nitrogen or similar substances.

Safety functions and fault displays

Safety functions

F1 - Overloading

In order to prevent overloading of the drive motor and resulting danger to the operator the RM200 is provided with a load control.

F1

03

This continuously measures the actual motor load and indicates this in the load control display. In case of overloading the load control switches off the machine in good time and guarantees a cooling time. This is indicated to the operator by the alternately flashing display F1 and the remaining cooling time, e.g. 03 = 3 minutes.

After the cooling time has elapsed it is only necessary to switch the machine off and on again to operate it normally again.

F4 – Hood open

F4

If the hood is open the drive should not run. This serves to protect the operator from injury. If the hood is opened while the machine is running the drive is immediately switched off by the controller and "F4" appears in the display. If the start button is pressed with the hood open in order to start the milling operation F4 is also displayed and the drive is not started.

This signal can be deleted by pressing the stop button.

F5 –Keyboard control

F5

If one or more buttons are accidentally pressed for longer than 15 seconds the drive is switched off by the controller and F5 is displayed.

This function is intended to prevent unintentional faulty operation if an object accidentally presses on the keyboard.

In order to delete this fault signal switch the machine off and on again once.

F6 – Switch control for hood switch

F6

If the switch which controls hood opening has a lead defect this is recognised by the controller and causes the machine to be switched off. "F6" appears in the display. To remedy this fault repairs by an authorised Retsch service technician are required.

Accessories / milling tools

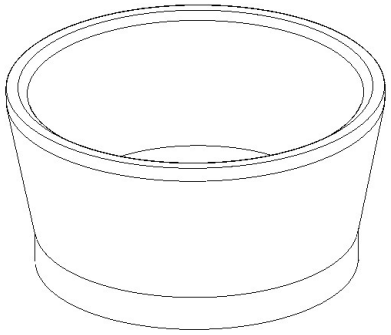


Fig.20

Mortar Fig.20

- Mortar of special steel
- Mortar of stainless steel
- Mortar of agate
- Mortar of sintered corundum
- Mortar of zirconium oxide
- Mortar of hard porcelain
- Mortar of tungsten carbide

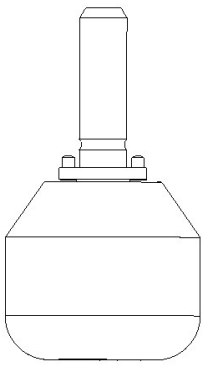


Fig.21

Pestle Fig.21

- Pestle of tungsten carbide
- Pestle of special steel
- Pestle of stainless steel
- Pestle of agate
- Pestle of sintered corundum
- Pestle of zirconium oxide
- Pestle of hard porcelain

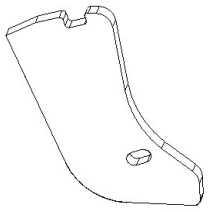


Fig.22

Scraper Fig.22

- Scraper of PUR (abrasion resistant, rubber type material)
- Scraper of beech wood
- Scraper of PTFE (Teflon)

Cleaning

Do not clean the RM200 with running water.

Danger to life through current surge

Use only a cloth moistened with water. Cleaning agents and solvents must not be used – not for cleaning the milling tools either.

Maintenance

The RM200 is maintenance free. When used properly no maintenance and adjusting work need be carried out.

Accessories RM200

Designation	Material	Article No.
Mortar RM200/100	Special steel	02.460.0018
Mortar RM200/100	Stainless steel	02.460.0057
Mortar RM200/100	Tungsten carbide	02.460.0021
Mortar RM200/100	Agate	02.460.0098
Mortar RM200/100	Sintered corundum	02.460.0017
Mortar RM200/100	Zirconium oxide	02.460.0086
Mortar RM200/100	Hard porcelain	02.460.0016
Pestle RM200	Special steel	02.461.0112
Pestle RM200	Stainless steel	02.461.0113
Pestle RM200	Tungsten carbide	02.461.0114
Pestle RM200	Agate	02.461.0115
Pestle RM200	Sintered corundum	02.461.0116
Pestle RM200	Zircondium oxide	02.461.0117
Pestle RM200	Hard porcelain	02.461.0118
Scraper	PTFE	03.008.0022
Scraper	Beech wood	03.008.0023
Scraper	PU	03.862.0011

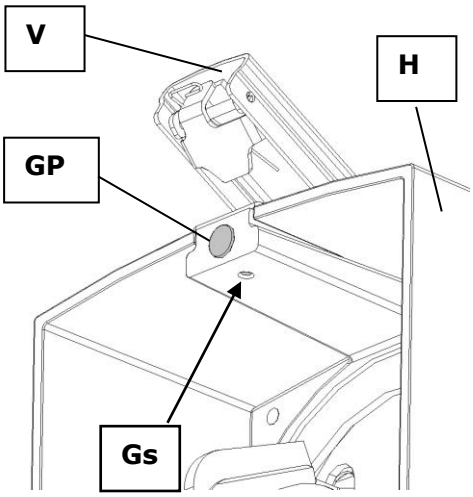
Do not carry out any modification of the machine and use only spare parts and accessories approved by Retsch.

Otherwise the declared Conformity with the European Directives by Retsch will lose its validity. Furthermore this will lead to loss of any kind of guarantee claims.

Wear

The scraper and milling tools can wear, depending on the frequency of milling operations and the material to be milled. The scraper should be regularly checked for wear and replaced if necessary. The scraper must be reset before the metal components come into contact with the mortar.

Readjusting the lock pre-tensioning



The lock tension in the lock handle **Vg** can be influenced by adjusting the rubber buffer **GP**.

Open the hood **H** and loosen the setscrew **Gs**.

Increasing the lock tension:

Turn the rubber buffer GP in an anti-clockwise direction

Reducing the lock tension:

Turn the rubber buffer GP in a clockwise direction

Wearing parts

These operating instructions do not include repair instructions. For your own safety repairs should be carried out only by Retsch GmbH or an authorised agency and service technicians.

Checks

The function of the hood switch must be checked regularly:

- Switch on the machine with switch **D**
- Start the milling operation with start button **Q**
- Open the closing grip **F** and lift up the hood
- If there is an opening gap of only a few cm the machine is switched off and **F4** appears in the display.
- Delete **F4** with stop button **R**

If switching off does not take place the RM200 must be checked immediately by Retsch service.

Alterations
Subject to technical alterations without notice.

Summary of safety regulations for the RM200

Process	Action	Danger
Safety	Injury to persons and damage to the machine caused through non-observance of the safety instructions	Claims for damages in any form are excluded
Transport	Do not knock, vibrate or throw the RM200 during transport	Electronic and mechanical components can be damaged
	Keep the packing material for the duration of the guarantee	Complaint and return of the equipment in inadequate packing material puts your guarantee claim at risk
Temperature variations	If there are temperature variations protect the RM200 from condensed water	Electronic components can be damaged
Supplied items	If the delivery is incomplete and/or there is transport damage you must inform the transporter and Retsch GmbH immediately (within 24 hrs).	Later complaints may possibly not be considered.
Ambient temperature	Drops below 5°C Exceeds 40°C	Electronic and mechanical components may be damaged. Performance data are changed to an unknown extent.
Atmospheric humidity	Exceeds 80% at temperatures up to 31°C	Electronic and mechanical components can be damaged. Performance data are changed to an unknown extent.
Electrical connection	Power supply does not agree with the values on the type plate Fault current protective switch must be provided in the power supply	Mechanical and electronic components can be damaged. Prevents current surge if there is an electrical defect in the machine.
Installing the mortar	Ensure that the mortar is properly engaged in the plate slot.	Mortar and pestle can be damaged.
Installing the pestle	Ensure that the pestle engages properly.	The pestle can fall out when closing the hood and damage the mortar.
Scraper pressure	Set too high	Rapid wear to be expected. Contaminates the sample to a greater extent than expected. Increases the motor load and can cause switching off through overloading.
Crushing **Mixing** **Milling**	Do not push sample material into the opening with your fingers. Do not push sample material in using objects. Do not add sample material in batches.	Fingers can be squeezed. Mortar, pestle and scraper can be damaged, danger of injury. Mortar and pestle can become blocked.
Checks	Check hood switch regularly	Danger of injury if there is a defect and the machine is open in operation.
Cleaning	Do not clean with running water.	**Danger to life through current surge**

EU Declaration of Conformity

Translation

MORTAR MILL

RM 200 | 20.455.xxxx

EU DECLARATION OF CONFORMITY

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

Machinery Directive 2006/42/EC

Applied standards, in particular:

DIN EN ISO 12100	Machine Safety - General Design Principles
DIN EN 61010-1	Safety Regulations for Electrical Measurement, Control, Regulation and Laboratory Devices

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

Applied standards, in particular:

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

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

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

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

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

Retsch GmbH

Haan, 09/2023

Dr. Stefan Mähler, Technical Manager

CE

www.retsch.com · E-mail: info@retsch.com · Phone: +49 2104 2333-100