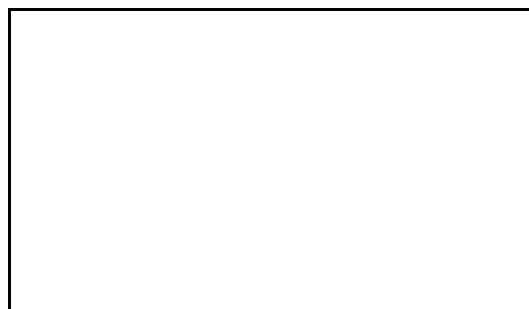


# Operating Manual DM400 Disc Mill



Translation



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# 1 Basic construction



1	Display
2	Control panel
3	Main switch
4	Fill hopper
5	Fixed grinding disc
6	Moving grinding disc
7	Gap set screw
8	Grinding chamber closing mechanism
9	Locking bolts sample material container
10	Sample material container
11	Suction flange lid
12	Height adjustable support
13	Interlock switch
14	Housing cover



<b>a</b>	+ button (change parameters and gap width, menu navigation)
<b>b</b>	- button (change parameters and gap width, menu navigation)
<b>c</b>	Arrow up button (menu navigation)
<b>d</b>	Arrow down button (menu navigation)
<b>e</b>	Start button
<b>f</b>	Stop button
<b>g</b>	Button dust extraction (on/off)
<b>h</b>	Unlocking and locking the grinding chamber
<b>i</b>	Sensor grinding chamber



## **2 Safety instructions and use**

### **2.1 Requirements for the user**

This Operating Manual is intended for persons commissioned with the operation and monitoring of the DM400. The Operating Manual, and in particular the safety instructions, should be heeded by all persons working on or with the equipment. Furthermore the regulations and provisions on accident prevention applicable at the application site must be observed. The Operating Manual must always be kept where the DM400 is used.

Persons with health disorders or who are under the influence of medication, drugs, alcohol or extreme tiredness must not operate the device.

The DM400 may only be operated by authorised persons and serviced and repaired by trained specialists. Technically qualified personnel must conduct all maintenance, servicing and repair work! Qualified personnel are people who have been authorised by persons responsible for the safety of the system to execute the required activities and are able to recognise potential dangers and avoid them based on their training, experience and instruction, as well as their knowledge of relevant standards, regulations, accident prevention regulations and operating conditions (definition of skilled personnel according to IEC 364).

The instructions in this Manual should be followed in order to prevent danger to the user.

Faults which can impair the safety of persons, the DM400 or other material assets should be rectified immediately. The following instructions serve both personal safety of operating staff and the safety of the described products as well as connected equipment: all servicing and repair work may only be carried out by technically qualified personnel!

This Operating Manual is not a full technical description. It only describes information required for safe operation and maintenance of serviceability.

Retsch has prepared and checked this Operating Manual very carefully. However no liability can be assumed regarding completeness and accuracy.

Subject to technical amendments.

### **2.2 Intended use**

The DM400 is a disc mill for batch or continuous fine grinding of hard brittle to medium hard solids from the areas of mining and metallurgy, geology and mineralogy and the glass and ceramics industry.

The maximum feed size is 20 mm edge length; the achievable final fineness level depending on the gap width set is approx. 12 mm (largest gap width) and 0.05 mm (smallest gap width).

The material throughput of the disc mill lies in the range of 20 to 150 kg/h. This depends on the setting of the outlet gap and the bulk weight and grinding conduct of the sample.

### 2.2.1 Operating principle



The grinding of the material sample takes place in a grinding chamber which is dustproof to the outside and in which two coarsely toothed grinding discs operate against each other. The moving grinding disc is driven by a powerful, slow running gear motor.

The sample material is filled through a lockable hopper into the centre of the upright grinding disc and, after being ground by compression and shear stress, escapes through the gap between the two discs. The gap width determines the mean particle size of the sample material. The grinding gap can be set to an accuracy of 0.05 mm using the plus/minus buttons on the control panel. The gap width can be read off the display (1).

When grinding batches, the sample material is collected in a sample material container placed in the device (volume: 2l). The closed design prevents dust escaping. A dust extraction device may additionally be connected. To clean, the front housing is opened sideways - the grinding chamber is then freely accessible.

### 2.3 Duties of the operating company

This Manual should be read and understood before using the DM400. Use of the DM400 demands expert knowledge and should be limited to commercial users.

Operating personnel must be familiar with the contents of the Operating Manual. It is therefore very important for this Operating Manual to be actually handed to these persons. It must be ensured that the Operating Manual always remains with the device.

The DM400 may be used exclusively within the possible uses set out in this Manual and within the specified regulations in this Manual. In the event of contravention or incorrect use, the customer assumes full liability for the functionality of the DM400 or for damage arising from an infringement of this duty.

Through use of the DM400 the customer agrees and recognises that defects, faults or errors cannot be entirely ruled out. In order to avoid the risk of personal injury or damage to property arising from this or otherwise or of other indirect or direct damage, customers must take adequate and comprehensive safety measures when working with the device.

It is not possible for Retsch GmbH to monitor compliance with this Manual or the conditions and methods used in the installation, operation, use and servicing of the DM400. Damage to property leading to danger to persons may result from incorrect installation. We therefore assume no responsibility and liability at all for loss, damage or costs arising from or in any way associated with faulty installation, incorrect operation or from incorrect use and servicing.

The applicable accident prevention regulations must be complied with. Generally accepted statutory and other binding regulations on environmental protection must be observed.

## 2.4 Hazard warnings and symbols used

### Safety instructions

Safety instructions are indicated in this Manual by symbols. The safety instructions are introduced by signal words which express the degree of danger.



#### **DANGER!**

This combination of symbol and signal word indicates a direct hazardous situation leading to death or serious injuries if it is not avoided.



#### **WARNING!**

This combination of symbol and signal word indicates a potentially hazardous situation which can lead to death or serious injuries if it is not avoided.



#### **CAUTION!**

This combination of symbol and signal word indicates a potentially hazardous situation which can lead to minor or slight injuries if it is not avoided.



#### **NOTICE!**

This combination of symbol and signal word indicates a

potentially hazardous situation which can lead to damage to property if it is not avoided.



### **NOTICE!**

This combination of symbol and signal word indicates a potentially hazardous situation which can lead to damage to the environment if it is not avoided.

**Special safety instructions**

The following symbols are used in safety instructions to alert to specific hazards:

**DANGER!**

This combination of symbol and signal word indicates a direct hazardous situation through electric current. If a sign with this symbol is not heeded, serious or fatal injuries will result.

**DANGER!**

This combination of symbol and signal word designates content and instructions for intended use of the machine in potentially explosive areas. If a sign with this symbol is not heeded, serious or fatal injuries will result.

**DANGER!**

This combination of symbol and signal word designates content and instructions for intended use of the machine with flammable materials. If a sign with this symbol is not heeded, serious or fatal injuries will result.

**DANGER!**

This combination of symbol and signal word designates content and instructions for intended use of the machine with potentially explosive substances. If a sign with this symbol is not heeded, serious or fatal injuries will result.

**WARNING!**

This combination of symbol and signal word indicates a direct hazardous situation due to moving parts. If a sign with this symbol is not heeded, injuries to hands may result.



**WARNING!**

This combination of symbol and signal word indicates a direct hazardous situation due to hot surfaces. If a sign with this symbol is not heeded, skin contact with hot surfaces may cause serious burns to skin.

**Safety instructions in operating instructions**

Safety instructions may refer to a specific, individual operating instruction. Such safety instructions are embedded in this operating instruction in order not to interrupt the flow of reading when performing the action concerned. The signal words described above are used.

Example:

1. Loosen screw.

- 2.



**CAUTION!**

**Risk of pinching on the lid.**

Close the lid carefully.

3. Tighten the screw.


**Tips and recommendations**



*This symbol highlights useful tips and recommendations as well as information for efficient and fault-free operation.*

**Other labelling**

The following labels are used to emphasise operating instructions, results, lists, references and other elements in this Manual:

Labelling	Explanation
 1., 2., 3. ...	Step-by-step operating instructions
⇒	Results of operating steps
■	Lists without specified order
[Button]	Control elements (e.g. button, switch), indicators (e.g. signalling lamps)
"Display"	Screen elements (e.g. buttons, assignment)

of function buttons)

## 2.5 Device safety instructions

**Please note!**

- Only use original accessories and original spare parts. Failure to do so can place the protection of the machine in doubt.
- Safe conduct must be strictly followed during all work.
- The current applicable national and international accident prevention regulations must be complied with.



**CAUTION!**  
**Wear hearing protection!**

Hearing protection should be worn when a noise level of 85dB (A) is reached or exceeded in order to prevent damage to hearing.



**WARNING!**

The maximum workplace concentrations (threshold limit values - TLV) in valid safety regulations must be observed, and ventilation must be provided where necessary or the machine operated under an extractor hood.



**DANGER!**  
**Risk of explosion!**

- When grinding oxidable substances (e.g. metals or coal) there is a risk of spontaneous ignition (dust explosion) if the fine fraction exceeds a certain percentage. For this reason special safety measures must be taken when grinding such substances and the work must be supervised by a specialist.
- The device is not designed for use in potentially explosive areas and is not suitable for grinding explosive materials.

- Do not remove signs.



**NOTICE!**

Replace damaged or illegible signs without delay.

- Unauthorised modifications to the device lead to loss of the conformity to European directives declared by Retsch and to loss of the warranty claim.
- Only use the DM400 in a technically perfect state and as intended, with an awareness of safety and dangers as specified in the Operating Manual. In particular have faults which might impair safety rectified immediately!
- If you have any questions or problems after reading the Operating Manual, please contact our technical staff.



**2.6 Safety equipment**



*Safety equipment must be used as intended and must not be rendered unworkable or removed.*

*All safety equipment must be checked regularly for completeness and function.*

The disc mill has a comprehensive safety system:

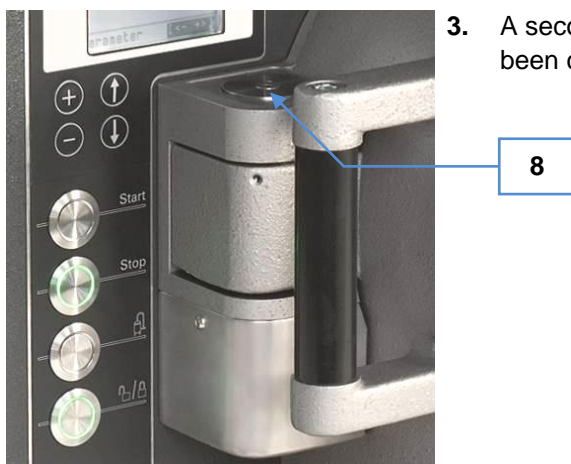
1. A grille (4G) prevents contact with the fill hopper (4).

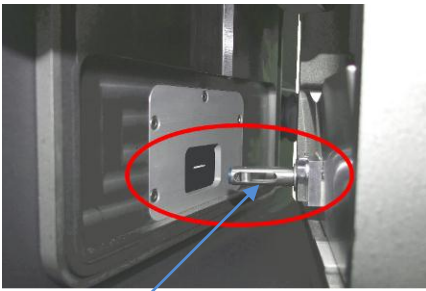


2. A sensor (i) monitors the closing of the grinding chamber before operation and prevents the disc mill starting up after it has been opened.



3. A second safety device checks whether the grinding chamber has been closed by means of the motorised closing mechanism (8).





13

4. The interlock switch (13) pulls in the sample material container after the start of grinding and locks it using the locking bolt (9) on the container. During operation the interlock switch monitors whether the device is closed correctly. It likewise prevents the disc mill starting up after it has been opened.



*The disc mill does not start if the grinding chamber is open or the sample material container is missing.*

## 2.7 Danger areas



### CAUTION!

- Risk of crushing on hopper cover
- Risk of crushing when closing the grinding chamber
- Risk of crushing when cover of dust extraction is removed during operation!

## 2.8 Electrical safety

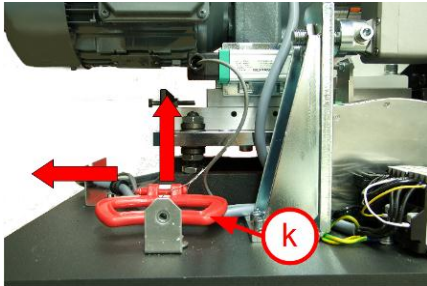
### 2.8.1 General information



The disc mill is switched on and off with a main switch (3).

- By pressing the switch to I (On):  
Disc mill is activated and can be started using the start button (e) as long as the grinding chamber is closed and the sample material container is inserted!
- By pressing the switch to O (off) during grinding:  
The disc mill comes to a halt and is completely deactivated!  
Grinding chamber and sample material container are locked and cannot be opened. Stop grinding using the stop button (f) in order to be able to remove the sample material container after deactivating the device.

**2.8.2 Protection against restarting**



The device switches off in the event of a power failure during operation.

- The mill comes to a halt within seconds!
- Sample material container can only be opened with the emergency release (k) inside the device! To do this the housing cover (14) must be removed as follows (also see *chapter "Positioning"*)
  - Open the housing cover (14) by releasing the quick acting screws placed on either side.
  - After releasing the quick acting screws, pull the housing cover (14) back by a few centimetres. Then lift the housing cover up and out.
- The emergency release (k) inside the device is then visible.
- To release the sample material container, pull the emergency release (k) backwards until the locking bolt (9) on the sample material container (10) is released.  
Considerable force is required to release it.
- The emergency release can then be engaged again and the housing cover closed. The sample material container is pulled in when grinding next starts.



**NOTICE!**

Grinding chamber cannot be opened when the grinding chamber interlock is closed or when switched off.

The disc mill does not start up by itself when supply voltage returns.

- The mill has protection against restarting.
- The motor is started again by pressing the start button (e), and the mill begins operation.



### 3 Technical data

#### 3.1 Dimensions

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

#### 3.2 Weight

240 kg (net)

#### 3.3 Operating noise

The noise level goes up to approx. 68.9 dB (A).

#### 3.4 Voltage, power consumption, power input

<b>Voltage</b>	400V / 3~ 50Hz	230V / 3~ 60Hz
<b>Power consumption</b>	3.2 A	5.6 A
<b>Power input</b>	1830 W Under high load (significantly lower in normal use)	1800 W Under high load (significantly lower in normal use)

The device may only be operated on a three phase supply network!  
Transient electrical surges according to surge category II permissible (also see *chapter "Electrical connection"*)

#### 3.5 Fuse

A thermal circuit breaker (motor circuit breaker) is integrated in the main switch (3) and triggers on overheating; it is operational again after a brief cooling phase.

In addition 3x16A fuses are installed in the disc mill.

#### 3.6 Material

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

### 3.7 Final fineness

The final fineness is between 0.05 and 12mm.

## 4 Installation

### 4.1 Transport

The device is supplied on a transport pallet with wooden cover. We recommend transporting the packaged device with a pallet truck or forklift.

**DANGER!**

Do not walk under the transport pallet during transport.

**WARNING!**

Incorrect lifting can lead to injury or damage to property. The machine should only be lifted using suitable equipment and by appropriately qualified personnel!

Damage caused by incorrect transport does not justify any replacement or warranty claims.

### 4.2 Unpacking

- Pull out the nails attaching the cover to the transport pallet. The cover is the wooden box pulled over the transport pallet.
- Lift the cover from the transport pallet.

**CAUTION!****Risk of crushing!**

Always lift with 2 people.

- Compare the contents of delivery with your order.

### 4.3 Positioning

**DANGER!**

Do not walk under the transport pallet during transport.

To position the disc mill you will need a crane or other suitable means of transport as well as 2 carrying straps (not included with delivery) with a minimum length of 40cm and loadbearing capacity of 500 kg.

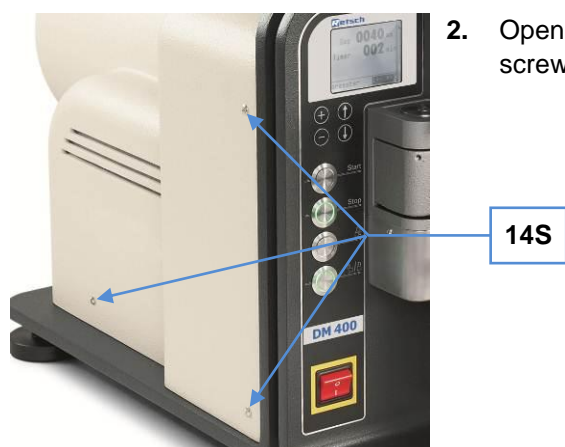
**CAUTION!**

Weight of the disc mill is 240 kg!

**NOTICE!**

The disc mill must be placed on an even, stable surface. It can be screwed to this or to a base plate.

1. The disc mill is screwed to the transport pallet from underneath using 3 screws. Loosen screws using a spanner wrench (17 mm).
2. Open the housing cover (14) by unscrewing the quick acting screws on either side.







3. After unscrewing the quick acting screws, pull the housing cover (14) back by a few centimetres.  
Then lift the housing cover up and out.



4. Two carrying lugs to attach the carrying straps are then visible.



5. Attach the carrying straps to a crane or other auxiliary equipment.
6. Now attach the carrying straps to the 2 carrying lugs provided.
7. With the help of the crane, position the disc mill in the desired place. Take care while positioning that the device does not swing when hanging on the crane.
8. Remove the carrying straps!
9. Place the housing cover (14) back on and screw tight.

#### 4.4 Ambient conditions



**WARNING!**  
**Mains voltage!**

- The device may only be used inside.
- The surrounding air must not contain any conductive dust.
- Maximum relative humidity 80% for temperatures up

to 31°C, decreasing in a linear fashion to 50% relative humidity at 40°C.

- The room temperature must be between 5 and 40°C.
- Height up to 2000m above sea level
- Degree of pollution 2 in accordance with IEC 664.

## 4.5 Electrical connection

Before connection, compare the voltage and current values on the type plate with the values on the intended mains.



### CAUTION!

Electrical as well as mechanical components may be damaged by failure to heed to values on the type plate.

### 4.5.1 Adjusting the disc mill to the mains network

The DM400 is delivered with supply voltage adapted to suit your country.

## 4.6 Putting into service

The disc mill is supplied with mounted grinding discs. Before grinding for the first time, check the desired gap width (see *chapter "Adjusting the gap width"*) The device is operational once you have positioned the disc mill as described under *chapter "Positioning"* and have connected the plug to the mains socket.



### CAUTION!

- Grinding discs must not touch each other.
- The device may only be operated with mounted and secured grinding discs.
- Smallest gap width 0.05mm

## 4.7 Switching on for the first time / function test

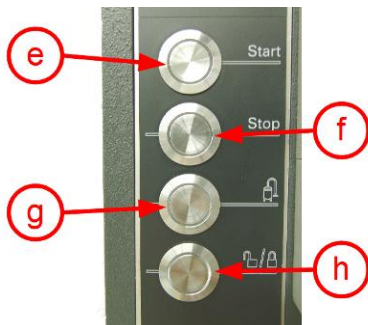
Only switch the device on when all work described as from the *chap-*

ter "Installation" has been carried out!

#### 4.7.1 Switching on

Set the main switch (3) to I! The display (1) switches on and the STOP button (f) is lit up in red! If the grinding chamber is locked, the release and locking button (h) is lit up in green.

##### 4.7.1.1 Function test



When the grinding chamber has been electrically closed and the sample material container is inserted, start using the start button (e). The disc mill starts up. Then actuate the stop button (f), and the machine comes to a halt. It is then possible to continue with the *chapter* "working with the disc mill".

#### 4.7.2 Switching off

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



## 5 Working with the disc mill

**WARNING!**

No warranty or complaint will be accepted in the case of damage to the device when grinding tools are used which are not original accessories of the device.

**WARNING!**

Before starting the machine, ensure that the grinding discs are correctly mounted and that there are no loose parts inside the device. If this is not observed, no warranty or complaint will be accepted for damage to the device or personal injury that result.

**CAUTION!**

- Grinding discs must not touch each other.
- The device may only be operated with mounted and secured grinding discs.
- Smallest gap width 0.05mm

**NOTICE!**

Do not leave the disc mill to run unsupervised.

**CAUTION!**

Ensure that the suction flange lid or adapter to use the dust extractor are fitted securely. Never reach into the opening of the suction flange during grinding!

## 5.1 Display and control panel



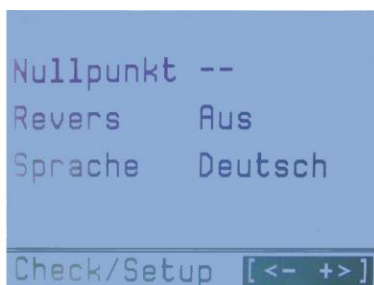
- If the grinding chamber is open, the button (h) to lock the grinding chamber is not lit up!
- During the motorised closing of the grinding chamber, the button (h) flashes green until the grinding chamber is closed. It is then lit up in green.
- When starting up, the start button (e) flashes green. When the device has started up, it lights up in green.
- After stopping the device, the stop button (f) flashes red until the disc comes to a standstill. When it is at a standstill it lights up in red.
- When a dust extractor is connected, the button (g) lights up in green after its activation.
- The +/- buttons (a, b) are used to adjust values and for menu changes.
- The arrow buttons (c, d) are used to select menu items and to make changes in the menu bar.

## 5.2 Menu navigation

### Menu selection

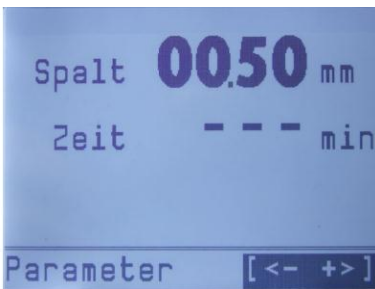


1. The Parameter menu is used for the following:
  - To adjust the gap width between the grinding discs → Gap
  - To adjust the grinding time in minutes → Time

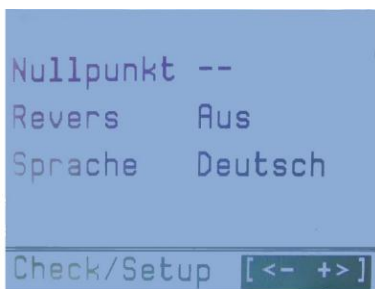


2. In the Check/Setup menu you can:
  - Define the “zero point” → no gap between the grinding discs
  - Change the direction of rotation of the moving grinding disc (6) → Reverse
  - Set the language → Language

**Menu change**



1. To move from the "Parameter" menu to the "Check/Setup" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Check/Setup menu!



2. The menu change from the Check/Setup menu to the Parameter menu takes place in the same way.

**Selecting menu items**

1. The menu items within menus are selected using the arrow buttons (c, d).

**5.3 Specifying the zero point**



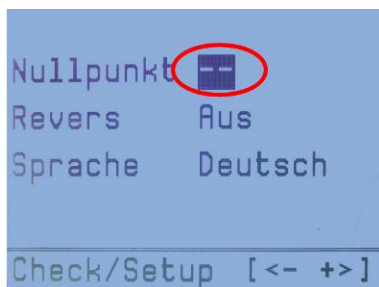
*The zero point is the gap width at which the fixed and the moving grinding disc rub slightly against each other so that no gap is present. All other gap widths are actuated from this zero point.*



*The zero point must be reset after every time the grinding discs are changed. Grinding discs can vary in thickness according to the degree of wear.*



1. To move from the "Parameter" menu to the "Check/Setup" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Check/Setup menu!
2. Close the grinding chamber and remove the sample material container.



3. To change the grinding gap to adjust the zero point, the zero point line must be selected in the Check / Setup menu using the arrow buttons (c, d).
4. Remove the suction flange lid (11). Check both grinding discs while they are moving together through this opening. It should only be possible to see a minimal light gap between the two discs.



*During the process of setting the zero point, no gap information is shown on the display. You can hear a mechanical noise of the servomotor and see how the moving grinding disc (6) is aligned through the suction flange (11)!*

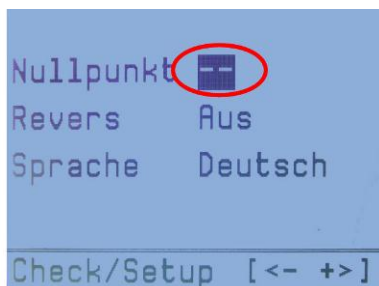


5.

**CAUTION!**

Risk of crushing between the grinding discs!

To check while adjusting the zero point, rotate the moving grinding disc by hand through the opening of the sample material container. While rotating, reduce the gap using the – button (b) until slight rubbing of the two discs can be felt and heard!



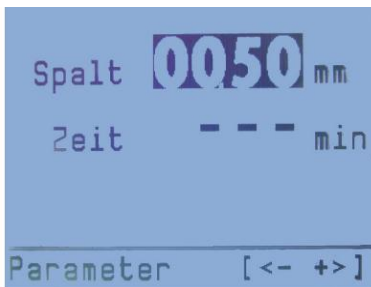
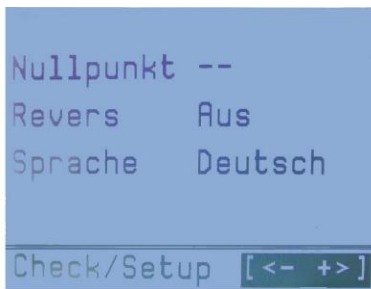
- As soon as the smallest gap width has been set and a minimum rubbing of the discs is registered, this may be defined as zero point. Only when the zero point is highlighted in black can the zero point be fixed by simultaneously pressing the stop (f) and + (a) buttons.
6. Reinsert the sample material container.

## 5.4 Adjusting the gap width

The adjustment of the gap width takes place automatically using the Parameter menu item. The zero point must be set first (see *chapter "Specifying the zero point"*) to prevent damage to the grinding discs.

The gap width is adjusted as follows:





1. To move from the "Check/Setup" menu to the "Parameter" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Parameter menu
2. Close the grinding chamber!
3. In the Parameter menu, press the c button (arrow up) until the line to enter the gap width is highlighted.
4. Using the +/- buttons on the control panel, increase (+) or decrease (-) the gap width!
5. The gap width between the discs adjusts automatically if:
  - ☞ the menu item is exited or
  - ☞ the grinding process is started using the start button (e).



**NOTICE!**

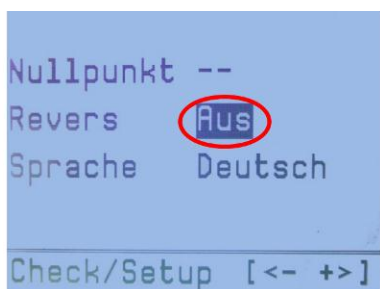
Grinding discs wear during grinding. For this reason the gap width must be checked and possibly adjusted from time to time. This takes place as described in the chapter "Specifying the zero point and the chapter "Adjusting the gap width".

**5.5 Reverse operation**

Reverse operation can be selected in the case of one-sided wear on grinding discs.



1. To move from the "Parameter" menu to the "Check/Setup" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Check/Setup menu!



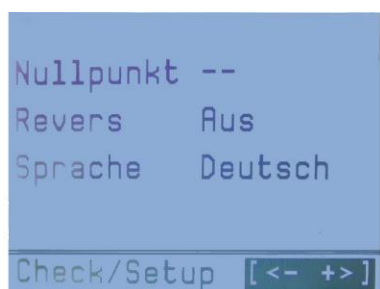
2. Select reverse using the arrow buttons (c, d), and activate (on) or deactivate (off) reverse operation with + (c) or - (d) button.



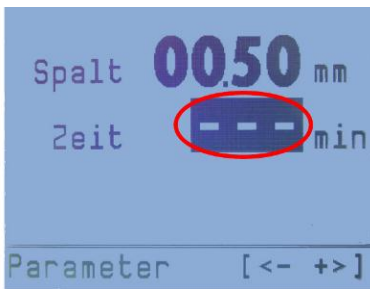
#### NOTICE!

Grinding discs are subject to natural wear after longer periods of use and must be replaced where necessary. If you ascertain that the grinding discs are worn on one side, they need not be replaced immediately. Reverse the direction of rotation of the drive motor using the reverse setting. The crushing edges of the grinding discs that had been on the back are then in use. At this point at the latest you should order spare grinding discs (see *chapter "Replacing the grinding discs (5 + 6)"*)

## 5.6 Adjusting the grinding time

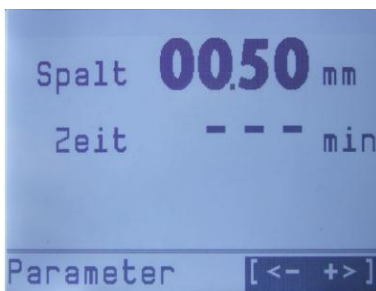


1. To move from the "Check/Setup" menu to the "Parameter" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Parameter menu!

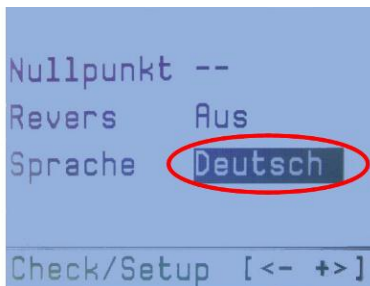


2. Select the Time menu item using the arrow buttons (c, d) and then adjust using the + / - button. If no grinding duration has been specified, the grinding can be started and ended manually using the start - (e) and stop- (f) button. The maximum time-controlled grinding duration that can be set is 60 min!

### 5.7 Changing the language



1. To move from the "Parameter" menu to the "Check/Setup" menu, actuate the arrow buttons (c, d) until the - and + signs which are visible on the bottom right of the display are highlighted in black! Then use the buttons + (a) or - (b) to move to the Check/Setup menu!



2. Select the language line using the arrow buttons (c, d). The language (German or English) can be selected using the +/- button and then set by exiting the menu item.

### 5.8 Grinding with zirconium oxide grinding discs

A number of points must be observed when grinding using zirconium oxide grinding discs:

1. Precise adjustment of the zero gap. Under no circumstances may the discs touch each other during grinding. The localised heating leads directly to stress cracks on the perimeter. These cracks occur in a very short time and are easily identified.
2. Localised heating can also occur if you add so much material that high pressure grinding takes place permanently in the grinding gap on the outer edge of the grinding discs. This leads to stress cracks on the perimeter of the grinding disc or even to it breaking.
3. The hardness of the zirconium oxide grinding disc is MOHS 8.5

(HV1350). No sample material that is harder may be ground because this causes the outer edges of the grinding disc to chip. Chipping of the edges can also occur with a sample material with MOHS hardness of 6 or 7.

4. Proceed very carefully when grinding using zirconium oxide grinding discs. You should pre-grind your sample material with a large gap width in the first run before achieving the desired fineness with the smallest gap in a second run. You should proceed in a similar way if you have no information about the grindability of your material. The grinding discs have a progressive chipping geometry. Coarse grinding takes place in the inner area, and fine grinding in the outer area of the grinding disc. The strain is greatest in the fine grinding area. The chipping described may occur here with very hard sample material.
5. The adhesive used to adhere the securing bolts in the grinding disc has a temperature resistance up to 80°C. The grinding discs should therefore not be heated above 80°C in order to guarantee the secure fit in the support.
6. Please observe the *chapter "Replacing the grinding discs (5 + 6)"* in the Operating Manual when assembling and removing the grinding discs!

**NOTICE!**

Retsch GmbH guarantees that only zirconium oxide grinding discs of the highest quality leave our company. Used grinding discs which are cracked, chipped or completely broken on the perimeter, cannot be accepted as complaint.

## 5.9 Material feed

**CAUTION!**

Switch the device on before filling material in the hopper.



1. The cover of the hopper is secured by a quarter turn quick release fastener. To open the lid, turn the quick release fastener a quarter turn in an anticlockwise direction!



2. Fill the sample in the hopper
3. Add only as much material as will allow the hopper cover to be closed!



4. To close the cover you must press the pins on the quick release fastener into the grooves on the hopper and lock again with a quarter turn in a clockwise direction!
5. Monitor the grinding process (grinding noise) and determine the optimum feed quantity! Repeat this with each new material.
6. Only fill more material once the grinding noise has reduced!
7. The maximum feed quantity depends on the grindability of the material and the collecting volume of the sample material container.
8. Place large lumps of material (max. 20mm edge length) individually in the hopper, close the cover and secure!



**NOTICE!**

The grinding disc support and the housing are made from ductile cast iron. This cast steel is not rustproof. If you grind slightly damp sample material, after grinding you must dry the back of the grinding disc, the inside of the grinding disc support and all parts of the housing which come into contact with the sample. If you do not do so, corrosion can be expected to occur.

### 5.10 Final fineness

The achievable final fineness depends on the selected gap width (approx. 0.05 mm to approx. 12 mm). Only one dimension of the individual particles in the fine material is determined by the gap width, e.g. material crushed in platelet form in the fine product may well contain larger dimensions in an expansion direction. Normally, however, after a second run with such materials, the proportion of the sample with larger dimensions in this expansion direction will have decreased significantly.

## 6 Cleaning



### **DANGER!** **Mains voltage!**

- Before starting cleaning work, unplug the device and protect it from restarting accidentally!
- Do not let liquid run into the device.
- Indicate cleaning work using a warning sign.
- Put safety equipment back into operation after cleaning work.



### **NOTICE!**

The grinding disc support and the housing are made from ductile cast iron. This cast steel is not rustproof. If you grind slightly damp sample material, after grinding you must dry the back of the grinding disc, the inside of the grinding disc support and all parts of the housing which come into contact with the sample. If you do not do so, corrosion can be expected to occur.

### 6.1 Extracting dust after grinding

After completion of the grinding process, you can vacuum the dust created during grinding.



### **NOTICE!**

Do not switch on the dust extraction during grinding as sample material may otherwise also be extracted.

### 6.2 Grinding chamber

To clean the grinding chamber, open the chamber. Clean the chamber using a brush and vacuum cleaner. Where necessary you can also use liquid detergents (alcohol, benzene). However pay attention to any rust if you use aqueous liquids.

It is important to allow the disc mill to dry completely.



### **WARNING!** **Risk of poisoning and fire!**

When using detergents which are flammable or harmful to health, it is essential to heed the valid safety regulations (TLV) and where applicable to clean the disc mill in a ventilated safety zone.

### 6.3 Housing

The machine can be cleaned outside when switched off using a soft damp cloth. A solution of water and mild detergent may be used here. No not use a solvent for cleaning.

### 6.4 Cleaning the hopper



In special cases the hopper may also be removed and cleaned as described in the *chapter "Replacing the grinding discs (5 + 6)"*. When grinding with the same sample, it is sufficient to clean the hopper of dirt using a brush and dust extraction. For more intensive cleaning, the protective grille can be removed by unscrewing 4 M3 countersunk screws. Clean the hopper with the help of a damp cloth!



#### CAUTION!

Mount the grille again after cleaning!

Never operate the disc mill without hopper or hopper grille!



## 7 Servicing



**DANGER!**  
**Mains voltage**

- Before starting servicing work, unplug the device and protect it from restarting accidentally!
- Indicate servicing work using a warning sign.
- Only have servicing carried out by skilled personnel.
- Put safety equipment back into operation after servicing and repair work.



- The most important element of servicing is regular cleaning:
- Cleaning of the entire device must observe the regulations of the employer's liability insurance associations (BGV A3) – in particular when the device is positioned in a dusty environment or dusty sample material is processed.

Function part	Task	Test	Service interval
Grinding chamber sensor	Start inhibitor	Open grinding chamber; start; error message	Always before use
Grinding chamber safety interlock	Start inhibitor	Do not close grinding chamber electrically; start; error message	Always before use
Grinding container protective equipment	Start inhibitor	Sample material container not inserted; start; error message	Always before use
Grinding disc gap width	Crush function	Check distance	Always before use

## 7.1 Grinding discs

The grinding discs wear after a certain period of time according to sample material. Check the surfaces at specific intervals. Refer to the information in the *chapter "Reverse operation"* and the *chapter below "Replacing the grinding discs (5 + 6)"* to change the direction of rotation or to replace the discs.

## 7.2 Replacing the grinding discs (5 + 6)



Tools required:

- M20 spanner wrench (r)
- Motor shaft retainer (s)
- 30 mm ratchet wrench (t)



*The device must be connected to the mains to change the grinding discs.*



### NOTICE!

In order to ensure that the hexagon screws on the back of the moving grinding disc are more easily accessible, the grinding gap when the grinding chamber is open should be moved to the lowest width.



### CAUTION!

- Risk of crushing when changing the grinding discs.
- When changing grinding discs, secure them to prevent them falling down.



### CAUTION!

When replacing grinding discs, hold them securely and do not allow them to fall. In the case of zirconium oxide discs, this can lead to breakage or chipping.

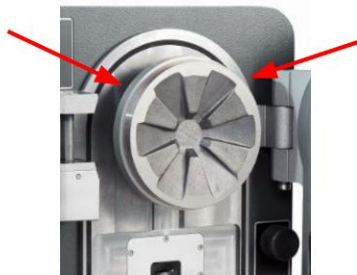


1. Switch main switch (3) to I (ON)!

3



2. Then press the release button (h) on the control panel.



3. The grinding chamber interlock (8) is released! Now open the grinding chamber. The grinding discs are visible. The moving grinding disc (6) is screwed at the back with 2x M20 hexagon screws.

4. In order to be able to remove the moving grinding disc, the housing cover (14) must be removed (see *chapter "Positioning"*)



5. Then hold the motor shaft in place with the help of the motor shaft retainer (s).



**CAUTION!**

Do not lock the motor shaft retainer (s) by resting on the component!



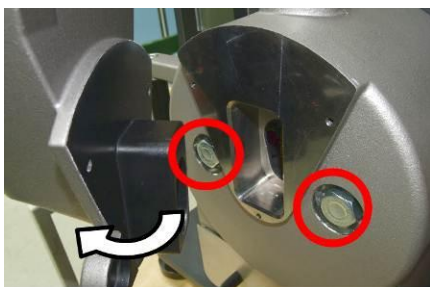


6. Then unscrew the hexagon screws on the moving grinding disc using the spanner wrench (r).



7. The fill hopper (4) must be removed to dismantle the fixed grinding disc (5).

8. To do this, manually close the grinding chamber and remove the 3 cylinder screws shown.



9. Remove hopper from the front.

⇒ The mounting screws on the fixed grinding disc are then visible!



10.

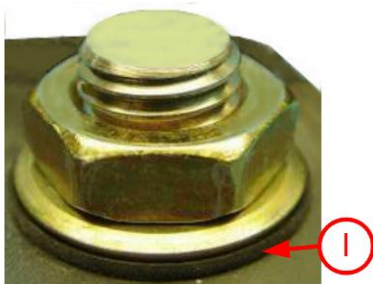


**DANGER!**

Risk of crushing when changing the grinding discs. Ensure that the grinding disc does not fall on the floor.

Loosen the 2x M20 mounting screws using the ratchet wrench and open the grinding chamber. Hold the grinding disc in place. Remove the hexagon screws and remove the grinding disc.

11. Now take the replacement moving grinding disc and assemble with the hexagon screws (see Point 5 + 6 in reverse order)
12. Set the gap width to at least 10 mm as described in *chapter "Adjusting the gap width"*
13. Insert the replacement fixed grinding disc and secure with the hexagon screws. Manually close the grinding chamber and secure the disc using the ratchet wrench (t).
14. Secure the hopper again in reverse order (see Point 7)
15. Manually close the grinding chamber and lock again with the help of the locking button (h).
16. Assemble the housing cover.



**CAUTION!**

Before inserting the new discs, clean the support and the back of the discs thoroughly. This is in particular very important when using the  $ZrO_2$  discs and also with TC+CO discs, so that the discs are positioned without tension and parallel to each other.

It is also important when tightening the screws that the tightening torque is not too great (see table) and is the same for both screws.

Rubber washers (I) which are placed under the steel washers are used with  $ZrO_2$  grinding discs. The nuts are then tightened until the rubber washer slightly squeezes out beneath the steel washer. This ensures a tightening torque of approx. 20Nm.

Material	Max. guide value tightening torque (Nm)	Density g/cm <sup>3</sup>	Abrasion resistance	Use for sample material
Hardened steel 11-12% Cr	<b>At least 50</b>	7.9	Good	Hard, brittle samples
Manganese steel 12-13% Mn	<b>At least 50</b>	7.9 - 8	Good	Hard, brittle samples
Tungsten carbide 90.3% TC + 9.5% CO	<b>At least 50</b>	14.8	Very good	Hard, abrasive samples
Zirconium oxide 92.5 ZrO <sub>2</sub>	<b>Approx. 20</b>	5.9	Extremely good	Medium hard, abrasive samples for iron-free grinding

### 7.3 Replacing the gear oil

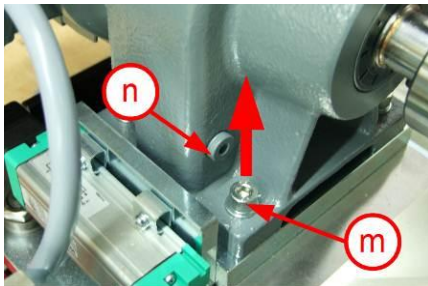


The gearbox of the motor is filled with gear oil on delivery (ISO VG 220). A removable fill screw is present in the top of the gearbox housing to check the oil level. To reach this the housing cover must be removed.

This filling of oil must be replaced after approx. 10,000 operating hours or 4 years.

#### 7.3.1 Conducting the gear oil change

1. Run the DM400 for approx. 15 minutes so that the gear oil inside warms up and drains off better.
2. Unplug the device and remove the cover (see *chapter "Positioning"*)
3. Remove the motor securing screw (m) under the oil drain plug (n) using an M10 Allen key!



*The gearbox contains approx. 0.22 litres of ISO VG 220 gear box oil!*



4. Hold a flat container underneath the oil drain plug (n) and unscrew this using an Allen Key No. 5 until oil flows out.
5. Allow all of the oil to drain from the gearbox (approx. 0.22 l). Watch the size of the collecting container and empty at intervals where necessary, screwing the oil drain plug back in to do so.
6. When the gear oil has been completely emptied, remove the oil drain plug!
7. Wipe any spilt gear oil with a paper towel and clean the contact surface of the oil drain plug.
8. Screw the oil drain plug with washer tight again.
9. Assemble the motor securing screw again.



10. The fill screw (o) is then removed!
11. Place a funnel in the hole and fill the gearbox with 0.22 litres of gear oil ISO VG 220.
12. Screw the fill screw (o) with clean sealing ring tight again.
13. Assemble the housing cover.



## 8 Repair



**DANGER!**  
**Mains voltage!**

- Before starting repair work, unplug the device and protect it from restarting accidentally!
- Indicate repair work using a warning sign.
- Have all repair work conducted by skilled personnel.
- Put safety equipment back into operation after servicing and/or repair work.

## 8.1 Checklist for troubleshooting

Malfunction	Possible cause	Rectification of fault
Mill does not start	No mains connection	Plug in
	Mains switch is off	Switch the mains switch on
	Grinding chamber safety switch open	Correctly connect the grinding chamber
	Sample material container safety switch open	Correctly insert the sample material container
Discs do not rotate	Gap width set to 0	Adjust the gap width! See <i>chapter "Working with the disc mill"</i>
	Sample is blocking the disc	Open grinding chamber and remove the sample
Mill stands still during operation	Overload! Switch off by motor circuit breaker switch (main switch)	Allow the mill to cool. Remove sample material, reduce feed of sample material
	Grinding chamber overfilled. Too large / hard sample material has become stuck	Open the grinding chamber and empty
Mill produces poor grinding result	Grinding discs are worn	Change the direction of rotation or replace grinding discs. See <i>chapter "Reverse operation"</i> or <i>chapter "Replacing the grinding discs (5 + 6)"</i>
	Grinding discs are not installed in parallel	Remove grinding discs, clean the support and reinsert (see <i>chapter "Working with the disc mill"</i> )
Sample materials escapes	Grinding chamber seals and sample material container seals dirty or faulty	Clean or replace seals
	Collecting container overfilled (max. 2l)	Remove container and clean the inside
Error message sample material container	Sample material container not recognised	Slide container in centrally
	Soiling of the container guide	Cleaning
No release of the sample material container after STOP	Release mechanism on sample material container faulty	Release by emergency actuation inside the device; see <i>chapter "Protection against restarting"</i> . Contact Retsch!
Automatic gap adjustment not possible	Control panel is faulty	Replace the control panel
	Gap adjustment is faulty	Contact Retsch Temporary problem solution using the set screw (7) on the bottom right-hand side at the front! Adjust the precise gap width manually!
	Discs have got stuck	With the help of the set screw (7), loosen! Realign the zero point!
Error message	Gap width, grinding chamber, sample material container	Actuate the STOP button

## 9 Disposal

Observe the respective statutory regulations when disposing of the device. Information on disposal of electrical and electronic devices in the European Community:

The disposal of electrical equipment within the European Community is specified by national regulations based on EU Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE).

Accordingly all equipment supplied after 13.08.2005 in the business-to-business area may no longer be disposed of with the municipal or household waste. They are labelled as follows to document this:

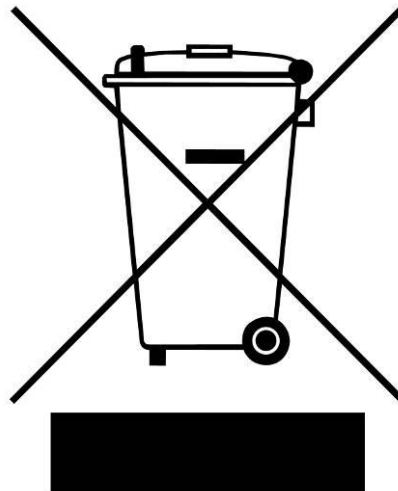


Fig. 1: Disposal label

Since the disposal regulations may differ from one country to another within the EU, we ask you to contain your supplier where necessary.

In Germany this labelling duty has applied since 23.03.2006. As from this date the manufacturer must offer a reasonable possibility for returning all equipment supplied as from 13.08.2005. The last user is responsible for correct disposal for all equipment delivered before 13.08.2005.

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# DISC MILL

## DM 400

### Declaration of Conformity

Type of machine: laboratory disc mill for grinding different materials in the version placed on the market by us corresponds to the basic requirements which are set out in the harmonisation regulations specified below:

Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast).

Directive 2004/108/EC of the European Parliament and of the Council of 15 December 2004 on the approximation of the laws of the Member States relating to Electromagnetic Compatibility and repealing Directive 89/336/EEC

DIRECTIVE 2011/65/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)

Specification of pertinent harmonised standards taken as basis or notification of specifications for which conformity is declared:

EN 50581, EN 61010-1, EN ISO 12100-1, EN ISO 12100-2

### Authorised representative for compiling the technical file:

J. Bunke (Technical file)

### Retsch GmbH keeps the following available for inspection as technical file:

Documents for development, design plans, analysis of measures for ensuring conformity, analysis of residual risks and operating manual in line with regulations, which correspond to accepted rules for the preparation of user information.

We hereby certify that the certification procedure was conducted exclusively in accordance with Directive 89/392/EEC (14.6.1989), amendment 91/368/EEC (20.6.1991), amendment 93/44/EEC (14.6.1993), amendment 93/68/EEC (22.7.1993) Directive of the Council on the approximation of the laws of the Member States for machinery.

**This declaration ceases to be valid in the case of a modification to the machine not agreed with us or the use of spare parts and accessories not approved by us.**

Retsch GmbH

Haan, January 2014



Dr. -Ing. Frank Janetta  
Manager Development















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