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MiniSpin®/MiniSpin® plus

Operating manual

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1 Operating instructions

1.1 Using this manual

- ▶ Read this operating manual completely before using the device for the first time. Also observe the instructions for use of the accessories.
- ▶ This operating manual is part of the product. Thus, it must always be easily accessible.
- ▶ Enclose this operating manual when transferring the device to third parties.
- ▶ You will find the current version of the operating manual for all available languages on our webpage under www.eppendorf.com.

1.2 Danger symbols and danger levels

The safety instructions in this manual appear with the following danger symbols and danger levels:

1.2.1 Danger symbols

	Biohazard		Explosive substances
	Electric shock		Risk of crushing
	Hazard point		Material damage

1.2.2 Danger levels

DANGER	<i>Will</i> lead to severe injuries or death.
WARNING	<i>May</i> lead to severe injuries or death.
CAUTION	May lead to light to moderate injuries.
NOTICE	May lead to material damage.

Operating instructions

MiniSpin®/MiniSpin® plus

English (EN)

1.3 Symbols used

Depiction	Meaning
1.	Actions in the specified order
2.	
▶	Actions without a specified order
•	List
<i>Text</i>	Display text or software text
	Additional information

1.4 Abbreviations used**rcf**Relative centrifugal force – relative centrifugal force: g -force in m/s^2 **rpm**

Revolutions per minute – revolutions per minute

2 Safety

2.1 Intended use

The MiniSpin/MiniSpin plus is used for the separation of aqueous solutions and suspensions of different densities in approved sample tubes.

The MiniSpin/MiniSpin plus is exclusively intended for use indoors. All country-specific safety requirements for operating electrical equipment in the laboratory must be observed.

2.2 User profile

The device and accessories may only be operated by trained and skilled personnel.

Before using the device, read the operating manual carefully and familiarize yourself with the device's mode of operation.

2.3 Information on product liability

In the following cases, the designated protection of the device may be compromised. Liability for any resulting property damage or personal injury is then transferred to the operator:

- The device is not used in accordance with the operating manual.
- The device is used outside of its intended use.
- The device is used with accessories or consumables which are not recommended by Eppendorf.
- The device is maintained or repaired by people not authorized by Eppendorf.
- The user makes unauthorized changes to the device.

2.4 Application limits

2.4.1 Declaration concerning the ATEX directive (94/9/EC)



DANGER! Risk of explosion.

- ▶ Do not operate the device in areas where work is completed with explosive substances.
 - ▶ Do not use this device to process any explosive or highly reactive substances.
 - ▶ Do not use this device for processing any substances which could generate an explosive atmosphere.
-

Due to its design and the environmental conditions inside the device, the MiniSpin/MiniSpin plus is not suitable for use in a potentially explosive atmosphere.

The device may only be used in a safe environment, such as in the open environment of a ventilated laboratory or an extractor hood. The use of substances that may contribute to a potentially explosive atmosphere is not permitted. The final decision on risks associated with the use of such substances lies with the user.

2.5 Warnings for intended use

2.5.1 Personal injury or damage to the equipment



WARNING! Electric shock due to damage to device or mains cable.

- ▶ Only switch on the device if the device and mains cable are undamaged.
- ▶ Only use devices that have been properly installed or repaired.
- ▶ In case of danger, disconnect the device from the mains supply by pulling the power plug from the device or the mains socket or, by using the isolating device intended for this purpose (e.g., emergency stop switch in the laboratory).



WARNING! Lethal voltages inside the device.

Touching parts which are under high voltage may cause an electric shock. An electric shock injures the heart and causes respiratory paralysis.

- ▶ Ensure that the housing is closed and undamaged.
 - ▶ Do not remove the housing.
 - ▶ Ensure that no liquid can penetrate into the device.
- Only authorized service staff may open the device.



WARNING! Risk from incorrect supply voltage

- ▶ Only connect the device to voltage sources which correspond to the electrical requirements on the name plate.
- ▶ Only use sockets with a protective earth (PE) conductor and suitable power cable.



WARNING! Damage to health due to infectious liquids and pathogenic germs.

- ▶ When handling infectious liquids and pathogenic germs, observe the national regulations, the biological security level of your laboratory, the material safety data sheets, and the manufacturer's application notes.
- ▶ Wear personal protective equipment.
- ▶ For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, in its respectively current valid version).



WARNING! Risk of injury when opening or closing the centrifuge lid.

There is a risk of crushing your fingers when opening or closing the centrifuge lid.

- ▶ When opening or closing the centrifuge lid, do not reach between the lid and device or into the latching mechanism of the lid.
- ▶ Always open the centrifuge lid completely to prevent it from falling.



WARNING! Risk of injury from chemically or mechanically damaged accessories.

Even minor scratches and cracks can lead to serious internal material damage.

- ▶ Protect all accessory parts from mechanical damage.
- ▶ Inspect the accessories for damage before each use. Replace any damaged accessories.
- ▶ Do not use any accessories whose maximum service life has been exceeded.



CAUTION! Risk of burns to the fingers.

The base of the centrifuge becomes very hot during the run.

- ▶ Check the temperature at the bottom of the centrifuge before lifting the centrifuge.
- ▶ Only hold the centrifuge at the sides.



CAUTION! Poor safety due to incorrect accessories and spare parts.

The use of accessories and spare parts other than those recommended by Eppendorf may impair the safety, functioning and precision of the device. Eppendorf cannot be held liable or accept any liability for damage resulting from the use of incorrect or non-recommended accessories and spare parts, or from the improper use of such equipment.

- ▶ Only use accessories and original spare parts recommended by Eppendorf.



NOTICE! Damage to device due to spilled liquids.

1. Switch off the device.
2. Disconnect the device from the power supply.
3. Carefully clean the device and the accessories in accordance with the cleaning and disinfection instructions in the operating manual.
4. If a different cleaning and disinfecting method is to be used, contact Eppendorf AG to ensure that the intended method will not damage the device.

**NOTICE! Damage to electronic components due to condensation.**

Condensate can form in the device after it has been moved from a cool environment to a warmer environment.

- ▶ After installing the device, wait at least for 3 h. Only then connect the device to the mains.

2.5.2 Incorrect handling of the centrifuge

**NOTICE! Damage from knocking against or moving the device during operation.**

If the rotor bangs against the rotor chamber wall, it will cause considerable damage to the device and rotor.

- ▶ Do not move or knock against the device during operation.

2.5.3 Incorrect handling of the rotors

**WARNING! Risk of injury from improperly attached rotors and rotor lids.**

- ▶ Only centrifuge with rotor and rotor lid firmly tightened.
- ▶ If there are any unusual noises when the centrifuge is started up, the rotor or rotor lid may not be properly attached. Immediately press the **start/stop** key to stop centrifuging.

**CAUTION! Risk of injury due to asymmetric loading of a rotor.**

- ▶ Load rotors symmetrically with identical tubes.
- ▶ Only load adapters with suitable tubes.
- ▶ Always use the same type of tubes (weight, material/density and volume).
- ▶ Check symmetric loading by balancing the adapters and tubes used with scales.

**CAUTION! Risk of injury from overloaded rotor.**

The centrifuge is designed for the centrifugation of material with a maximum density of 1.2 g/mL at maximum speed and filling volume and/or load.

- ▶ Do not exceed the maximum load of the rotor.



NOTICE! Damage to rotors from aggressive chemicals.

Rotors are high-quality components which withstand extreme stresses. This stability can be impaired by aggressive chemicals.

- ▶ Avoid using aggressive chemicals, including strong and weak alkalis, strong acids, solutions with mercury, copper and other heavy metal ions, halogenated hydrocarbons, concentrated saline solutions and phenol.
- ▶ Due to the manufacturing process, color variations may occur on rotors marked "coated". These color variations do not effect service life or resistance to chemicals.

2.5.4 Extreme strain on the centrifuging tubes



CAUTION! Risk of injury from overloaded tubes.

- ▶ Note the loading limits specified by the tube manufacturer.
- ▶ Only use tubes which are approved by the manufacturer for the required *g*-force (rcf).



NOTICE! Risk from damaged tubes.

Damaged tubes must not be used, as this could cause further damage to the device and the accessories and loss of the samples.

- ▶ Before use, visually check all of the tubes for damage.



NOTICE! Risk from open tube lids.

Open tube lids can brake off during centrifugation and damage the rotor and the centrifuge.

- ▶ Carefully seal all tube lids before centrifuging.



NOTICE! Hazard to plastic tubes from organic solvents.

The density of plastic tubes is reduced when organic solvents (e.g., phenol, chloroform) are used, i.e. the tubes could become damaged.

- ▶ Observe the manufacturer's specifications for chemical resistance of the tubes.



NOTICE! Micro test tubes heat up.

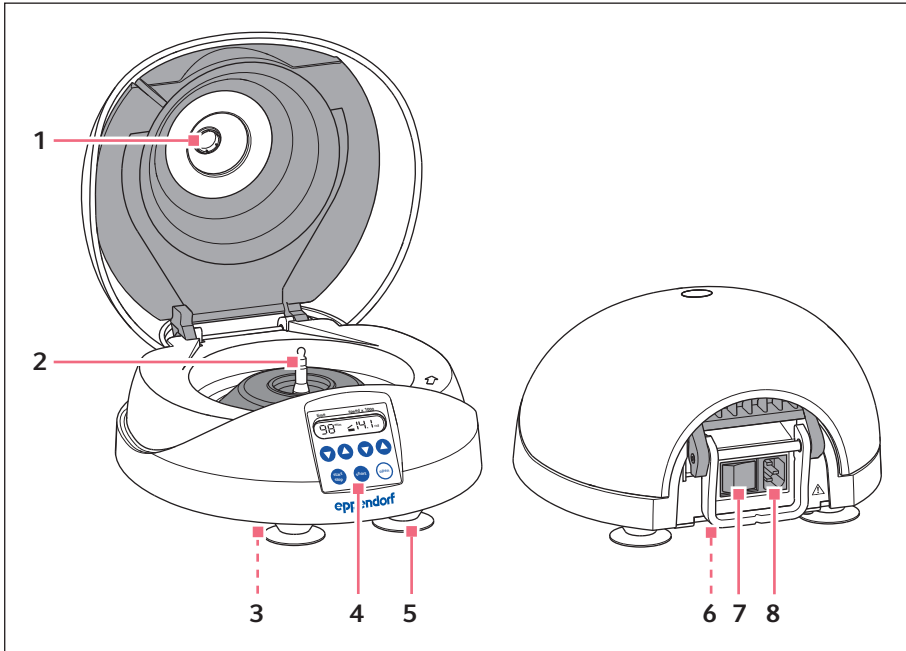
In uncooled centrifuges, the temperature in the rotor chamber, rotor and sample can increase to above 40 °C, depending on the run time, *g*-force (rcf)/speed and ambient temperature.

- ▶ Please note that this will reduce the resistance to centrifugation of the micro test tubes.
- ▶ Please note the temperature resistance of the samples.

2.6 Safety instructions on the device

Symbol	Meaning	Location
	Hazard point ▶ Observe the operating manual.	Rear of the device

3 Product description
3.1 Product overview



- | | |
|---|--|
| 1 Monitoring glass | 5 Suction foot |
| 2 Motor Shaft | 6 Name plate (bottom of the device) |
| 3 Emergency release
(bottom of the device) | 7 Mains/power switch |
| 4 Control panel | 8 Mains/power cord socket |

3.2 Delivery package

1 or	Centrifuge MiniSpin Centrifuge MiniSpin plus
1	Rotor F-45-12-11 incl. rotor lid
1	Rotor nut
1	Mains/power cord
1	Operating manual



- ▶ Check the delivery for completeness.
- ▶ Check all parts for damage in transit.
- ▶ To safely transport and store the device, keep the transport box and packing material.

3.3 Features

The high-power and user-friendly microcentrifuges MiniSpin and the MiniSpin plus are so small that each workstation can be equipped with a "personal" centrifuge. For the MiniSpin and the MiniSpin plus, 2 rotors are available:

Fixed-angle rotor F-45-12-11

Capacity: 12 tubes

- Micro test tubes 0.2 mL to 2.0 mL
- Microtainers

Fixed-angle rotor F-55-16-5-PCR

Capacity: 16 PCR tubes

- 0.2 mL PCR tubes
- PCR strips

4 Installation

4.1 Selecting the location



NOTICE! If an error occurs, the objects in the immediate proximity of the device will be damaged.

- ▶ In accordance with the recommendations of EN 61010-2-020, leave a safety clearance of **30 cm** around the device during operation.
- ▶ Please remove all materials and objects from this area.



NOTICE! Damage from overheating.

- ▶ Do not install the device near to any heat sources (e.g., heating, drying cabinet).
 - ▶ Do not expose the device to direct sunlight.
 - ▶ Ensure unobstructed air circulation. Keep free a clearance of at least 30 cm (11.8 in) around all ventilation grilles.
-

Select the device location according to the following criteria:

- Mains connection as specified on name plate
- Resonance free table with horizontal even work surface
- Surrounding area must be well ventilated.
- The location must be protected against direct sunlight.

4.2 Installing the instrument

Prerequisites

- The centrifuge is standing on a suitable lab bench with a smooth surface.
- The suction feet are fixed to the surface.



WARNING! Risk from incorrect supply voltage

- ▶ Only connect the device to voltage sources which correspond to the electrical requirements on the name plate.
- ▶ Only use sockets with a protective earth (PE) conductor and suitable power cable.



NOTICE! Damage to electronic components due to condensation.

Condensate can form in the device after it has been moved from a cool environment to a warmer environment.

- ▶ After installing the device, wait at least for 3 h. Only then connect the device to the mains.

-
1. Let the centrifuge warm up to ambient temperature.
 2. Connect the centrifuge to the mains and switch it on using the mains/power switch.
 - The display is active.
 - The centrifuge lid opens.

5 Operation

5.1 Operating controls

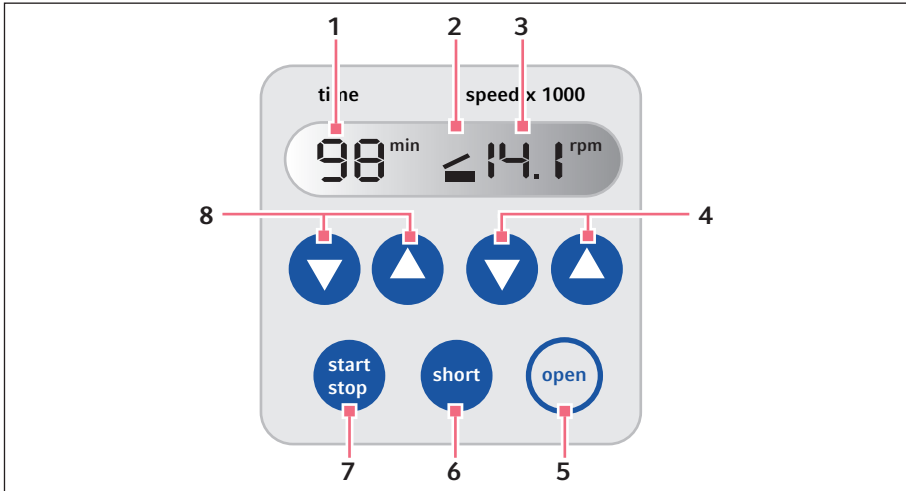


Fig. 5-1: Operating controls MiniSpin/MiniSpin plus

- | | |
|---|---|
| <p>1 Centrifugation time</p> <p>2 Centrifuge status
 ■ The centrifuge lid is open.
 The bar flashes alternately at the top and bottom: centrifugation in progress.</p> <p>3 Centrifugation speed
 MiniSpin: speed (rpm)
 MiniSpin plus: speed (rpm) or <i>g</i>-force (rcf)</p> <p>4 Arrow keys speed
 Set centrifugation speed.
 Keep the arrow key pressed: quick setting
 Change rpm/rcf display (MiniSpin plus):
 Press both speed arrow keys.</p> | <p>5 open key
 Open the centrifuge lid.</p> <p>6 short key
 Short run centrifugation</p> <p>7 start/stop key
 Start and stop centrifugation.</p> <p>8 time arrow keys
 Adjust centrifugation time.
 Keep the arrow key pressed: quick setting</p> |
|---|---|

5.2 Switching on the centrifuge

- ▶ Switch the centrifuge on using the mains/power switch at the rear of the device.
 - The lid opens.
 - The display shows the parameters of the last run.

5.3 Inserting and loading the rotor



WARNING! Risk of injury from chemically or mechanically damaged accessories.

Even minor scratches and cracks can lead to serious internal material damage.

- ▶ Protect all accessory parts from mechanical damage.
 - ▶ Inspect the accessories for damage before each use. Replace any damaged accessories.
 - ▶ Do not use any accessories whose maximum service life has been exceeded.
-

5.3.1 Inserting the rotor

1. Fit the rotor on the motor shaft.
2. Fit the rotor nut on the motor shaft.
3. Rotate the rotor nut **clockwise** and tighten it.

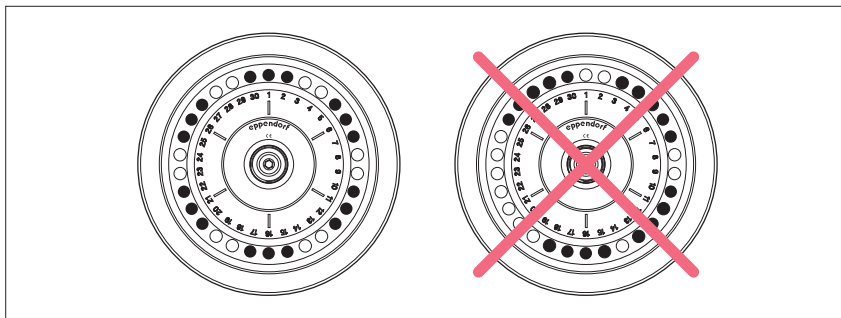
5.3.2 Loading the rotor



CAUTION! Risk of injury due to asymmetric loading of a rotor.

- ▶ Load rotors symmetrically with identical tubes.
 - ▶ Only load adapters with suitable tubes.
 - ▶ Always use the same type of tubes (weight, material/density and volume).
 - ▶ Check symmetric loading by balancing the adapters and tubes used with scales.
-

1. Check maximum load (adapter, vessel, and contents) for each rotor bore.
2. Load rotors and adapters only with the tubes intended for them.
3. To ensure symmetrical loading, insert sets of two tubes in opposite bores.
Tubes located opposite each other must be of the same type and contain the same filling quantity.



5.3.3 Positioning the rotor lid

- ▶ Position the rotor lid on the rotor.
The rotor lid audibly engages.

5.3.4 Removing the rotor

1. Pull up the knob of the rotor lid and remove the rotor lid.
2. Turn the rotor nut **counterclockwise** and remove it.
3. Remove the rotor.

5.4 Centrifuging



WARNING! Risk of injury from improperly attached rotors and rotor lids.

- ▶ Only centrifuge with rotor and rotor lid firmly tightened.
- ▶ If there are any unusual noises when the centrifuge is started up, the rotor or rotor lid may not be properly attached. Immediately press the **start/stop** key to stop centrifuging.

5.4.1 Closing the centrifuge lid



WARNING! Risk of crushing due to the device lid.

- ▶ When closing the device lid, do not place your finger between the lid and the device, or in the lid locking mechanism.

1. Check the correct attachment of the rotor and rotor lid.
2. Press the centrifuge lid down until it is gripped by the lid latch.

5.4.2 Starting centrifugation

Setting the centrifugation parameters

1. Set the centrifugation time with the **time** arrow keys.
2. Set the centrifugation speed with the **speed** arrow keys.

Starting the centrifugation run

3. To start the centrifugation run, press the **start/stop** key.

Display during centrifugation

- The bar in the center of the display flashes alternately at the top and bottom.
- Remaining cycle time in minutes. The last minute is counted down in seconds.
- Current speed (rpm) or *g*-force (rcf) (MiniSpin plus).



During the run, you can change the centrifugation time and the centrifugation speed. The new parameters are adopted immediately.

5.4.3 Short spin centrifugation

- **MiniSpin:** Short run centrifugation at maximum speed (13400 rpm)
 - **MiniSpin plus:** The speed of the short run centrifugation can be set.
1. Start short run centrifugation: Keep the **short** key pressed.
 - The bar in the center of the display flashes alternately at the top and bottom.
 - The cycle time is counted up.
 2. Stop short run centrifugation: Release the **short** key.
 - During the braking process, the elapsed running time flashes on the display.
 - The centrifuge lid opens automatically.

5.4.3.1 MiniSpin plus: Setting the speed of the short spin centrifugation

Prerequisites

The centrifuge lid is open.

- ▶ Keep the **short** key pressed until the display changes.
 - *14t*: Short run centrifugation at maximum speed (14500 rpm)
 - *1 – 14t*: Short run centrifugation at set speed (rpm) or *g*-force (rcf)
- ▶ For *1 – 14t*, set the speed (rpm) or *g*-force (rcf) with the **speed** arrow key.

5.4.4 MiniSpin plus: Switching the display between speed and *g*-force

- ▶ Press both **speed** ▼ and ▲ arrow keys simultaneously.
 The display changes from *rpm* (speed) to *rcf* (*g*-force) and vice versa.

 It is possible to switch the display between speed and *g*-force during a centrifugation run.

For the MiniSpin, you can use the following formula to calculate the *g*-force for the displayed speed according to DIN 58 970:

$$rcf = 1.118 \cdot 10^{-5} \cdot n^2 \cdot r_{\max}$$

n: speed in rpm

*r*_{max}: maximum centrifugation radius in cm

Example: The maximum centrifugation radius of the rotor F-45-12-11 is 6 cm. At a speed of 10200 rpm, a maximum *g*-force of 7000 × *g* is reached.

5.4.5 MiniSpin plus: Centrifuging in continuous operation

Setting up continuous operation

1. In order to centrifuge without any time limits, use the **time** arrow keys to select the setting *oo* (▼ below 15 s or ▲ above 99 min).
2. Set the speed (rpm) or the *g*-force (rcf) with the **speed** arrow keys.
3. To start the centrifugation run, press the **start/stop** key.
 - The bar in the center of the display flashes alternately at the top and bottom.
 - The cycle time is counted up.
 - Current speed (rpm) or *g*-force (rcf).
4. Press the **start/stop** key to end the centrifugation.
 - During the braking process, the elapsed running time flashes on the display.

6

Maintenance

6.1

Prepare cleaning/disinfection

- ▶ Clean all accessible surfaces of the device and the accessories at least weekly and when contaminated.
- ▶ Clean the rotor regularly. This way the rotor is protected and the durability is prolonged.
- ▶ Furthermore, observe the notes on decontamination (see *Decontamination before shipment on p. 25*) when the device is sent to the authorized Technical Service for repairs.

The procedure described in the following chapter applies to the cleaning as well as to the disinfection or decontamination. The table below describes the steps required on top of this:

Cleaning	Disinfecting/decontamination
1. Use a mild cleaning fluid to clean the accessible surfaces of the device and the accessories. 2. Carry out the cleaning as described in the following chapter.	1. Choose the disinfection method which corresponds to the legal regulations and guidelines in place for your range of application. For example, use alcohol (ethanol, isopropanol) or alcohol-based disinfectants. 2. Carry out the disinfection or decontamination as described in the following chapter. 3. Then clean the device and the accessories.

 If you have any further questions regarding the cleaning and disinfection or decontamination or regarding the cleaning fluid to be used, contact the Eppendorf AG Application Support. The contact details are provided on the back of this manual.

6.2 Cleaning/disinfection



DANGER! Electric shock as a result of penetration of liquid.

- ▶ Switch off the device and disconnect the power plug before starting cleaning or disinfection work.
 - ▶ Do not allow any liquids to penetrate the inside of the housing.
 - ▶ Do not spray clean/spray disinfect the housing.
 - ▶ Only plug the device back in if it is completely dry, both inside and outside.
-



NOTICE! Damage from the use of aggressive chemicals.

- ▶ Do not use any aggressive chemicals on the device or its accessories, such as strong and weak bases, strong acids, acetone, formaldehyde, halogenated hydrocarbons or phenol.
 - ▶ If the device has been contaminated by aggressive chemicals, immediately clean it by means of a mild cleaning agent.
-



NOTICE! Corrosion from aggressive cleaning agents and disinfectants.

- ▶ Do not use corrosive cleaning agents, aggressive solvents or abrasive polishes.
 - ▶ Do not incubate the accessories in aggressive cleaning agents or disinfectants for a longer period of time.
-



NOTICE! Damage from UV and other high-energy radiation.

- ▶ Do not use UV, beta, gamma, or any other high-energy radiation for disinfecting.
 - ▶ Avoid storage in areas with strong UV radiation
-



Autoclaving

All rotors, rotor lids and adapters can be autoclaved (121 °C, 20 min).

6.2.1 Cleaning and disinfecting the device



If you have any additional questions on disinfection, decontamination, cleaning and the cleaning agents to be used, please contact Eppendorf AG Application Support. The contact details are provided on the back of this manual.

1. Open the lid. Switch off the device with the mains/power switch. Disconnect the power plug from the power supply.
2. Loosen the rotor nut. To this purpose, loosen the rotor nut by turning it counterclockwise.
3. Remove the rotor.
4. Clean and disinfect all accessible surfaces of the device, including the power cable, using a damp cloth and the recommended cleaning agents.
5. Clean the motor shaft with a soft, dry and lint-free cloth. Do not lubricate the motor shaft.
6. Check the motor shaft for damage.
7. Inspect the device for corrosion and damage.
8. Leave the centrifuge lid open when the device is not being used.
9. Only connect the device to the power supply if it is fully dry inside and out.

6.2.2 Cleaning and disinfecting the rotor

1. Inspect the rotor and accessories for damage and corrosion. Do not use any damaged rotors or accessories.
2. Clean and disinfect the rotors and accessories with the recommended cleaning agents.
3. Use a bottle brush to clean and disinfect the rotor bores.
4. Rinse the rotors and accessories thoroughly with distilled water. Rinse the rotor bores of fixed-angle rotors particularly thoroughly.



Do not immerse the rotor in liquid as liquid can get trapped inside the cavities.

5. Place rotors and accessories on a cloth to dry. Place fixed-angle rotors with the rotor bores facing downwards to allow the bores to also dry.
6. Clean the rotor cone with a soft, dry and lint-free cloth. Do not lubricate the rotor cone.
7. Inspect the rotor cone for damage.
8. Place the dry rotor onto the motor shaft.
9. Tighten the rotor nut firmly by turning it clockwise.
10. Leave the rotor lid open when the rotor is not being used.

6.3 Decontamination before shipment

If you are shipping the device to the authorized Technical Service for repairs or to your authorized dealer for disposal please note the following:



WARNING! Risk to health from contaminated device

1. Follow the instructions in the decontamination certificate. You find it as a PDF file on our website (www.eppendorf.com/decontamination).
 2. Decontaminate all the parts you would like to dispatch.
 3. Include the fully completed decontamination certificate in the packing.
-

7 Troubleshooting

If you cannot remedy an error with the recommended measures, please contact your local Eppendorf partner. The contact addresses can be found on the Internet at www.eppendorf.com.

7.1 General errors

Problem	Cause	Solution
No display.	No mains connection.	▶ Check the mains connection. ▶ Check the mains fuse of the laboratory.
	Power failure.	▶ Check the mains connection. ▶ Check the mains fuse of the laboratory.
The centrifuge lid cannot be opened.	Rotor is still running.	▶ Wait for the rotor to stop.
	Error message with locking time. Locking period still running.	▶ Wait for the locking time to elapse.
The centrifuge cannot be started.	Centrifuge lid is not closed.	▶ Close the centrifuge lid.
Centrifuge shakes when it starts up.	Rotor loaded unsymmetrically.	1. Stop the centrifuge and load the rotor symmetrically. 2. Re-start the centrifuge.

7.2 Error messages

Key lock after error message

- If an error message occurs, the keys remain locked as long as the rotor is moving.
- For some errors, the remaining blocking time and the error message are alternately shown on the display. The blocking time also remains active if the centrifuge is disconnected from the mains/power line.

If an error message appears, proceed as follows:

- ▶ Remedy the fault as described in the "Remedy" column.
- ▶ Wait for the blocking time to elapse or the rotor to stop.
- ▶ To clear the error message from the display, press the **open** key.

Problem	Cause	Solution
Er 3.1 Er 3.2 Er 3.3 Er 3.4 Er 3.5	Error in speed measuring system.	▶ Tighten rotor. ▶ Wait for the blocking time to elapse. ▶ Press the open key.
Er 6.1 Er 6.2 Er 6.3 Er 6.4	• Error in the drive electronics. • The drive is overheated.	▶ Repeat the run. If the error message appears again: 1. Switch off centrifuge and wait for 20 s. 2. Switch on the centrifuge. If the error message appears again: ▶ Let the drive cool down for at least 15 min.
Er 10.0 Er 10.1 Er 10.2	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on the centrifuge.
Er 15.1 Er 15.2 Er 16.2 Er 16.3 Er 16.4	Electronics fault.	1. Switch off centrifuge and wait for 20 s. 2. Switch on the centrifuge.
Int	Mains/power failure during a run.	▶ Check the power supply. ▶ Press the open key.
Lid	Centrifuge lid will not lock.	▶ Press the open key. ▶ Try again to close centrifuge lid.
	Centrifuge lid cannot be released.	▶ Switch off centrifuge and wait for 20 s. ▶ Switch on the centrifuge. ▶ Press the open key. If the error occurs again: 1. Switch off centrifuge. 2. Activate the emergency lid release.
	Emergency release was actuated during a run.	▶ Wait for the rotor to stop. ▶ Press the open key.

7.3 Emergency release

If the centrifuge lid cannot be opened during a power failure, you can activate the emergency release manually.

**WARNING! Risk of injury from rotating rotor.**

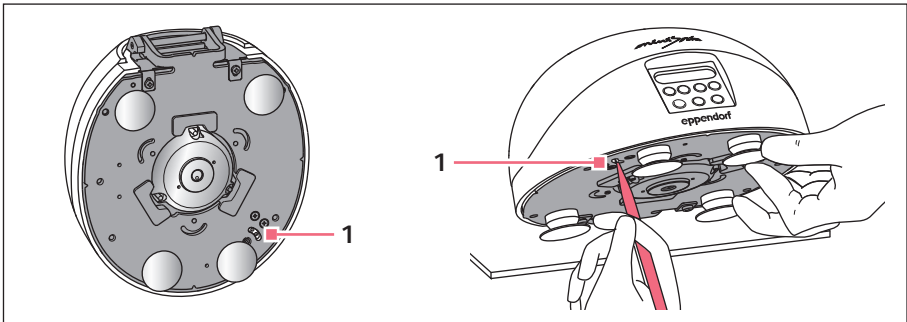
If the emergency release of the lid is operated, the rotor may continue rotating for several minutes.

- ▶ Wait until the rotor stop before operating the emergency release.
- ▶ Check the monitoring glass in the centrifuge lid.

**CAUTION! Risk of burns to the fingers.**

The base of the centrifuge becomes very hot during the run.

- ▶ Check the temperature at the bottom of the centrifuge before lifting the centrifuge.
- ▶ Only hold the centrifuge at the sides.



1. Pull out the mains/power plug and wait for the rotor to stop.
2. Lift up the centrifuge. Use a ball pen to move the disk behind the opening of the bottom panel clockwise until the centrifuge lid opens.

8 Transport, storage and disposal

8.1 Transport

- ▶ Remove the rotor from the centrifuge before transport.
- ▶ Use the original packing for transport.

	Air temperature	Relative humidity	Atmospheric pressure
General transport	-25 °C – 60 °C	10 % – 75 %	30 kPa – 106 kPa
Air freight	-20 °C – 55 °C	10 % – 75 %	30 kPa – 106 kPa

8.2 Storage

	Air temperature	Relative humidity	Atmospheric pressure
In transport packing	-25 °C – 55 °C	10 % – 75 %	70 kPa – 106 kPa
Without transport packing	-5 °C – 45 °C	10 % – 75 %	70 kPa – 106 kPa

8.3 Disposal

In case the product is to be disposed of, the relevant legal regulations are to be observed.

Information on the disposal of electrical and electronic devices in the European Community:

Within the European Community, the disposal of electrical devices is regulated by national regulations based on EU Directive 2012/19/EU pertaining to waste electrical and electronic equipment (WEEE).

According to these regulations, any devices supplied after August 13, 2005, in the business-to-business sphere, to which this product is assigned, may no longer be disposed of in municipal or domestic waste. To document this, they have been marked with the following identification:



Because disposal regulations may differ from one country to another within the EU, please contact your supplier if necessary.

9 Technical data

9.1 Power supply

	MiniSpin	MiniSpin plus
Mains/power connection	230 V, 50 Hz – 60 Hz 120 V, 50 Hz – 60 Hz 100 V, 50 Hz – 60 Hz	230 V, 50 Hz – 60 Hz 120 V, 50 Hz – 60 Hz 100 V, 50 Hz – 60 Hz
Power consumption	60 W	68 W
Current consumption	0.45 A (230 V) 0.9 A (120 V) 0.9 A (100 V)	0.6 A (230 V) 1.2 A (120 V) 1.2 A (100 V)
Overvoltage category	II	
EMC: Interference emission. (radio interference)	EN 61326-1 – Class B (230 V) EN 61326-1 – Class A (120 V), FCC15 – Class B (120 V) EN 61326-1 – Class A (100 V), FCC15 – Class B (100 V)	
EMC: Noise immunity	EN 61326 - category B	
Fuses	1.6 AT (230 V) 3.15 AT (120 V) 3.15 AT (100 V)	
Degree of pollution	2	

9.2 Weight/dimensions

	MiniSpin	MiniSpin plus
Dimensions	Width: 22.5 cm (8.86 in) Depth: 24.0 cm (9.45 in) Height: 12.0 cm (4.72 in)	
Weight without rotor	3.7 kg (8.16 lb)	

9.3 Noise level

The noise level was measured according to (DIN EN ISO 3745) frontally in a sound measuring room with accuracy class 1 at a distance of 1 m from the device and at lab bench height.

	MiniSpin	MiniSpin plus
Noise level	< 49 dB(A)	< 52 dB(A)

9.4 Ambient conditions

Ambience	Only for use indoors.
Ambient temperature	10 °C – 40 °C
Relative humidity	10 % – 75 %, non-condensing.
Atmospheric pressure	79.5 kPa – 106 kPa

9.5 Application parameters

	MiniSpin	MiniSpin plus
Cycle time	15 s – 30 min	• 15 s – 99 min • unlimited (∞)
	• 15 s – 1 min: can be set in increments of 15 s • from 1 min: can be set in increments of 1 min	
Rotational speed	800 rpm – 13400 rpm	800 rpm – 14500 rpm
	can be set in increments of 100 rpm Tolerance at maximum rotational speed: 3 %	
Relative centrifugal force	$100 \times g$ – $12\,100 \times g$	$100 \times g$ – $14\,100 \times g$ can be set in increments of $100 \times g$
Maximum load	12 × 2.0 mL	
Maximum kinetic energy	728 Nm	852 Nm
Permitted density of the material for centrifuging (at maximum <i>g</i> -force (rcf) and/or speed (rpm) and maximum load)	1.2 g/mL	
Tolerance at maximum rotational speed	13 s	
Deceleration time from maximum rotational speed	12 s	

9.6 Rotors

- i** Eppendorf centrifuges may only be operated with rotors that are intended for use with the centrifuge.
- Only use rotors that are intended for use with the centrifuge.

9.6.1 Rotor F-45-12-11

Fixed-angle rotor for 12 tubes

	Maximum <i>g</i> -force:	MiniSpin MiniSpin plus	12 100 × <i>g</i> 14 100 × <i>g</i>
	Maximum speed:	MiniSpin MiniSpin plus	13 400 rpm 14 500 rpm
	Maximum load (tubes and contents):		12 × 4 g
Rotor F-45-12-11			

Tube	Tube	Adapter	Bottom shape	Maximum <i>g</i> -force:	
	Capacity	Order no.	Tube	Maximum speed:	
	Tubes per	(international)	diameter	Radius	
	adapter/rotor				
	PCR tube	 5425 715.005	conical	MiniSpin	7 830 × <i>g</i>
	0.2 mL		Ø 11 mm	MiniSpin plus	9 170 × <i>g</i>
	1/12			MiniSpin MiniSpin plus	13 400 rpm 14 500 rpm 3.9 cm
	Tube	 5425 717.008	conical	MiniSpin	12 100 × <i>g</i>
	0.4 mL		Ø 6 mm	MiniSpin plus	14 100 × <i>g</i>
	1/12			MiniSpin MiniSpin plus	13 400 rpm 14 500 rpm 6.0 cm
	Tube	 5425 716.001	conical	MiniSpin	9 840 × <i>g</i>
	0.5 mL		Ø 6 mm	MiniSpin plus	11 520 × <i>g</i>
	1/12			MiniSpin MiniSpin plus	13 400 rpm 14 500 rpm 4.9 cm

Tube	Tube Capacity Tubes per adapter/rotor	Adapter Order no. (international)	Bottom shape Tube diameter	Maximum <i>g</i> -force: Maximum speed: Radius	
	Microtainers	 5425 716.001	open	MiniSpin	12 100 × <i>g</i>
	0.6 mL		Ø 8 mm	MiniSpin plus	14 100 × <i>g</i>
	1/12			MiniSpin MiniSpin plus	13400 rpm 14500 rpm 6.0 cm
	Tube		Ø 11 mm	MiniSpin	12 100 × <i>g</i>
	1.5 ml/2.0 mL			MiniSpin plus	14 100 × <i>g</i>
	–/12			MiniSpin MiniSpin plus	13400 rpm 14500 rpm 6.0 cm

9.6.2 Rotor F-55-16-5-PCR

Fixed-angle rotor for 16 PCR tubes

	Maximum <i>g</i> -force:	MiniSpin MiniSpin plus	9840 × <i>g</i> 11520 × <i>g</i>
	Maximum speed:	MiniSpin MiniSpin plus	13400 rpm 14500 rpm
	Maximum load (tubes and contents):		16 × 0.43 g (2 × 3.5 g)

Tubes	Tube Capacity Tubes per adapter/rotor	Bottom shape Tube diameter	Maximum <i>g</i> -force: Maximum speed: Centrifugation radius	
	0.2 mL	conical Ø 6 mm	MiniSpin MiniSpin plus	9840 × <i>g</i> 11520 × <i>g</i>
	–/16		MiniSpin MiniSpin plus	13400 rpm 14500 rpm 4.9 cm
	PCR strips	conical	MiniSpin MiniSpin plus	9840 × <i>g</i> 11520 × <i>g</i>
	0.2 mL	Ø 6 mm	MiniSpin MiniSpin plus	13400 rpm 14500 rpm 4.9 cm
	–/2 × 8			

10 Ordering information

10.1 Centrifuge

Order no. (International)	Order no. (North America)	Description
5452 000.018 5452 000.131 5452 000.034	022620151 022620100 –	Centrifuge MiniSpin incl. rotor F-45-12-11 230 V/50 – 60 Hz 120 V/50 – 60 Hz, with US plug 100 V/50 – 60 Hz
5453 000.011 5453 000.135 5453 000.038	022620258 022620207 –	Centrifuge MiniSpin plus incl. rotor F-45-12-11 230 V/50 – 60 Hz 120 V/50 – 60 Hz, with US plug 100 V/50 – 60 Hz

10.2 Accessories

Order no. (International)	Order no. (North America)	Description
5452 725.000 5452 720.008	022668501 022668498	Rotor F-45-12-11 angle 45°, 12 places, max. tube diameter 11 mm, incl. rotor lid and rotor nut MiniSpin MiniSpin/MiniSpin plus
5452 702.000	022668510	Rotor lid for rotor F-45-12-11 stainless steel, with rotor nut
5452 727.007	022665821	Rotor F-55-16-5-PCR angle 55°, 16 places, max. tube diameter 5 mm, incl. rotor lid (aluminum) MiniSpin/MiniSpin plus
5452 730.008	022665847	Rotor lid for rotor F-55-16-5-PCR aluminum, with rotor nut
5452 729.000	022668455	Rotor nut for MiniSpin, MiniSpin plus

Order no. (International)	Order no. (North America)	Description
5425 716.001 5425 715.005	022636227 022636260	Adapter used in FA-45-48-11, F-45-48-11, FA-45-30-11, F-45-30-11, F-45-48-11, F-45-70-11, FA-45-24-11, FA-45-24-11-Special, FA-45-24-11-HS and FA-45-24-11-Kit for 1 sample tube (0.5 mL, max. Ø 6 mm) or 1 Microtainer (0.6 mL, max. Ø 8 mm), set of 6 for 1 PCR tube (0.2 mL, max. Ø 6 mm), set of 6
5425 717.008	022636243	Adapter used in FA-45-48-11, F-45-48-11, F-45-12-11, FA-45-18-11, FA-45-30-11, F-45-30-11, F-45-48-11, F-45-70-11, FA-45-24-11-HS, FA-45-24-11-Kit and S-24-11-AT for 1 sample tube (0.4 mL, max. Ø 6 mm), set of 6
0013 563.934 0013 594.490 0013 613.952 0013 592.454 0013 613.973	– – – – –	Mains/power cord 230 V/50 Hz, Europe 230 V/50 Hz, GB/HK 230 V/50 Hz, CN 230 V/50 Hz, AUS 230 V/50 Hz, ARG

EG-Konformitätserklärung EC Conformity Declaration

Das bezeichnete Produkt entspricht den einschlägigen grundlegenden Anforderungen der aufgeführten EG-Richtlinien und Normen. Bei einer nicht mit uns abgestimmten Änderung des Produktes oder einer nicht bestimmungsgemäßen Anwendung verliert diese Erklärung ihre Gültigkeit.

The product named below fulfills the relevant fundamental requirements of the EC directives and standards listed. In the case of unauthorized modifications to the product or an unintended use this declaration becomes invalid.

Produktbezeichnung, Product name:

Centrifuge MiniSpin[®], MiniSpin[®] plus, MiniSpin[®] plus SPACE

einschließlich Zubehör / including accessories

Produkttyp, Product type:

Laborzentrifuge / Laboratory Centrifuge

Einschlägige EG-Richtlinien/Normen, Relevant EC directives/standards:

2006/95/EG, EN 61010-1, EN 61010-2-20

2004/108/EG, EN 55011/B, EN 61000-6-1, EN 61000-3-2, EN 61000-3-3, EN 61326-1

98/79/EG, EN ISO 14971, EN 61010-2-101, EN 61326-2-6, EN 62366, EN ISO 18113-3

H.-G. Köhl

Vorstand, Board of Management:

15.01.2013

Hamburg, Date:

P. Ferre

Projektmanagement, Project Management:

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