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MixMate®

Operating manual

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Table of contents

1	Operating instructions	5
1.1	Using this manual	5
1.2	Danger symbols and danger levels	5
1.2.1	Danger symbols	5
1.2.2	Danger levels	5
1.3	Symbols used	5
1.4	Abbreviations used	6
1.5	Glossary	6
2	Safety	8
2.1	Intended use	8
2.2	User profile	8
2.3	Information on product liability	8
2.4	Warnings for intended use	8
3	Product description	12
3.1	Main illustration	12
3.2	Delivery package	13
3.3	Features	14
4	Installation	15
4.1	Preparing installation	15
4.2	Selecting the location	15
4.3	Installing the instrument	15
5	Operation	16
5.1	Overview of operating controls	16
5.2	Inserting plates and tubes	18
5.2.1	Insert plate in the plate holder	19
5.2.2	Insert the tube holder in the plate holder	19
5.2.3	Insert the plate in the PCR 96 tube holder	20
5.2.4	Insert tubes in the tube holders	20
5.3	Mixing	20
5.3.1	Mixing with preset parameters	21
5.3.2	Mixing with free preset parameters	22
5.4	Vortexing	22
5.4.1	Touch vortex mode with 3500 rpm	22
5.4.2	Using free parameters	23
5.5	Device menu	24
5.5.1	Menu structure	24
5.5.2	Navigating in the menu	24
5.5.3	Key lock (LOCK) activation/deactivation	25
5.5.4	Adjusting the signal tone-volume (VOL)	25

6	Troubleshooting	26
6.1	General errors	26
7	Maintenance	27
7.1	Cleaning	27
7.1.1	Cleaning the device and accessories	27
7.1.2	Performing a function test	28
7.2	Disinfection/decontamination	29
7.3	Decontamination before shipment	30
8	Transport, storage and disposal	31
8.1	Transport	31
8.2	Storage	31
8.3	Disposal	31
9	Technical data	32
9.1	Power supply	32
9.2	Ambient conditions	32
9.3	Weight/dimensions	32
9.4	Application parameters	32
10	Ordering information	33
10.1	MixMate	33
10.2	Tubes and plates	33
10.3	IsoTherm-System	34
	Index	35
	Certificates	37

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 of this operating manual indicate the following danger symbols and danger levels:


1.2.1 Danger symbols

	Explosion		Electric shock
	Hazard point		Material damage

1.2.2 Danger levels

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

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

ANSI

American National Standards Institute

DNA

Deoxyribonucleic acid

DWP

Deepwell plate

MTP

Microplate

PCR

Polymerase chain reaction

RNA

Ribonucleic acid

rpm

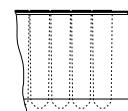
Revolutions per minute

SLAS

Society for Laboratory Automation and Screening

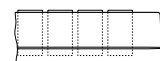
1.5 Glossary

Deepwell plate Plate with 48, 96 or 384 wells with a larger volume than microplates. Suitable for the preparation, mixing, centrifuging, transporting and storing of solid and liquid samples.



Incubate Includes: cultivation of cell and bacterial cultures under controlled ambient conditions.

Micro test plate Plates with 24, 48, 96 or 384 wells for the preparation, mixing, centrifuging, transporting and storing of solid and liquid samples.

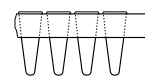


Mixing load All samples to be mixed and the tubes or plates in which the samples are located.

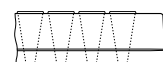
Pellet Compressed material. Is, for example, created via the centrifugation of a suspension.

Resuspending Dissolve the pellet by vortexing in a liquid. The material is distributed in the liquid. The result is a suspension.

Semi-skirted PCR plate PCR plate with surrounding half-edge.

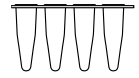


Skirted PCR plate PCR plate with a surrounding edge.



Unskirted PCR plate

PCR plate without a surrounding edge.

**Vortexing**

Strong whirling or blending by manually pressing a tube onto the vortex mat.

Well

Cavity. Microplate, PCR plate or Deepwell plate tube.

2 Safety

2.1 Intended use

The MixMate is intended exclusively for indoor use and is designed for mixing aqueous solutions and suspensions in closed tubes and closed plates.

All country-specific safety requirements for operating electrical equipment in the laboratory must be observed.

Only use Eppendorf accessories or accessories recommended by Eppendorf.

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 Warnings for intended use

Read the operating instructions and observe the following general safety information before using the MixMate.



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.



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 of device catching fire as a result of penetration of liquid.

Penetration of liquid can cause a fire due to a short-circuit in the device.

- ▶ Do not allow any liquids to penetrate the inside of the housing.
- ▶ Only mix in closed tubes and closed tubes and plates.
- ▶ If any liquids have penetrated into the device: switch off the device, pull the power plug, and have the device cleaned by service technicians who are authorized by Eppendorf.



WARNING! Injury from flying tubes and plates.

If the maximum permitted total weight of the mixing load is exceeded, plates or tubes may become detached from the device.

- ▶ Always ensure that tubes, plates and tube holders are well seated.
- ▶ Only use plates that conform to the Microplate Standards ANSI/SLAS 1-2004 through ANSI/SLAS 4-20041.
- ▶ Mix the DWP and the tube holders for 0.5 mL, 1.5/2.0 mL and PCR 96 with max. 2000 rpm.
- ▶ Only mix mixing loads with a total weight of up to 80 g at maximum speed.
- ▶ Only mix mixing loads with a total weight of 80 to 300g at speed of max. 2000 rpm.

**WARNING! Injury from sample material being thrown out.**

Sample material can be thrown out of open, improperly sealed or unstable tubes and plates.

- ▶ Only mix in closed tubes and closed plates.
- ▶ Observe the nationally prescribed safety environment when working with hazardous, toxic and pathogenic samples. Pay particular attention to personal protective equipment (gloves, clothing, goggles etc.), extraction, and the safety class of the lab.

**WARNING! Injury from improper vortex action.**

Improper vortex action can destroy tubes or cause their content to be lost.

- ▶ Only vortex intact and sealed tubes.
- ▶ Never vortex tubes made of glass or other fragile material.

**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 the display due to mechanical pressure.**

- ▶ Do not apply mechanical pressure to the display.

**NOTICE! Caution! Strong vibration.**

When mixing at high speeds, items located near the device may be moved by the vibrations of the work surface and, e.g., fall off the work table.

- ▶ Do not place easily movable items near the device or secure them adequately.

**NOTICE! Damage to electronic components from spilled liquids.**

- ▶ Make sure that the vortex mat and the cover caps are fitted properly. If the vortex mat is not fitted properly, contact your Eppendorf partner or the authorized Technical Service.
- ▶ If liquid has been spilt: Switch off the device, disconnect the power plug and arrange for it to be cleaned by service personnel authorized by Eppendorf.



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.



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.
-

3 Product description

3.1 Main illustration

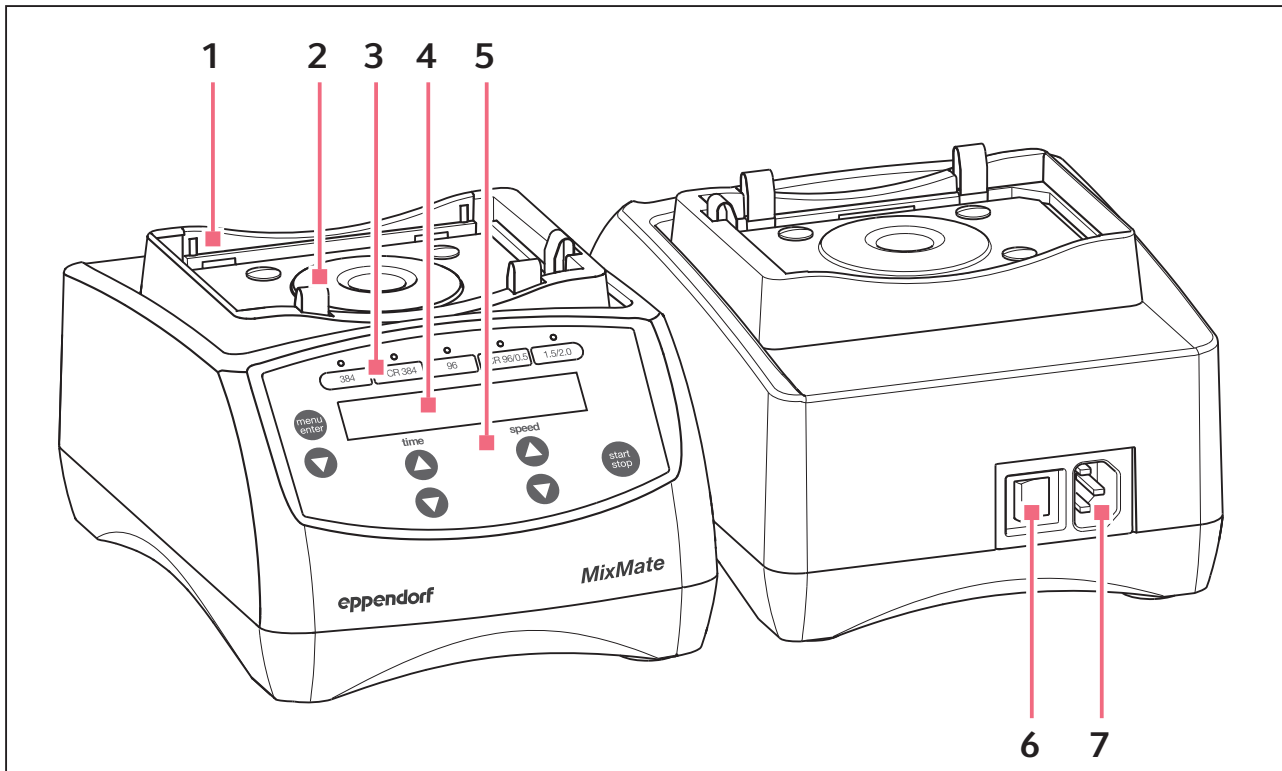


Fig. 3-1: Front and rear view

1 Plate holder

For holding skirted PCR plates, MTP and DWP as well as tube holders.

2 Vortex mat

For direct vortexing of various tubes.

3 Softkeys

For selecting preset mixing parameters.

4 Display

Displays the mixing frequency and the mixing time (Fig. 5-2 on p. 17).

5 Operating controls

Keys for operating the MixMate (Fig. 5-1 on p. 16).

6 Mains/power switch

Switch for switching the device on and off.

Switch position **0**: the device is switched off.

Switch position **I**: the device is switched on.

7 Power connection socket

Connection for supplied power cable

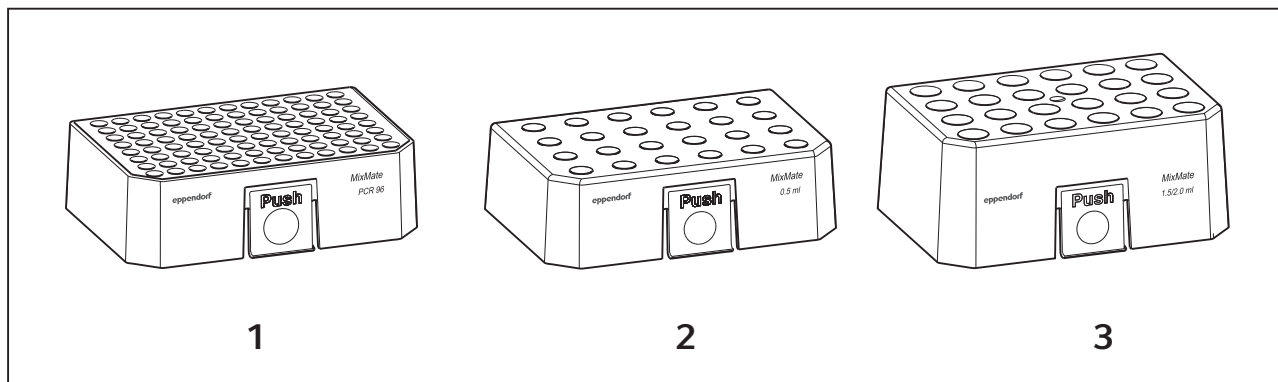


Fig. 3-2: Tube holders for the MixMate

- 1 PCR 96 tube holder**
For a PCR plate (96-well, semi-skirted or unskirted) or 96 micro test tubes (0.2 mL).

3 1.5/2.0 mL tube holder
For 24 micro test tubes (1.5 and 2.0 mL).
- 2 0.5 mL tube holder**
For 24 micro test tubes (0.5 mL).

3.2 Delivery package

Quantity	Order no. (International)	Order no. (North America)	Description
1 or	5353 000.014 5353 000.022	022674226 022674200	MixMate 230 V 120 V
1	5353 040.113	022674005	Tube Holder PCR 96
1	5353 040.121	022674021	0.5 mL
1	5353 040.130	022674048	1.5/2.0 mL
1	–	–	Mains/power cord
1	5353 900.015		Operating Manual MixMate multi-lingual
1	5353 900.023		Short Instructions MixMate

3.3 Features

The MixMate allows aqueous solutions and suspensions to be **mixed and vortexed** effectively in a wide range of micro test tubes or plates. The MixMate supports tube formats from 0.2 mL PCR tubes to 2.0 mL micro test tubes as well as MTP, DWP and PCR plates up to 384 wells at a maximum mixing frequency of up to 3000 rpm.


The **softkeys** facilitate rapid access to selected mixing parameters (see p. 21).

Potential **applications** include:

- controlled mixing of PCR, restriction or other enzyme reactions.
- controlled incubation of absorption, blocking or reaction batches.
- resuspension of DNA, RNA, protein or cell pellets in tubes and plates.
- vortexing in micro test tubes and in 15 mL and 50 mL screw-top tubes.

4 Installation

4.1 Preparing installation


 Keep the transport carton and the packing material for subsequent safe transport or storage.

- ▶ Use the details on the scope of delivery (see *Delivery package on p. 13*) to check that delivery is complete.
- ▶ Check all parts for any transport damage.

4.2 Selecting the location

Select the device location according to the following criteria:

- Mains/power connection in accordance with the name plate
- Minimum distance to other devices and walls: 10 cm
- Resonance free table with horizontal even work surface
- The design of table is suitable for operating the device.
- Surrounding area must be well ventilated.
- The location must be protected against direct sunlight.

 The mains/power switch and cutting unit of the mains/power line must be easily accessible during operation (e.g, residual current circuit breaker).

4.3 Installing the instrument

1. Place the MixMate on a suitable work surface so that the air slots on the underside of the device are not blocked.
2. Connect the device to the mains power supply via the mains power socket **7** (see Fig. 3-1 on p. 12) using the mains cable supplied.
3. Switch on the device with the mains power switch **6** (see Fig. 3-1 on p. 12).
4. Carry out a test run at maximum speed (3000 rpm) to ensure that the grip between the device and the surface is sufficient. The MixMate must not move from its position.

5 Operation

5.1 Overview of operating controls

Familiarize yourself with the operating controls and the display of the MixMate before using it for the first time.

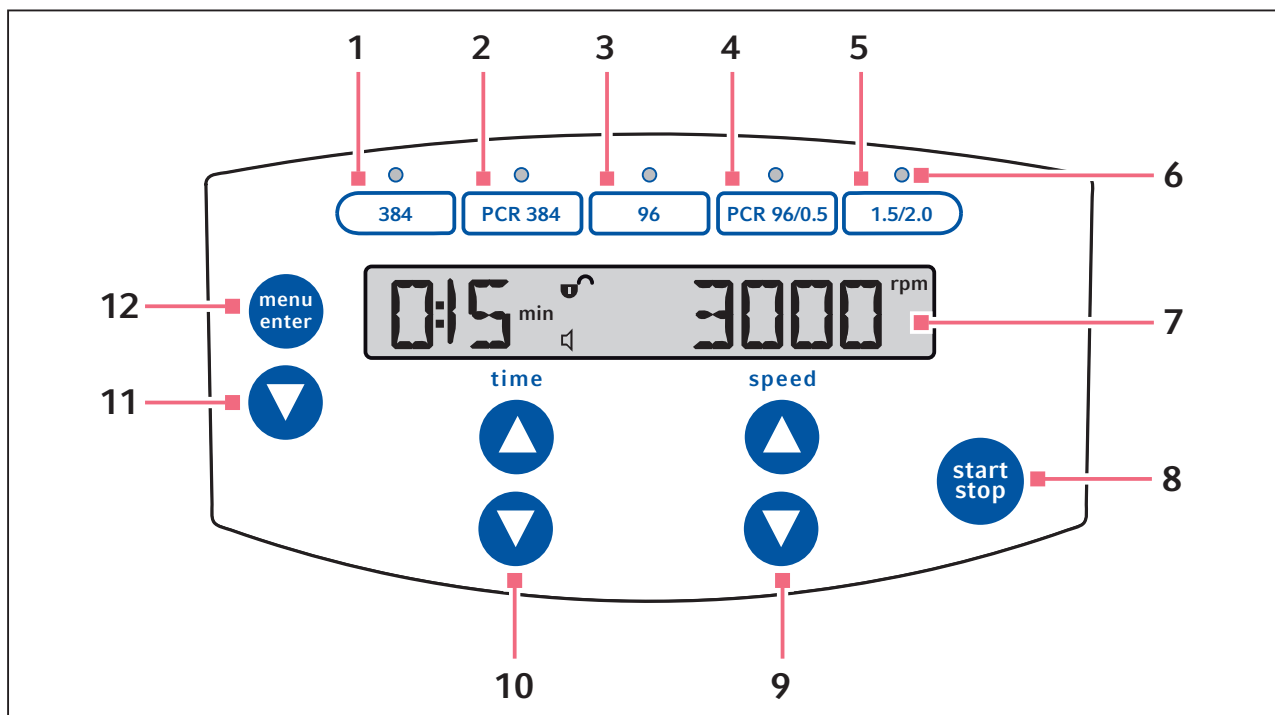


Fig. 5-1: Operating controls and display

- | | |
|--|--|
| 1 Softkey for MTP (384-well) | 7 Display |
| 2 Softkey for PCR plates (384-well) | 8 Start/stop mixing run |
| 3 Softkey for MTP (96-well) | 9 Set the mixing frequency (speed) |
| 4 Softkey for PCR plates (96-well) and micro test tubes (0.2 and 0.5 mL) | 10 Set the mixing duration (time) |
| 5 Softkey for micro test tubes (1.5 mL and 2.0 mL) | 11 Navigate in the menu |
| 6 Control LED to display the selected softkey | 12 Call and select the menu parameters |

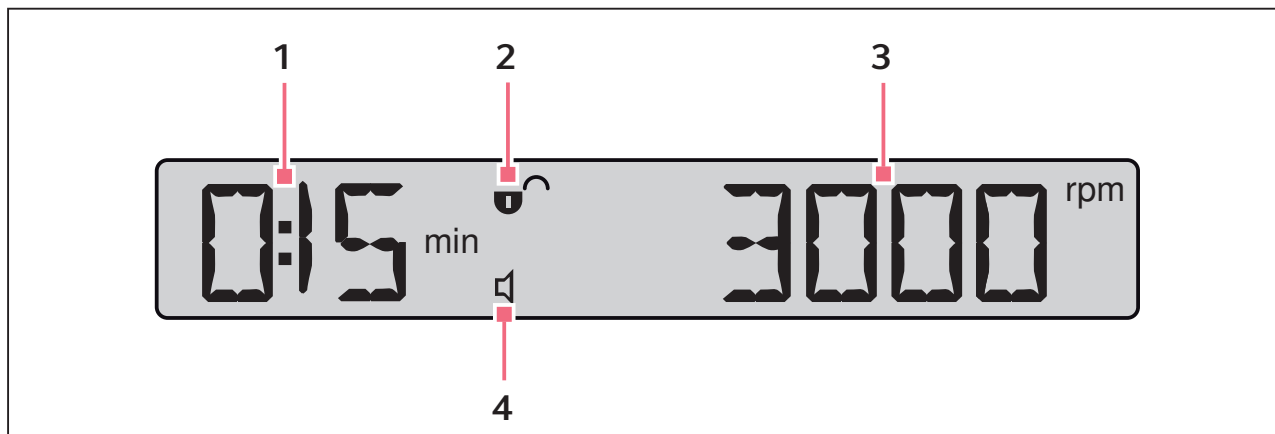


Fig. 5-2: Display

1 Mixing time

Setting:
up to 19:45 min. in 15 s increments,
from 20 min. to 59 min.: in 1 min.
increments,
from 1.0 h to 99.5 h: in 0.5 h
increments,
'oo': unlimited mixing time.

3 Mixing frequency

Setting:
300 rpm to 3000 rpm in 50 rpm
increments.

2 Symbol for key lock

4 Symbol for signal tone setting



After switching on, the display shows the values of the last run.

5.2 Inserting plates and tubes







WARNING! Injury from flying tubes and plates.

If the maximum permitted total weight of the mixing load is exceeded, plates or tubes may become detached from the device.

- ▶ Always ensure that tubes, plates and tube holders are well seated.
- ▶ Only use plates that conform to the Microplate Standards ANSI/SLAS 1-2004 through ANSI/SLAS 4-20041.
- ▶ Mix the DWP and the tube holders for 0.5 mL, 1.5/2.0 mL and PCR 96 with max. 2000 rpm.
- ▶ Only mix mixing loads with a total weight of up to 80 g at maximum speed.
- ▶ Only mix mixing loads with a total weight of 80 to 300g at speed of max. 2000 rpm.

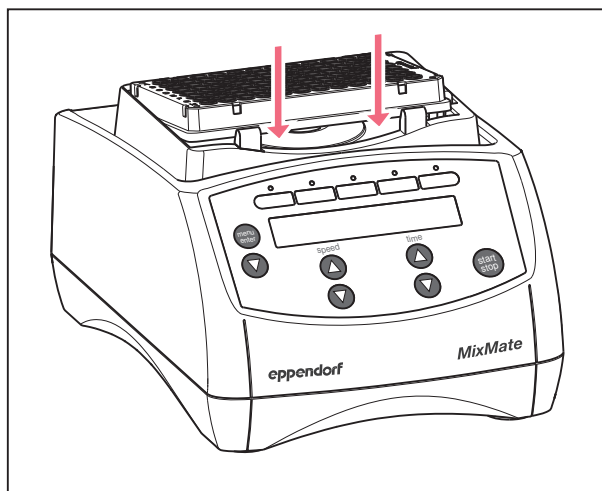
Tab. 5-1: Select a suitable holder

Plate/tube	Plate holder ⁽¹⁾	Tube holder ⁽²⁾		
		PCR 96	0.5 mL	1.5/2.0 mL
				
PCR plate, skirted	+			
PCR plate, semi-skirted		+		
PCR plate, unskirted		+		
MTP	+			
DWP ⁽²⁾	+			
0.2 mL PCR tubes		+		
0.5 mL PCR and micro test tubes			+	
0.5 mL micro test tubes			+	
1.5 mL micro test tubes				+
2.0 mL micro test tubes				+

(1) To ensure that the plates are positioned securely in the plate holder, the plates must conform to the Microplate Standards ANSI/SLAS 1-2004 through ANSI/SLAS 4-20041.

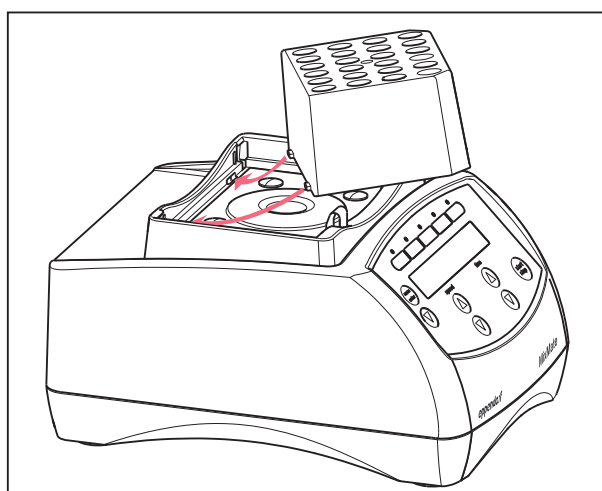
(2) The maximum permissible mixing frequency for tube holders and DWP is 2000 rpm.

5.2.1 Insert plate in the plate holder

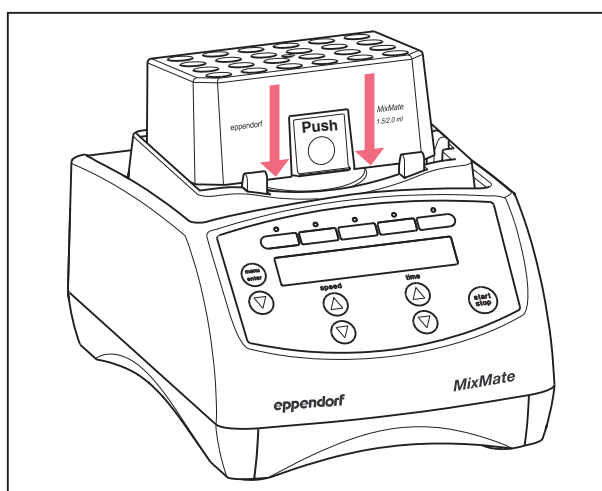


1. Place the plate up against the back of the plate holder **1** first.
2. Then press the plate into the plate holder. In doing so, ensure that it is properly engaged.

5.2.2 Insert the tube holder in the plate holder



1. Select a suitable tube holder (see Tab. on p. 18).
2. Hold the tube holder up against the back edge of the plate holder so that the stop pins fit in the holes.



3. Engage the tube holder by pressing gently on the front.

Remove the tube holder by pressing gently on the unlatching **Push** key to release the latch.

5.2.3 Insert the plate in the PCR 96 tube holder

1. Insert the PCR 96 tube holder in the plate holder (see *Insert the tube holder in the plate holder on p. 19*).
2. Push semi-skirted or unskirted PCR plates into the bores of the tube holder. In doing so, ensure they are evenly engaged.

5.2.4 Insert tubes in the tube holders

1. Select the suitable tube holder (Tab. on p. 18).
2. Insert it into the plate holder (see *Insert the tube holder in the plate holder on p. 19*).
3. Push the tubes fully into the bores of the tube holder.

5.3 Mixing



WARNING! Injury from sample material being thrown out.

Sample material can be thrown out of open, improperly sealed or unstable tubes and plates.

- ▶ Only mix in closed tubes and closed plates.
- ▶ Observe the nationally prescribed safety environment when working with hazardous, toxic and pathogenic samples. Pay particular attention to personal protective equipment (gloves, clothing, goggles etc.), extraction, and the safety class of the lab.



WARNING! Risk of device catching fire as a result of penetration of liquid.

Penetration of liquid can cause a fire due to a short-circuit in the device.

- ▶ Do not allow any liquids to penetrate the inside of the housing.
- ▶ Only mix in closed tubes and closed tubes and plates.
- ▶ If any liquids have penetrated into the device: switch off the device, pull the power plug, and have the device cleaned by service technicians who are authorized by Eppendorf.



Note the following rule when setting the mixing frequency: only mix at a load above 80 g with a maximum mixing frequency of 2000 rpm.






The MixMate comes with an automatic protection against overloading. If the selected speed for the mixing load is too high or the mixing load is not securely placed on the plate holder a signal tone sounds. The MixMate reduces the mixing frequency automatically to 1400 rpm. In the display the messages **TOO FAST** and **1400 rpm** appear alternately.

Press **start/stop** to end the mixing process. Press again **start/stop** to deactivate the error message.

5.3.1 Mixing with preset parameters

With the softkey you can select the following preset parameters (mixing frequency and mixing duration). These permit a controlled and effective mixing of samples without wetting the tube lids or plate sealings. The softkey cannot be programmed.

Tab. 5-2: Softkeys for preset, optimized mixing parameters

Softkey	Parameter	Tube/plate	Filling level *
	15 s/2000 rpm	MTP and DWP (384 well)	10 % to 60 %
	15 s/2600 rpm	PCR plates (384 well)	10 % to 50 %
	30 s/1000 rpm	MTP (96 well)	5 % to 60 %
	30 s/1650 rpm	PCR plates and DWP (96 well), PCR tubes (0.2 mL) and micro test tubes (0.5 mL)	5 % to 50 %
	1 min/1400 rpm	Micro test tubes (1.5 mL and 2.0 mL)	5 % to 80 %

* Amount of maximum filling volume. Follow the manufacturer instructions.



The parameters of the softkeys do not cover all known or possible of tube or plate geometry as well as sample properties.

For some applications these parameters can possibly be optimized. For example, the mixing frequency can be too low or the mixing duration can be too short. As a result the samples are not optimally mixed. Or the mixing frequency is too high which leads to the wetting of the lid. In that case you can adjust the preset parameters before stating the mixing procedure to your requirements.

1. Select the appropriate parameters from the table (see Tab. on p. 21).
2. Select the respective softkey.
3. If necessary change the preset mixing duration and mixing frequency with the arrow keys **time** and **speed**.
If you change the parameter settings the indicator lamp of the softkey goes out.
4. Press **start/stop** to start the mixing process.
At the end of the mixing process a signal tone sounds.
Changed parameters are not saved. At the end of the mixing process the original parameters are reassigned to the softkeys.

5.3.2 Mixing with free preset parameters



After switching on the device, the parameters of the last run are shown on the display.

1. Set the with the mixing time using the **time** arrow keys.
 For continuous operation set **oo** below 0:15 min or above 99.5 h.
2. Set the with the mixing frequency using the **speed** arrow keys.
3. Press **start/stop** to start the mixing process.
 The remaining mixing duration and the current mixing frequency are displayed. At continuous operation the current mixing duration is displayed alternating with **oo**, after 99.5 h only **oo** is displayed.
 You can also change the parameters during a mixing process by pressing the **time** and **speed** arrow keys. To do so, the key lock may not be active (see *Key lock (LOCK) activation/deactivation on p. 25*). The mixing procedure is then continued with the changed parameters.
 The softkeys are not available during a mixing procedure.
 At the end of the mixing process a signal tone sounds. The MixMate stops.
4. In order to stop the mixing process, if applicable, prematurely press **start/stop** again.

5.4 Vortexing

During the vortexing process, press different tubes (e.g., 1.5 mL tubes or 50 mL screw cap tubes) on the vortex mat of the MixMate to mix them individually.



WARNING! Injury from improper vortex action.

Improper vortex action can destroy tubes or cause their content to be lost.

- ▶ Only vortex intact and sealed tubes.
- ▶ Never vortex tubes made of glass or other fragile material.



NOTICE! Damage to vortex mat caused by improper vortexing.

- ▶ Only vortex tubes in the depression in the middle of the vortex mat.

5.4.1 Touch vortex mode with 3500 rpm

With the touch vortex mode, vortexing is carried out at a fixed frequency of 3500 rpm.

1. Push the tube into the depression in the vortex mat to start the touch vortex mode.
 In the display, the **VORTX** mode is shown, along with the elapsed time:
 - Up to 1 min in second increments.
 - Up to 19:59 h in minute increments.
 - The time display then changes to **oo**.

2. Remove the load from the vortex mat in order to end the touch vortex mode.
The MixMate continues to run for approx. another 2 s.

i **Ergonomic vortexing:** A post-run facility in touch vortex mode prevents the MixMate braking immediately after the load is removed from the vortex mat. This post-run facilitates both vortexing with 15 and 50 mL screw cap tubes and vortexing several tubes consecutively.

5.4.2 Using free parameters

You can also vortex on the vortex mat of the MixMate using free parameters. Vortexing time can be set variably from 15 s to infinite, vortexing frequency from 300 to 2000 rpm.

i In this Vortex mode, the **TOO FAST** message may be issued at frequencies > 2000 rpm. The MixMate automatically reduces the frequency to 1400 rpm. In the display the messages **TOO FAST** and **1400 rpm** appear alternately. Press the **start/stop** button to end the vortexing process. Press again **start/stop** to deactivate the error message.
The touch vortex mode is inactive as long as the MixMate is running.

1. Set the mixing time using the **time** arrow keys.
For continuous operation set **oo** below 0:15 min or above 99.5 h.
2. Set the with the mixing frequency using the **speed** arrow keys.
3. Press **start/stop** to start the vortexing process.
4. Hold the tube on the vortex mat.
The remaining vortexing time and the current vortexing frequency are displayed. During continuous operation, the current vortexing time appears alternately with **oo**, after 99.5 h only **oo** is displayed.
You can also change the parameters during the vortexing process with the arrow keys **time** and **speed**. To do so, the key lock may not be active (see *Key lock (LOCK) activation/deactivation on p. 25*). The vortexing process is then continued with the changed parameters.
The touch vortex mode is not active during the vortexing process.
A signal tone is generated at the end of the vortexing process. The MixMate stops.
5. In order to cancel the vortexing process prematurely, press **start/stop** again.

5.5 Device menu

In the MixMate menu, you can activate the key lock (**LOCK**) and set the volume of the signal tone (**VOL**) .

5.5.1 Menu structure

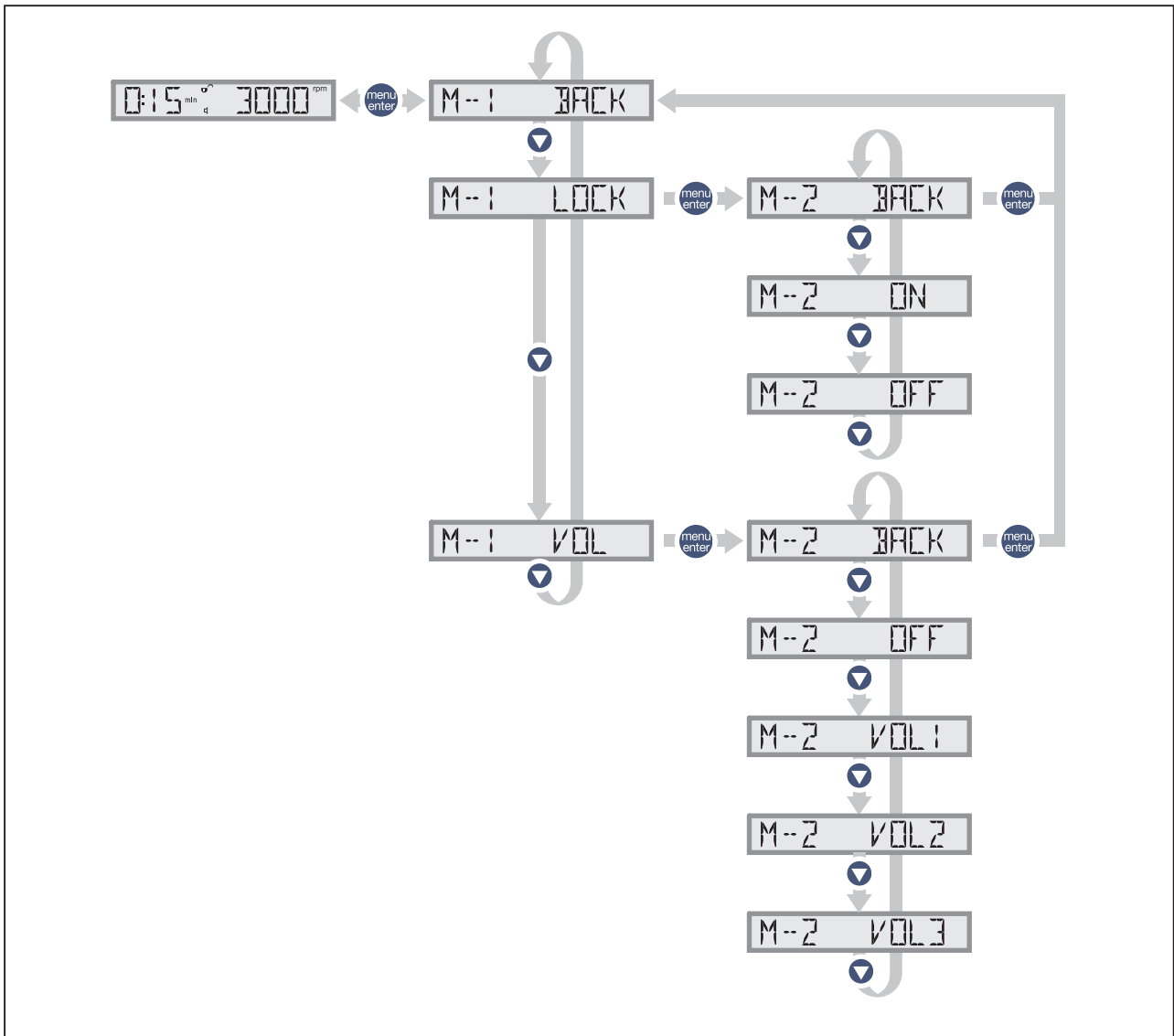


Fig. 5-3: Menu structure

5.5.2 Navigating in the menu

- ▶ With the **menu/enter** key, you can switch between the menu levels or confirm the changed parameters.
- ▶ You can select the parameters with the menu arrow key **11**.
- ▶ When **M – 1 BACK** or **M – 2 BACK** is displayed, press the **menu/enter** key to exit the menu level without saving changes.

5.5.3 Key lock (LOCK) activation/deactivation

The key lock prevents set parameters being modified inadvertently during a mixing process.

1. Press the **menu/enter** key to call up the menu.
2. Press the menu arrow key once.
3. Press the **menu/enter** key to open the key lock menu.
4. Select sub-item **M – 2 ON** with the menu arrow key to activate the key lock, or **M – 2 OFF** to deactivate the key lock.
5. Press the **menu/enter** key to confirm the selected setting.
You will then exit menu level 2.
Press the **menu/enter** key again to exit the menu completely.

With key lock activated, all keys apart from **menu/enter** are inactive during the mixing process. When the mixer is at rest, all the keys are released.

You can tell from the  symbol in the display that key lock is active and from the  symbol that key lock is deactivated.

5.5.4 Adjusting the signal tone-volume (VOL)

The MixMate announces that a mixing process is complete by means of a signal tone. You can set the volume of this signal tone in the device menu as follows:

1. Press the **menu/enter** key to call up the menu.
2. Press the menu arrow key twice.
3. Press the **menu/enter** key to open the menu for the signal tone volume.
4. Use the menu arrow key to select the desired setting from **OFF**, **VOL1** to **VOL3**. With **OFF** the signal tone is switched off, with **VOL3** the signal tone sounds at maximum volume.
The selected volume is played.
5. Press the **menu/enter** key to confirm the selected setting.
You will then exit menu level 2.
Press the **menu/enter** key again to exit the menu completely.
6. Press **M – 2 BACK** to leave this menu level.

6 Troubleshooting

6.1 General errors

If the suggested troubleshooting measures fail repeatedly, please contact your Eppendorf partner. You can find the contact addresses on the Internet at www.eppendorf.com.

Problem	Cause	Solution
No display	Power supply is interrupted.	▶ Check the mains connection and the power supply to the lab.
Too fast	Mixing load is too heavy for the selected mixing frequency.	▶ Reduce the mixing frequency or the weight of the mixing load.
Too fast	Mixing load not properly positioned in the plate holder.	▶ Check that the mixing load is fixed in position.
Too fast	Continuous vortexing at frequencies > 2000 rpm.	▶ Reduce the continuous vortexing frequency to ≤ 2000 rpm.
ERR00 - ERR03/ ERR06 - ERR11	Electronics error	▶ Switch off the device and switch it on again after 5 s.
ERR04 - ERR05	Device overheats. The ventilation slots on the underside of the device are blocked.	1. Switch off the device and leave to cool down for 10 minutes. 2. Ensure that the ventilation slots on the underside of the device are clear. 3. Switch the device back on again.
ERR12	Incorrect power supply	▶ Make sure that the supply voltage and the power frequency are compatible with the information given on the device name plate. This is located on the underside of the device.
ERR13	Software error	▶ Switch off the device and switch it on again after 5 s.
ERR15 and ERR16	Hardware error	▶ Contact your Eppendorf partner.

7 Maintenance

7.1 Cleaning

7.1.1 Cleaning the device and accessories

Clean the housing of the MixMate, the vortex mat, the plate holder and the tube holders regularly.



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

- ▶ Switch off the device and disconnect it from the power supply before starting cleaning or disinfecting.
- ▶ Do not allow any liquids to penetrate the inside of the housing.
- ▶ Do not spray clean/spray disinfect the housing.
- ▶ Wait until the device is completely dry before connecting it to the power source again.



WARNING! Risk of device catching fire as a result of penetration of liquid.

Penetration of liquid can cause a fire due to a short-circuit in the device.

- ▶ Do not allow any liquids to penetrate the inside of the housing.
- ▶ Only mix in closed tubes and closed tubes and plates.
- ▶ If any liquids have penetrated into the device: switch off the device, pull the power plug, and have the device cleaned by service technicians who are authorized by Eppendorf.



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 to electronic components from spilled liquids.**

- ▶ Make sure that the vortex mat and the cover caps are fitted properly. If the vortex mat is not fitted properly, contact your Eppendorf partner or the authorized Technical Service.
- ▶ If liquid has been spilt: Switch off the device, disconnect the power plug and arrange for it to be cleaned by service personnel authorized by Eppendorf.

Required equipment

- Mild, soap-based household cleaning agent
1. Switch off the MixMate and isolate it from the power supply.
 2. Clean the housing, plate holder, vortex mat and tube holder.
The housing may only be wiped with a damp cloth. Do not spray clean/spray disinfect the housing.
 3. Dry all cleaned parts.
 4. Perform a function test.

7.1.2 Performing a function test

1. Use the mains cable to connect the MixMate to the power supply (see *Installing the instrument on p. 15*).
2. Switch on the device, using the mains power switch.
3. Check the touch vortex function, using a suitable tube (see *Vortexing on p. 22*).

7.2 Disinfection/decontamination



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.



WARNING! Risk of device catching fire as a result of penetration of liquid.

Penetration of liquid can cause a fire due to a short-circuit in the device.

- ▶ Do not allow any liquids to penetrate the inside of the housing.
- ▶ Only mix in closed tubes and closed tubes and plates.
- ▶ If any liquids have penetrated into the device: switch off the device, pull the power plug, and have the device cleaned by service technicians who are authorized by Eppendorf.



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

Required equipment

- Alcohol (ethanol, isopropanol) or disinfectants containing alcohol
- Mild, soap-based household cleaning agent

Proceed as follows:

1. Choose the disinfection method which corresponds to the legal regulations and guidelines in place for your range of application.
2. Switch off the device and disconnect it from the mains/power line.
3. Wipe down all parts of the device and accessories, including the connecting cable, with the disinfectant.
4. Clean the device with a mild soap-based household cleaning agent (see *Cleaning on p. 27*).

7.3 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 package.
-

8 Transport, storage and disposal

8.1 Transport

- Only transport the device in the original packaging.

	Air temperature	Max. rel. humidity	Air pressure
General transportation	-20 to 60 °C	10 to 95 %	30 to 106 kPa
Air freight	-20 to 55 °C	10 to 95 %	30 to 106 kPa

8.2 Storage

	Air temperature	Max. rel. humidity	Air pressure
in transport packaging	-20 to 55 °C	10 to 95 %	70 to 106 kPa
without transport packaging	-5 to 45 °C	10 to 95 %	70 to 106 kPa

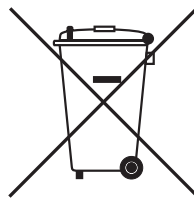
8.3 Disposal

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.

Technical data

MixMate®

English (EN)

9 Technical data**9.1 Power supply**

Mains power connection:	220 to 240 V ± 10 %, 50 to 60 Hz 110 to 120 V ± 10 %, 50 to 60 Hz
Power consumption:	40 W
Overvoltage category:	II

9.2 Ambient conditions

Environment	Use only indoors
Ambient temperature	2 °C – 40 °C
Relative humidity	10 % – 75 %
Atmospheric pressure	Use up to an altitude of 2000 m above MSL.
Degree of contamination	2

9.3 Weight/dimensions

Dimensions	Width: 170 mm Depth: 230 mm Height: 130 mm
Weight	4.15 kg
Noise level	< 50 dB(A)

9.4 Application parameters

Max. load	300 g
Mixing frequencies with a load up to 80g with a load above 80 g for tube holders and DWP	300 to 3000 rpm, in 50 rpm increments 300 to 2000 rpm, in 50 rpm increments up to max. 2000 rpm
Adjustable mixing time	up to 19:45 min. in 15 s increments, from 20 min. to 59 min. in 1 min. increments, from 1.0 h to 99.5 h in 0.5 h increments and unlimited mixing time.
Touch vortexing frequency	3500 rpm
Mixing and vortexing radius	1.5 mm (3 mm mixing stroke)

10 Ordering information

**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.

10.1 MixMate

Order no. (International)	Order no. (North America)	Description
5353 000.014	022674226	MixMate 230 V
5353 000.022	022674200	120 V
5353 040.113	022674005	Tube Holder PCR 96
5353 040.121	022674021	0.5 mL
5353 040.130	022674048	1.5/2.0 mL
5353 863.101		Cover cap 4 pieces

10.2 Tubes and plates

Order no. (International)	Order no. (North America)	Description
0030 121.023	022363611	Eppendorf Safe-Lock Tube 0.5 mL 500 pieces clear
0030 120.086	-	Eppendorf Safe-Lock Tube 1.5 mL 1,000 pieces clear
0030 120.094	-	Eppendorf Safe-Lock Tube 2.0 mL 1,000 pieces clear
0030 521.102	951031003	Eppendorf Deepwell Plate 384/200 µL 40 plates, wells clear, white border color PCR clean
		Eppendorf Deepwell Plate 96/500 µL 40 plates, wells clear, white border color

Ordering information

MixMate®

English (EN)

Order no. (International)	Order no. (North America)	Description
0030 501.101	951031801	PCR clean
0030 501.209	951032603	Eppendorf Deepwell Plate 96/1000 µL 20 plates, wells clear, white border color PCR clean
0030 501.306	951033405	Eppendorf Deepwell Plate 96/2000 µL 20 plates, wells clear, white border color PCR clean

All plates are available with different border colors (red, yellow, green and blue) and purity qualities, in large packs as well as with barcoding on request. You can find further information in our catalog or on our website www.eppendorf.com.

10.3 IsoTherm-System

Order no. (International)	Order no. (North America)	Description
3880 001.018 3880 000.011	022510053 022510002	IsoTherm-System includes IsoSafe, IsoRack, 0 °C IsoPack and -21 °C for 1.5/2.0 mL tubes 0.5 mL tubes
3881 000.015 3881 000.023 3881 000.031	022510509 022510541 022510525	PCR-Cooler Starter Set (1 × pink, 1 × blue) pink blue

Index

A

Activate/deactivate key lock	25
ANSI	6
Application fields.....	14
Application parameters	32
Applications.....	14

C

Changing the parameters.	
Mixing	22
Vortexing	23
Cleaning	27
Continuous operation	
Mixing	22
Vortexing	23

D

Decontamination	30
Deepwell plate	6
Dimensions.....	32
Disinfection	29
Display.....	17
LOCK	24
M – 2 BACK	25
M – 2 OFF.....	25
M – 2 ON	25
VOL.....	24
Disposal	31
DNA	6
DWP.....	6

E

Environmental conditions.....	32
Error messages.....	26

F

Features	14
Front view	12

G

Glossary	6
----------------	---

H

Hazards	8
---------------	---

I

Incubate	6
Insert plate	19, 20
Inserting	
Plates and tubes	18
Plates in the plate holder	19
Plates in the tube holder	20
Tube holder in the plate holder.....	19
Tubes in the tube holder	20

Inserting tubes	20
-----------------------	----

Installation

Device	15
Preparation.....	15
Selecting the location.....	15

Intended use

Hazards	8
---------------	---

L

LOCK	24
------------	----

M

Mains/power switch	12
Menu structure.....	24
menu/enter	25
Micro test plate	6
Mixing	20
Free parameters	22
Preset parameters	21
Start.....	22

Mixing frequency

Maximum permissible	18
parameter	22

Mixing load	6
-------------------	---

Mixing time

parameter	22
-----------------	----

MTP.....	6
----------	---

O

OFF	25
Operating controls.....	16

P

PCR	6
PCR plate	
Semi-skirted	6
PCR-Platte	
Skirted	6
Unskirted	7
Pellet.....	6
Performing a function test.....	28
Plate holder	12
Power connection socket.....	12
Power supply	32
Preset parameters	21
Press start/stop	
Mixing	22
Vortexing	23

R

Rear view	12
Resuspending	6
RNA	6
rpm	6

S

Safety precautions	8
Select holder.....	18
Selecting the location	15
Semi-skirted	6
Setting the volume	25
Signal tone.....	25
Skirted	6
SLAS	6
Softkeys	21
Software menu	24
SPEED	
Mixing frequency	22

Vortex frequency.....	23
-----------------------	----

Storage	31
---------------	----

T

Technical data	
Application parameters.....	32
Dimensions	32
Environmental conditions	32
Power supply.....	32
Time	
Mixing time	22
Vortex time.....	23
Transport.....	31
Troubleshooting	26
Tube formats	14
Tube holder	
Insert	19
Tube holders	13

U

Unskirted.....	7
----------------	---

V

Vessels	
Select.....	18
VOL	24
Vortex frequency	
set.....	23
Vortex mat.....	12
Vortex time	
set.....	23
Vortexing.....	7, 22
Free parameters	23
Post-run facility	23
Start.....	23
Touch vortex mode	22

W

Weight	
Device	32
Mixing load	18
Well	7

Declaration of Conformity

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

Product name:

MixMate 5353

Product type:

Mixer for micro test tubes and plates

Relevant directives/standards:

2006/95/EC: EN 61010-1, EN 61010-2-051
UL 61010-1, UL 61010A-2-051,
CSA C22.2 No. 61010-1, CSA C22.2 No. 61010-2-051

2004/108/EG: EN 55011/B, EN 61000-6-1, EN 61000-3-2, EN 61000-4-14

2011/65/EU

Date: October 28, 2014



Management Board



Portfolio Management

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www.eppendorf.com

ISO 9001
Certified

ISO
13485
Certified

ISO
14001
Certified

Eppendorf Certificate

Declaration of Conformity

Product: MixMate®
 Order No. International: 5353 000.014
 Order No. North America: 022674200

The device was tested in accordance with EN ISO 5349-1:2001 "Mechanical vibration – Measurement and assessment of human exposure to hand-transmitted vibration – Part 1"

Hand- arm vibration assessment of MixMate® in accordance with EN ISO 5349-1:2001

Tests were performed on the MixMate operated in the "touch vortex" operation mode (3,500 rpm) with 15 mL and 50 mL conical tubes. The total vibration value was measured, the daily vibration exposure and the exposure points calculated from it.

The exposure action value **EAV of 2.5 m/s² A(8)** is equivalent to 100 exposure points and is the level at and above which hand-arm-vibration management procedures must be initiated where employees are regularly exposed to this level of vibration exposure.

The exposure limit value **ELV of 5 m/s² A(8)** is equivalent to 400 exposure points and must not be exceeded on any work day. If it is, immediate measures must be taken to control vibration levels or reduce exposure times to limit daily vibration exposure to below the ELV.

Usage pattern: Each test consisted of a representative usage pattern equivalent to 5 successive touch vortex operations of 30 seconds with 5 second intervals in a total of 2 minutes 30 seconds “on” and 20 seconds “off”. Tubes were filled with 2/3 of water.	Tube	Total vibration value	Daily exposure value	1 HOUR exposure points	Time – single tool use: For not exceeding	
					EAV	ELV
		m/s ²	m/s ²		2.5 m/s ² minutes	5 m/s ² minutes
	15 mL	5.2	1.8	54	111	444
	50 mL	9.4	3.3	177	34	136

Eppendorf Certificate

Exposure Action Value (EAV)

The table indicates that the operator using 15 mL conical tubes in touch vortex mode (3,500 rpm) with reported usage would reach the EAV in 111 minutes and using 50 mL conical tubes in 34 minutes. Based on a usage pattern of 30 seconds vortex/5 seconds gap for changing the tube, this means that approximately 190×15 mL or 58×50 mL conical tubes could produce exposures that reach the EAV. With a usage pattern of 15 seconds vortex/5 seconds gap, 333×15 mL tubes or 102×50 mL tubes may be vortexed without exceeding the EAV. With a usage pattern of 45 seconds vortex/5 seconds gap 133×15 mL tubes or 40×50 mL tubes may be vortexed.

Exposure Limit Value (ELV)

The table indicates that the operator using 15 mL conical tubes in touch vortex mode (3,500 rpm) with reported usage would reach the ELV in 444 minutes and using 50 mL conical tubes in 136 minutes. Based on a usage pattern of 30 seconds vortex/5 seconds gap, this means that approximately 761×15 mL conical tubes or 233×50 mL conical tubes could produce exposures that reach the ELV. Immediate action must thus be taken to limit exposures to below the ELV. With a usage pattern of 15 seconds vortex/5 seconds gap, 1332×15 mL tubes or 408×50 mL tubes may be vortexed until the ELV is reached. With a usage pattern of 45 seconds vortex/5 seconds gap 532×15 mL tubes or 163×50 mL tubes may be vortexed.

Vortex time (5 seconds gap)	Number of tubes to reach EAV/for not exceeding ELV			
	EAV	ELV	EAV	ELV
	15 mL		50 mL	
15 seconds	333	1332	102	408
30 seconds	190	761	58	233
45 seconds	133	532	40	163

Date: November 4, 2014

Page 2 of 2

0015 033.509-03



Dr. S. Scheeff
Global Product Manager
Sample Preparation Instruments



Dr. B. Schreiber
Vice President
Quality Management & Regulatory Affairs

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E-mail: eppendorf@eppendorf.com

ISO 9001
Certified

ISO
13485
Certified

ISO
14001
Certified

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www.eppendorf.com

Measurement of sound power level according to
DIN EN ISO 3744:1995-11 and DIN EN ISO 11204:1996-7

Allround mixer MixMate

Eppendorf AG, 22331 Hamburg, Germany

1. Machine:

- | | | |
|-----|-----------------------|------------------------|
| 1.1 | Type: | Allround mixer MixMate |
| 1.2 | Serial Number: | 5353 05003 * |
| 1.3 | Year of construction: | 2008 |

2. Specifications:

See documents of the manufacturer

3. Measurement system:

- | | | |
|-----|-------------------------------|--------------|
| 3.1 | Calibrated sound level meter: | Norsonic 118 |
|-----|-------------------------------|--------------|

4. Measurement surface:

- | | | |
|-----|-----------------------|-------------------------------------|
| 4.1 | Measurement surface: | hemisphere with 10 measuring points |
| 4.2 | Measurement distance: | 1 m |

5. Measurement conditions:

- | | | |
|-----|-------------------------------------|------------------------------------|
| 5.1 | Environment: | Free field over a reflecting plane |
| 5.2 | Environmental correction K_{2A} : | 0.9 dB(A) |
| 5.3 | accuracy class | 2 |
| 5.4 | Operating conditions: | 1400 rpm |

- | | | |
|----|---|------------|
| 6. | <u>Measurement surface sound pressure level:</u> | 31.2 dB(A) |
| | <u>Sound power level:</u> | 39.0 dB(A) |

TÜV Nord Umweltschutz GmbH & Co. KG

Große Bahnstraße 31, 22525 Hamburg

Nr. 109SST127 Date of measurement: 25.04.2009



Dipl. - Ing. C. Michalke

*) Sample measurement for this device only.

Measurement of sound power level according to
DIN EN ISO 3744:1995-11 and DIN EN ISO 11204:1996-7

Allround mixer MixMate

Eppendorf AG, 22331 Hamburg, Germany

1. **Machine:**

- | | | |
|-----|-----------------------|------------------------|
| 1.1 | Type: | Allround mixer MixMate |
| 1.2 | Serial Number: | 5353 05003 * |
| 1.3 | Year of construction: | 2008 |

2. **Specifications:**

See documents of the manufacturer

3. **Measurement system:**

- | | | |
|-----|-------------------------------|--------------|
| 3.1 | Calibrated sound level meter: | Norsonic 118 |
|-----|-------------------------------|--------------|

4. **Measurement surface:**

- | | | |
|-----|-----------------------|-------------------------------------|
| 4.1 | Measurement surface: | hemisphere with 10 measuring points |
| 4.2 | Measurement distance: | 1 m |

5. **Measurement conditions:**

- | | | |
|-----|-------------------------------------|------------------------------------|
| 5.1 | Environment: | Free field over a reflecting plane |
| 5.2 | Environmental correction K_{2A} : | 0.9 dB(A) |
| 5.5 | accuracy class | 2 |
| 5.6 | Operating conditions: | 1650 rpm |

- | | | |
|----|---|------------|
| 6. | <u>Measurement surface sound pressure level:</u> | 33.1 dB(A) |
| | <u>Sound power level:</u> | 41.0 dB(A) |

TÜV Nord Umweltschutz GmbH & Co. KG

Große Bahnstraße 31, 22525 Hamburg

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Measurement of sound power level according to
DIN EN ISO 3744:1995-11 and DIN EN ISO 11204:1996-7

Allround mixer MixMate

Eppendorf AG, 22331 Hamburg, Germany

1. Machine:

- | | | |
|-----|-----------------------|------------------------|
| 1.1 | Type: | Allround mixer MixMate |
| 1.2 | Serial Number: | 5353 05003 * |
| 1.3 | Year of construction: | 2008 |

2. Specifications:

See documents of the manufacturer

3. Measurement system:

- | | | |
|-----|-------------------------------|--------------|
| 3.1 | Calibrated sound level meter: | Norsonic 118 |
|-----|-------------------------------|--------------|

4. Measurement surface:

- | | | |
|-----|-----------------------|-------------------------------------|
| 4.1 | Measurement surface: | hemisphere with 10 measuring points |
| 4.2 | Measurement distance: | 1 m |

5. Measurement conditions:

- | | | |
|-----|-------------------------------------|------------------------------------|
| 5.1 | Environment: | Free field over a reflecting plane |
| 5.2 | Environmental correction K_{2A} : | 0.9 dB(A) |
| 5.7 | accuracy class | 2 |
| 5.8 | Operating conditions: | 3000 rpm |

- | | | |
|----|---|------------|
| 6. | <u>Measurement surface sound pressure level:</u> | 46.1 dB(A) |
| | <u>Sound power level:</u> | 54.0 dB(A) |

TÜV Nord Umweltschutz GmbH & Co. KG

Große Bahnstraße 31, 22525 Hamburg

Nr. 109SST127 Date of measurement: 25.04.2009



Dipl. - Ing. C. Michalke

*) Sample measurement for this device only.

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