
# MixMate®

Operating manual

eppendorf

**Trademarks**



5353 900.015-11/102011

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# 1 Operating instructions

## 1.1 Using this manual

- Please read this operating manual completely before using the device for the first time. Also observe the instructions for use enclosed with the accessories.
- Please view this operating manual as part of the product and keep it somewhere easily accessible.
- When passing the device on to third parties, be sure to include this operating manual.
- If this manual is lost, please request another one. The current version can be found on our website www.eppendorf.com.

## 1.2 Danger symbols and danger levels

### 1.2.1 Hazard icons

| | | | |
|---|---|---|---|
|  | **Explosion** |  | **Electric shock** |
|  | **Hazard point** |  | **Material damage** |

### 1.2.2 Degrees of danger

The safety instructions in this operating manual indicate the following degrees of danger:

| | |
|---|---|
| **DANGER** | *Will* lead to severe injuries or death. |
| **WARNING** | *May* lead to severe injuries or death. |
| **CAUTION** | May lead to light to moderate injuries. |
| **NOTICE** | May lead to material damage. |

## 1.3 Symbols used

| Depiction | Meaning |
|---|---|
| ▶ | You are requested to perform an action. |
| 1.<br>2. | Perform these actions in the sequence described. |
| • | List. |
| **Text** | Terms and key names from the software. |
|  | References useful information. |

## 1.4 Abbreviations used

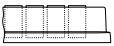
| | |
|---|---|
| **ANSI** | American National Standards Institute |
| **DNA** | Deoxyribonucleic acid |
| **DWP** | Deepwell plate |
| **MTP** | Microplate |
| **PCR** | Polymerase Chain Reaction |
| **RNA** | Ribonucleic acid |
| **rpm** | revolutions per minute |
| **SBS** | Society for Biomolecular 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.

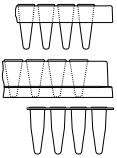
**Pellet** Compressed material. Is, for example, created via the centrifugation of a suspension.

**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 Product description

## 2.1 Main illustration

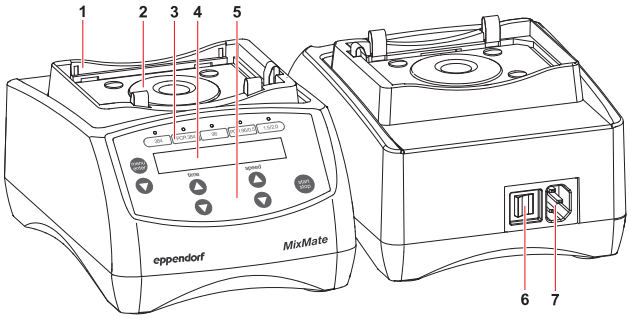
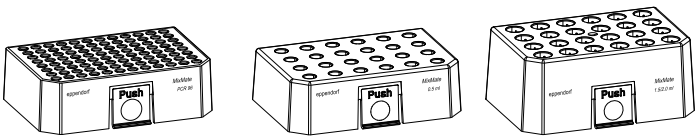



Fig. 1: Front and rear view

| | |
|---|---|
| **1 Plate holder**<br>For holding skirted PCR plates, MTP and DWP as well as tube holders. | **2 Vortex mat**<br>For direct vortexing of various tubes. |
| **3 Softkeys**<br>For selecting preset mixing parameters. | **4 Display**<br>Displays the mixing frequency and the mixing time (Fig. 4 on p. 12). |
| **5 Operating controls**<br>Keys for operating the MixMate (Fig. 3 on p. 12). | **6 Mains power switch**<br>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**<br>Connection for the supplied power cable. | |




1 2 3

Fig. 2: Tube holder for the MixMate

| | |
|---|---|
| **1 PCR 96 tube holder**<br>For one PCR plate (96-well, semi-skirted or unskirted) or a max. of 96 tubes (0.2 mL). | **2 0.5 mL tube holder**<br>For max. 24 tubes (0.5 mL). |
| **3 1.5/2.0 mL tube holder**<br>For max. 24 tubes (1.5 and 2.0 mL). | |

## 2.2 Delivery package

| Quantity | Order No. (International) | Order No. (North America) | Description |
|---|---|---|---|
| 1<br>or | 5353 000.014<br>5353 000.022 | 022674226<br>022674200 | **MixMate**<br>230 V<br>120 V |
| 1<br>1<br>1 | 5353 040.113<br>5353 040.121<br>5353 040.130 | 022674005<br>022674021<br>022674048 | **Tube Holder**<br>PCR 96<br>0.5 mL<br>1.5/2.0 mL |
| 1 | - | - | **Power cable** |
| 1 | 5353 900.015 | | **Operating Manual MixMate**<br>multi-lingual |
| 1 | 5353 900.023 | | **Short Instructions MixMate** |

## 2.3 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 from 0.2 mL PCR tubes to 2.0 mL micro test tubes as well as PCR, MTP and DWP plates up to 384 wells at a maximum mixing frequency of up to 3000 rpm.

The **direct select buttons** facilitate rapid access to selected mixing parameters (see p. 15).

Potential **applications** include:

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

# 3 Safety

## 3.1 Intended use

Exclusively intended for use indoors, the MixMate is used for mixing aqueous solutions and suspensions in closed tubes and closed plates.

Only use Eppendorf accessories or accessories recommended by Eppendorf.

## 3.2 User profile

This device 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.

### 3.3 Information on product liability

In the following cases, the designated protection of the device may be compromised. Liability for material damage and personal injury is 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 not recommended by Eppendorf.
- The device is maintained or repaired by persons not authorized by Eppendorf.
- The user makes unauthorized changes to the device.

### 3.4 Warnings for intended use

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

**DANGER! Danger 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 to process any substances which could create 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.

**WARNING! Lethal voltages inside the device.**

- Ensure that the housing is always closed and undamaged so that no parts inside the device can be contacted by accident.
- Do not remove the housing of the device.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not allow the device to be opened by anyone except service personnel who have been specifically authorized by Eppendorf.

**WARNING! Device fire due to 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 plates.
- If liquid has penetrated the inside of the housing: switch off the device, pull the power plug and have the device cleaned by service personnel 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 holder are well seated. The dimensions of the plates used must comply with the *ANSI/SBS standards for microplates*
- Mix the DWP and the tube holders 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 the 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 power supplies which correspond with the electrical requirements on the nameplate.
- Only use sockets with a protective earth (PE) conductor and a suitable mains cable.

**NOTICE! Damage to the display due to mechanical pressure.**

- Do not exert mechanical pressure on 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 mixer 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.**

After the device has been moved from a cool to a warmer environment, condensation may form inside the device.

- Wait at least three hours before connecting it to the power supply.

**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 becomes contaminated with aggressive chemicals, clean it immediately with a mild cleaning agent.

# 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. 8) to check that delivery is complete.
- Check all parts for any transport damage.

## 4.2 Selecting the location

Select a location for the MixMate in accordance with the following criteria:

- Mains power connection (230 V/120 V) as per device identification plate. This is located on the rear side of the device.
- At least 10 cm away from adjacent devices and walls.
- Solid bench with stable, horizontal and even work surface.

## 4.3 Installing the instrument

1. Place theMixMate 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. 1 on p. 7) using the mains cable supplied.
3. Switch on the device with the mains power switch **6** (see Fig. 1 on p. 7).
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.

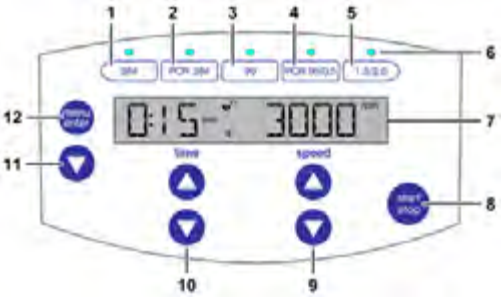



Fig. 3: Operator control elements and display

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

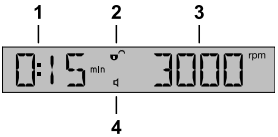



Fig. 4: Display

| | |
|---|---|
| **1 Mixing time**<br>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. | **2 Symbol for key lock** |
| **3 Mixing frequency**<br>Setting: 300 to 3000 rpm in 50 rpm increments. | **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 holder are well seated. The dimensions of the plates used must comply with the *ANSI/SBS standards for microplates*
- Mix the DWP and the tube holders 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. 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) | + | | | |
| PCR tubes 0.2 mL | | + | | |
| PCR and tubes 0.5 mL | | | + | |
| Tubes 0.5 mL | | | + | |
| Tubes 1.5 mL | | | | + |
| Tubes 2.0 mL | | | | + |

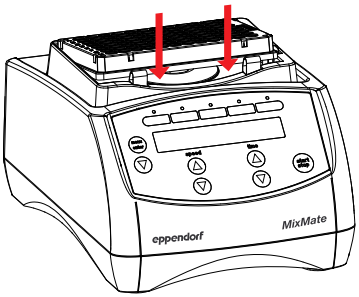
(1) To ensure that the plates are positioned securely in the plate holder, they must correspond with the *ANSI/SBS Standard for microplates*.

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

### 5.2.1 Insert plate in the plate holder

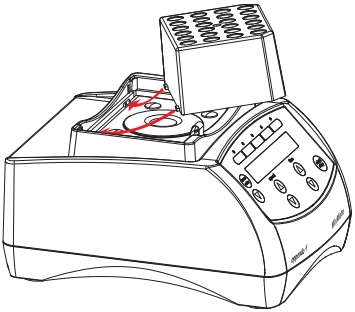
1. Place the plate up against the back of the plate holder **1** first.

2. Then press the plate into the plate holder. In doing so, ensure that it is properly engaged.

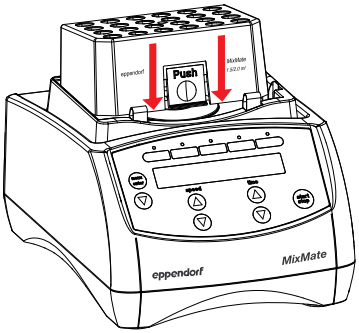



### 5.2.2 Insert the tube holder in the plate holder

1. Select a suitable tube holder (see Tab. on p. 13).
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. 14).
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. 13).
2. Insert it into the plate holder (see *Insert the tube holder in the plate holder* on p. 14).
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 the personal protective equipment (gloves, clothing, goggles etc.), extraction, and the safety class of the lab.

**WARNING! Device fire due to 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 plates.
- If liquid has penetrated the inside of the housing: switch off the device, pull the power plug and have the device cleaned by service personnel 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. 2: Softkeys for preset, optimized mixing parameters

| Softkey | Parameter | Tube/ plate | Fill level * |
|---|---|---|---|
| 384 | 15 s/2000 rpm | MTP and DWP (384 well) | 10 to 60 % |
| PCR 384 | 15 s/2600 rpm | PCR plates (384 well) | 10 to 50 % |
| 96 | 30 s/1000 rpm | MTP (96 well) | 5 to 60 % |
| PCR 96/0.5 | 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 % |
| 1.5/2.0 | 1 min/1400 rpm | Micro test tubes (1.5 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. 16).
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. 20). 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.

**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.

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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.

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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. 20). 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

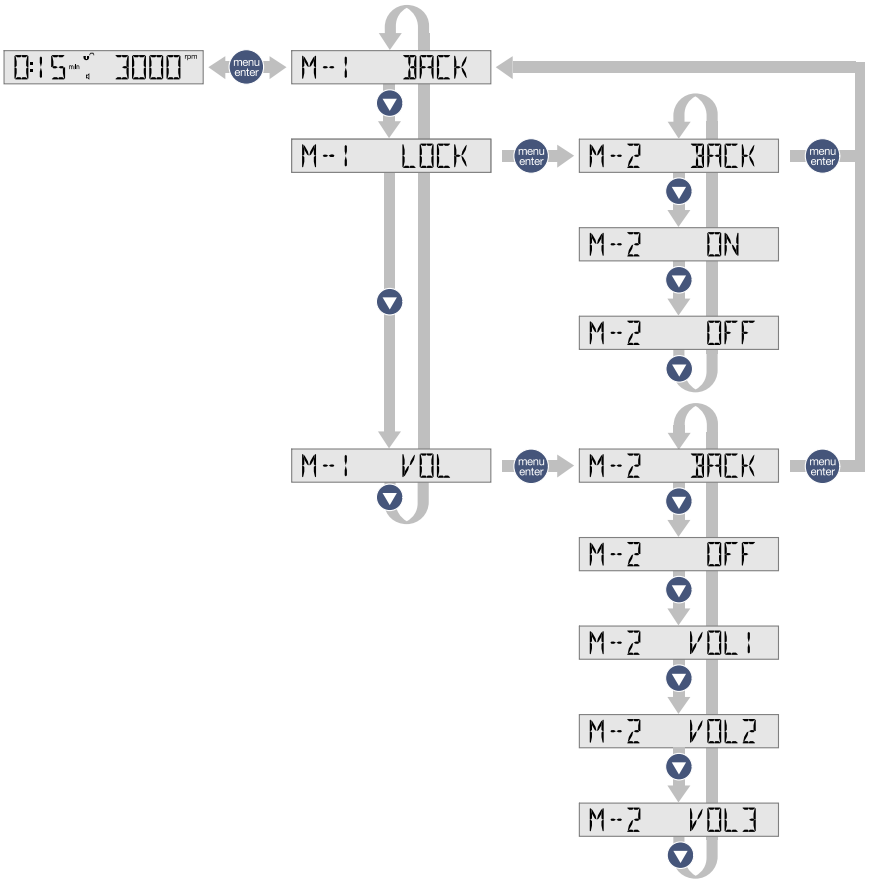


Fig. 5: Menu structure

### 5.5.2 Menu navigation

- With the **menu**/**enter** button, you can switch between the menu levels or confirm the changed parameters.
- You can select the parameters with the arrow key **11**.
- When **M – 1 BACK** or **M – 2 BACK** is displayed, press the **menu**/**enter** button 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 operation.

1. Press the **menu/enter** button to call up the menu.
2. Press the menu arrow key once.
3. Press the **menu/enter** button 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** button to confirm the selected setting.
   You will then exit menu level 2.
   Press the **menu/enter** button again to exit the menu completely.

With key lock activated, all keys apart from **menu/enter** are inactive during the mixing operation. 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 signal tone volume (VOL)

The MixMate announces that a mixing operation 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** button to call up the menu.
2. Press the menu arrow key twice.
3. Press the **menu/enter** button 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 with maximum volume.
   The selected volume is played.
5. Press the **menu/enter** button to confirm the selected setting.
   You will then exit menu level 2.
   Press the **menu/enter** button 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/worldwide.

| Symptom/ message | Cause | Remedy |
|---|---|---|
| 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. |

| Symptom/ message | Cause | Remedy |
|---|---|---|
| **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.<br>The ventilation slots on the underside of the device are blocked. | 1. Switch off the device and leave to cool down for 10 minutes.<br>2. Ensure that the ventilation slots on the underside of the device are clear.<br>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! Device fire due to 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 plates.
- If liquid has penetrated the inside of the housing: switch off the device, pull the power plug and have the device cleaned by service personnel 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 becomes contaminated with aggressive chemicals, clean it immediately with a mild cleaning agent.

**NOTICE! Corrosion due to 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 prolonged periods.

**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. 11).
2. Switch on the device, using the mains power switch.
3. Check the touch vortex function, using a suitable tube (see *Vortexing* on p. 17).

## 7.2 Disinfection/decontamination

**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 work.
- Do not allow any liquids to penetrate the inside of the housing.
- Do not spray clean/spray disinfect the housing.
- Only connect the device to the power supply if it is fully dried inside and out.

**WARNING! Device fire due to 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 plates.
- If liquid has penetrated the inside of the housing: switch off the device, pull the power plug and have the device cleaned by service personnel 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.

**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 power supply.
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. 21).

## 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. It is available in PDF format on our homepage (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you want to dispatch.
3. Enclose the fully-completed decontamination certificate for returned goods (including the serial number of the device) with the dispatch.

# 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 2002/96/EC 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

| | |
|---|---|
| Mains power connection: | 220 to 240 V ±10 %, 50 to 60 Hz<br>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 to 40 °C |
| Relative humidity: | 10 to 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<br>Depth: 230 mm<br>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: | 300 to 3000 rpm, in 50 rpm increments |
| with a load above 80 g: | 300 to 2000 rpm, in 50 rpm increments |
| for tube holders and DWP: | up to max. 2000 rpm |
| Adjustable mixing time: | up to 19:45 min. in 15 s increments,<br>from 20 min. to 59 min. in 1 min. increments,<br>from 1.0 h to 99.5 h in 0.5 h increments<br>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, function 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<br>5353 000.022 | 022674226<br>022674200 | **MixMate**<br>230 V<br>120 V |
| 5353 040.113<br>5353 040.121<br>5353 040.130 | 022674005<br>022674021<br>022674048 | **Tube Holder**<br>PCR 96<br>0.5 mL<br>1.5/2.0 mL |
| 5353 863.101 | 5353863101 | **Cover caps**<br>set of 4 |

## 10.2 Tubes and plates

| Order No. (International) | Order No. (North America) | Description |
|---|---|---|
| 0030 121.023 | 022363611 | **Safe-Lock micro test tubes**<br>0.5 mL per 500 pieces<br>colorless |
| 0030 120.086 | - | **Safe-Lock micro test tubes**<br>1.5 mL per 1,000 pieces<br>colorless |
| 0030 120.094 | - | **Safe-Lock micro test tubes**<br>2.0 mL per 1,000 pieces<br>colorless |
| 0030 124.502 | 951010057 | **PCR tubes**<br>thin-walled with hinged lid, colorless, 500 pieces<br>0.5 mL |
| 0030 124.332 | 951010006 | **PCR Tubes**<br>0.2 mL, colorless, 1,000 pieces |
| 0030 124.340 | 951010014 | **Five-tube strip for 0.2 mL PCR Tubes**<br>colorless, pack of 125 (= 625 tubes) |

| Order No. (International) | Order No. (North America) | Description |
|---|---|---|
| 0030 124.359 | 951010022 | **PCR Tube Strips**<br>0.2 mL, colorless, 120 strips |
| 0030 124.200 | 951010006 | **PCR Tubes**<br>0.2 mL per 1,000 pieces<br>colorless |
| 0030 128.648<br>0030 128.575 | 951020401<br>951020303 | **twin.tec PCR Plate 96**<br>Wells colorless<br>skirted, colorless, 25 pcs.<br>semi-skirted, colorless, 25 pcs. |
| 0030 521.102 | 951031003 | **Eppendorf Deepwell Plate 384/200 µL**<br>40 plates, wells clear<br>PCR Clean, white border color |
| 0030 501.101 | 951031801 | **Eppendorf Deepwell Plate 96/500 µL**<br>40 plates, wells clear<br>PCR Clean, white border color |
| 0030 501.209 | 951032603 | **Eppendorf Deepwell Plate 96/1000 µL**<br>20 plates, wells clear<br>PCR Clean, white border color |
| 0030 501.306 | 951033405 | **Eppendorf Deepwell Plate 96/2000 µL**<br>20 plates, wells clear<br>PCR Clean, white border color |

All plates are also 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 our website www.eppendorf.com.

### 10.3 IsoTherm-System

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

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# 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:

MixMate 5353

Produkttyp, Product type:

Mixer für Reaktionsgefäße und Platten / Mixer for micro test tubes and plates

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

2006/95/EG, EN 61010-1, EN 61010-2-051

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

2011/65/EU

H.-G. Kö

Vorstand, Board of Management:

Projektmanagement, Project Management:

07.10.2011

Hamburg, Date:

ISO CERTIFIED 9001

eppendorf

Eppendorf AG · Barkhausenweg 1 · 22339 Hamburg · Germany

# Declaration of Conformity

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”

Product name:
**MixMate 5353**

Product type:
**Mixer for microtest tubes and plates with integrated touch vortex function**

**Hand-arm-vibration assessment of MixMate 5353 in accordance with DIN ISO 5349-1:2001**
Tests were performed on the MixMate operated in the “touch vortex” operation mode (3500 rpm) with 15 ml and 50 ml Falcon 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/s$^2$ 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/s$^2$ 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 reprensentative 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 m/s$^2$ | Daily exposure value m/s$^2$ | 1 HOUR exposure points | Time – single tool use: For not exceeding EAV 2.5 m/s$^2$ minutes | ELV 5 m/s$^2$ minutes |
|---|---|---|---|---|---|---|
| | 15 ml | 5.2 | 1.8 | 54 | 111 | 444 |
| | 50 ml | 9.4 | 3.3 | 177 | 34 | 136 |

Exposure Action Value (EAV)
The table indicates that the operator using 15 ml Falcon tubes in touch vortex mode (3500 rpm) with reported usage would reach the EAV in 111 minutes and using 50 ml Falcon 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 of the 15 ml or 58 of the 50 ml Falcon tubes could produce exposures that reach the EAV. With a usage pattern of 15 seconds vortex / 5 seconds gap, 333 x 15 ml tubes or 102 x 50 ml tubes may be vortexed without exceeding the EAV.
With a usage pattern of 45 seconds vortex / 5 seconds gap 133 x 15 ml tubes or 40 x 50 ml tubes may be vortexed.

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Exposure Limit Value (ELV)

The table indicates that the operator using 15 ml Falcon tubes in touch vortex mode (3500 rpm) with reported usage would reach the ELV in 444 minutes and using 50 ml Falcon tubes in 136 minutes. Based on a usage pattern of 30 seconds vortex / 5 seconds gap, this means that approximately 761 of the 15 ml or 233 of the 50 ml Falcon 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 x 15 ml tubes or 408 x 50 ml tubes must be vortexed until the ELV is reached. With a usage pattern of 45 seconds vortex / 5 seconds gap 532 x 15 ml tubes or 163 x 50 ml tubes must be vortexed.

| **Vortex time** (5 sec gap) | **Number of tubes to reach** | | | |
|---|---|---|---|---|
| | **EAV** | **ELV** | **EAV** | **ELV** |
| | **15 ml** | | **50 ml** | |
| 15 sec | 333 | 1332 | 102 | 408 |
| 30 sec | 190 | 761 | 58 | 233 |
| 45 sec | 133 | 532 | 40 | 163 |

| **Vortex time** (5 sec gap) | **Number of tubes for not exceeding** | | | |
|---|---|---|---|---|
| | **EAV** | **ELV** | **EAV** | **ELV** |
| | **15 ml** | | **50 ml** | |
| **15 sec** | 333 | 1332 | 102 | 408 |
| **30 sec** | 190 | 761 | 58 | 233 |
| **45 sec** | 133 | 532 | 40 | 163 |

Dr. H. G. Köhn
Managing Director

H. G. Schmidt
Head of Quality Management

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TÜV NORD

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.** | **Measurement surface sound pressure level:** | 31.2 dB(A) |
| | **Sound power level:** | **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.

TÜV NORD

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.** | **Measurement surface sound pressure level:** | 33.1 dB(A) |
| | **Sound power level:** | **41.0 dB(A)** |

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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: | Allorund 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.** | **Measurement surface sound pressure level:** | 46.1 dB(A) |
| | **Sound power level:** | **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.


# Evaluate your operating manual

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