eppendorf

Eppendorf ThermoMixer® C

Operating manual

Table of contents

1   Operating instructions
1.1   Using this manual

‣ Read this operating manual completely before using the device for the first time. Observe the instructions for use of the accessories where applicable.
‣ This operating manual is part of the product. Please keep it in a place that is easily accessible.
‣ Enclose this operating manual when transferring the device to third parties.
‣ The current version of the operating manual for all available languages can be found on our webpage www.eppendorf.com/manuals.

1.2   Danger symbols and danger levels
1.2.1   Danger symbols

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

⚠	**Hazard point**	☣	**Biohazard**
⚡	**Electric shock**	🔥	**Highly flammable substances**
✋	**Risk of crushing**	♨	**Hot surface**
❋	**Material damage**		

1.2.2   Danger levels

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
1. 2.	Actions in the specified order
▶	Actions without a specified order
•	List
Text	Display or software texts
❶	Additional information

2   Safety
2.1   Intended use

The Eppendorf ThermoMixer C is designed for the temperature control and mixing of liquids in closed tubes and closed plates for the preparation and processing of samples.

The Eppendorf ThermoMixer C is exclusively intended for indoor use. All country-specific safety requirements for operating electrical equipment in laboratories must be observed.

Only use Eppendorf accessories or accessories recommended by Eppendorf.

The product can be used for training, routine and research laboratories in the areas of life sciences, industry or chemistry. This product is intended to be used for research purposes only. Eppendorf does not provide a warranty for other applications. The product is not suitable for use in diagnostic or therapeutic applications.

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 and the instructions for use of the accessories 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 affected. The liability for any resulting damage or personal injury is then transferred to the owner:

- 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 that are not recommended by Eppendorf.
- The device is maintained or repaired by persons not authorized by Eppendorf AG.
- The user makes unauthorized changes to the device.

2.4 Warnings for intended use

Read the operating manual and observe the following general safety information before using the Eppendorf ThermoMixer C.

WARNING! Risk of electric shock due to damage to the device or the mains/power cord.

‣ Only switch on the device if the device and the mains/power cord are undamaged.
‣ Only operate devices which have been installed or repaired properly.
‣ In the event of danger, disconnect the device from the mains/power supply voltage. Disconnect the mains/power plug from the device or the earth/grounded socket. Use the isolating device intended for this purpose (e.g., the emergency switch in the laboratory).

WARNING! Risk of burns from hot surfaces.
The thermoblock and the heating/cooling plate can be very hot after heating and cause burns.

‣ Allow the thermoblock and the heating/cooling plate to cool down completely before removing the thermoblock.

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

‣ When handling infectious liquids and pathogenic germs, observe the national regulations, the biosafety level of your laboratory, and the manufacturers' Safety Data Sheets and application notes.
‣ Wear your personal protective equipment.
‣ For comprehensive regulations about handling germs or biological material of risk group II or higher, please refer to the "Laboratory Biosafety Manual" (source: World Health Organization, Laboratory Biosafety Manual, in the currently valid version).

WARNING! Risk of fire.

‣ Do not use this device to process any highly flammable liquids.

⚠️ **WARNING! Contamination due to opening seals of consumables.**
In the following cases, the seals of micro test tubes or plates can spring open. Sample material can escape.

- High vapor pressure of the content
- Improperly sealed lid
- Damaged sealing lip
- Improperly fastened foil

▸ Always check that consumables have been sealed tightly before use.

⚠️ **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 biosafety level of the lab.

⚠️ **CAUTION! Risk of 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 accessories and spare parts other than those recommended or from improper use.

▸ Only use accessories and original spare parts recommended by Eppendorf.

⚠️ **CAUTION! Risk of crushing form movable parts.**

▸ Do not replace any consumables during the mixing process.
▸ Do not remove the Transfer Rack during the mixing process.
▸ Do not remove the thermoblock during the mixing process.
▸ Put on the ThermoTop or Lid prior to the mixing process.
▸ Do not remove the ThermoTop or Lid during the mixing process.

🔆 **NOTICE! Damage due to strong vibrations.**
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 the display due to mechanical pressure.

▶ Do not apply any mechanical pressure to the display.

NOTICE! Risk of damage due to overheating.

▶ Do not install the device near heat sources (e.g., heaters, drying cabinets).
▶ Do not expose the device to direct sunlight.
▶ Ensure unobstructed air circulation. Maintain a clearance of at least 10 cm around all ventilation gaps.

2.5 Danger symbols on the device

Depiction	Meaning	Location
	Risk of burns from hot surfaces.	• Upper side of the device • On the thermoblock
	Hazard point ▶ Observe the operating manual.	• Rear of the device • On the thermoblock

3 Product description
3.1 Delivery package

Quantity	Description
1	Eppendorf ThermoMixer C (without thermoblock)
1	Mains/power cord
1	Operating manual

▸ Check that the delivery is complete.
▸ Check all parts for transport damage.
▸ To safely transport and store the device, retain the transport box and packing material.

3.2 Product overview
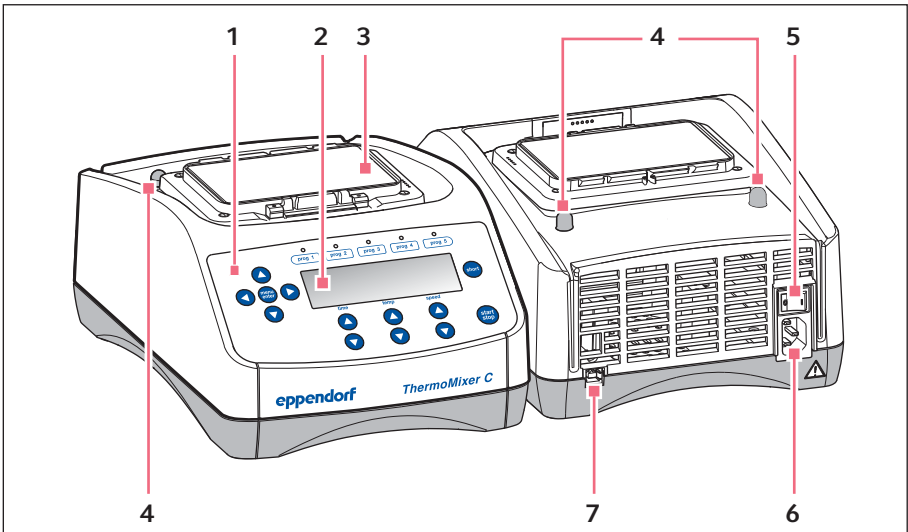
Fig. 3-1:   Eppendorf ThermoMixer C

1 Operating controls

2 Display

3 Heating/cooling plate

4 Centering pins

5 Mains/power switch

6 Mains/power cord socket

7 USB interface (for connecting to VisioNize)

3.3 Features

You can use the Eppendorf ThermoMixer C to perform two basic applications of sample preparation in one convenient step: The simultaneous mixing and temperature control of the sample material.

The thermoblocks can be exchanged quickly and easily, without the use of tools. The thermoblocks can be used with the following lab vessels:
- Micro test tubes with volumes of 0.2 mL to 5.0 mL
- Conical tubes with volumes of 15 mL to 50 mL
- Microplates and deepwell plates with any kind of bottom shape
- PCR plates in 96 and 384-well format
- Tubes with a diameter of 11.0 mm to 11.9 mm
- Cryogenic tubes with volumes of 2.0 mL

Temperature control
- Peltier cooling allows samples to be cooled to 15 °C below ambient temperature.
- The temperature range can be set from 1 °C to 110 °C.

Mixing
- Depending on the utilized thermoblock, you can select mixing frequencies between 300 rpm and 3 000 rpm.
- Anti-spill technology prevents lid wetting and cross contamination.
- The controlled and efficient mixing movement of the ^{2D}Mix-Control technology provides for a fast and complete mixing even of minimum volumes.
- **Short Mix:** Short, uncomplicated mixing of sample material. The mixing process is performed at the selected speed as long as you press the **short** key.
- **Interval Mix:** Continuous switching between mixing phases and pauses. The mixing frequency and the duration are freely selectable.
- **Interrupt time counting:** If you want to add reagents or exchange tubes while mixing, you can interrupt the mixing process and the time counter.

Multi-level mixing/temperature control
- In addition to a normal mixing/temperature control run, you can freely define programs with up to four successive levels ("steps"). The program levels automatically run one after the other.
- A total of 20 program slots is available.
- Program keys: The 5 most common mixing and temperature control parameters are already stored as programs and can be selected directly with the program keys. The programs can be overwritten.

Lid and ThermoTop

• The Lid ensures uniform temperature control and protects samples from unwanted exposure to light.
• The ThermoTop prevents the formation of condensation on the inner wall or the lid of the tube thanks to the **condens.***protect* technology.

SmartExtender

• The SmartExtender heats up lab vessels, independently from the SmartBlock, in a second temperature zone.

Thawing cells

• The SmartBlock cryo thaw automatically thaws frozen eukaryotic cells in cryogenic tubes.

4 Installation
4.1 Selecting the location

Select the location of the device 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 location must be well ventilated
- The location is protected against direct sunlight

> **ⓘ** The mains/power switch and the disconnecting device of the mains/power line must be easily accessible during operation (e.g., a residual current circuit breaker).

4.2 Installing the instrument

⚠ **WARNING! Risk due to incorrect voltage supply.**

- ▶ Only connect the device to voltage sources which correspond with the electrical requirements on the name plate.
- ▶ Only use earth/grounded sockets with a protective earth (PE) conductor.
- ▶ Only use the mains/power cord supplied.

1. Place the Eppendorf ThermoMixer C on a suitable work surface.
   Position the device in such a way that the ventilation slots of the device are not obstructed.
2. Connect the power cable to the power connection socket of the device and the power supply.

5 Operation
5.1 Operating controls
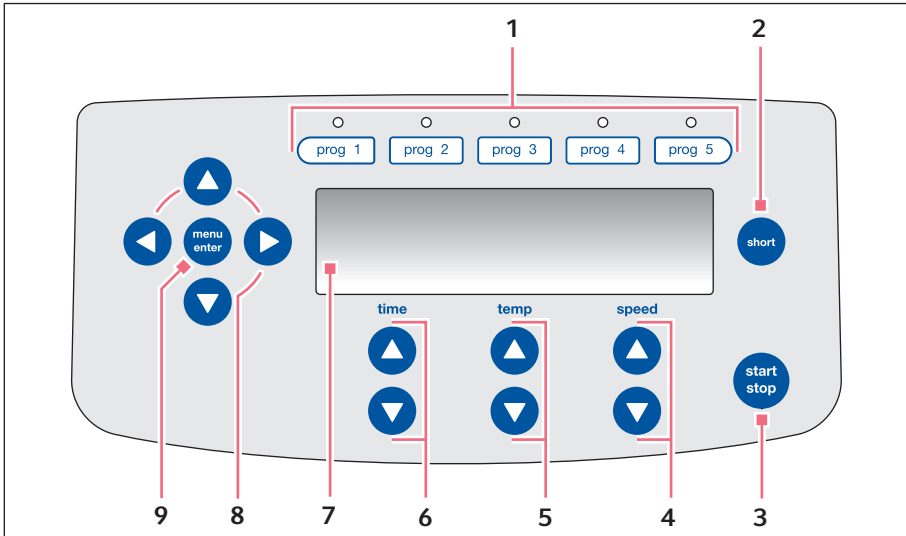
Fig. 5-1:   Eppendorf ThermoMixer C operating controls

1 Program keys with control LEDs

2 short key
Short Mix will run as long as the **short** key is pressed.

3 start/stop key
Press the **start/stop** key: Start or stop mixing/temperature control

4 speed arrow keys
Setting the mixing frequency

5 temp arrow keys
Setting the temperature

6 time arrow keys
Setting the mixing time

7 Display

8 Menu arrow keys
Navigating in the menu

9 menu/enter key
Open the menu
Confirm your selection
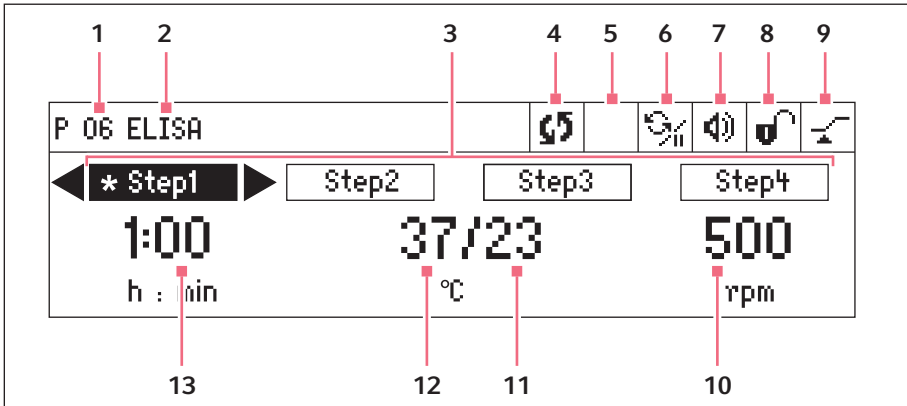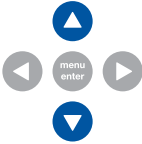
Fig. 5-2:   Display Eppendorf ThermoMixer C

1 Program number

2 Program name

3 Program levels (step 1 to step 4)
*: current step

4 Device status
⟳ Device is performing mixing/
temperature control.
❙❙ Mixing process interrupted,
temperature control to be continued.

5 ThermoTop
🅼 ThermoTop has been attached.
🖰 SmartExtender is attached.

6 Interval Mix
⬙ Interval Mix has been activated for
the current step.

7 Speaker
🔊 Speaker switched on.
🔇 Speaker switched off.

8 Key lock
🔒 Key lock is activated: Parameters
cannot be changed.
🔓 No key lock.

9 Time mode
⤓ *Time Control* Time counting begins
immediately.
⤒ *Temp Control* Time counting begins
when the set temperature has been
reached.

10 Mixing frequency

11 Actual temperature

12 Set temperature
When the set temperature has been
reached, only one value is displayed.

13 Mixing time

5.2 Setting the language

The device is delivered with *English* as the default language. To set another language,
proceed as follows:

1. Switch on the device with the power switch at the rear of
   the device.

2. To open the menu, press the **menu/enter** key.

3. Select the *Settings* menu item with the menu arrow key.

4. To confirm your selection, press the **menu/enter** key.

5. Select the *Language* menu item with the menu arrow keys.
   Confirm with the **menu/enter** key.

6. Select the language with the menu arrow keys and press
   the **menu/enter** key.
   A checkmark will appear in front of the selected language.

7. To exit the menu, press the left menu arrow key several
   times.

5.3 Installing the thermoblock

⚠️ **WARNING! Personal injury or material damage due to chemically or mechanically damaged thermoblocks.**

‣ Do not use thermoblocks that show signs of corrosion or mechanical damage.
‣ Check the condition of the thermoblocks regularly.

❄️ **NOTICE! Damage to electronic components due to condensation.**
Condensate may form in the device when it has been transported from a cool environment to a warmer environment.

‣ After installing the device, wait for at least 3 h. Only then connect the device to the mains/power line.

When you attach the thermoblock, the device automatically recognizes the mounted thermoblock. The mixing frequency is automatically limited to the maximum value for the thermoblock being used.

5.3.1 Attaching the thermoblock
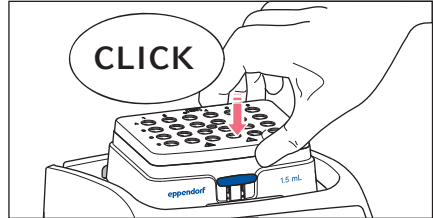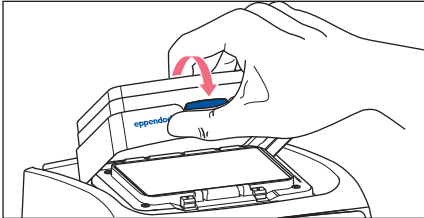
1. First only attach the rear edge of the thermoblock. The writing must face to the front.
2. Push the front edge of the thermoblock down.
   • The thermoblock audibly engages.
   • The display shows the name of the thermoblock.

5.3.2   Removing the thermoblock

⚠ **WARNING! Risk of burns from hot surfaces.**
The thermoblock and the heating/cooling plate can be very hot after heating and cause burns.

‣ Allow the thermoblock and the heating/cooling plate to cool down completely before removing the thermoblock.
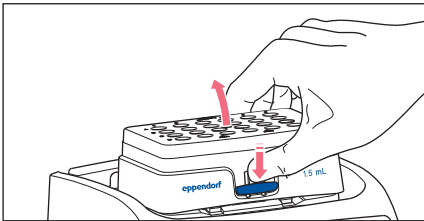
1. To unlock the thermoblock, press the lever at the front of the thermoblock down.
2. Lift the front edge so that the thermoblock is tilted backwards.
3. Remove the thermoblock upwards.

5.4   Inserting tubes and plates

⚠ **WARNING! Risk of injury due to incorrect consumables.**
• Poorly fitting tubes or plates can become detached from the thermoblock.
• Glass tubes can smash.

‣ Only use the thermoblocks with the consumables intended for this purpose.
‣ Never use tubes made of glass or other fragile material.

⚠ **WARNING! Risk of burns from hot adapter.**

‣ Do not touch the hot adapter when you remove it from the thermoblock.
‣ Place the hot adapter with the extraction tool on a heat-resistant surface.
‣ Allow the hot adapter to cool down completely.

5.4.1 Inserting adapters for Conical Tubes 25 mL

The Conical Tube 25 mL is always used together with an adapter.
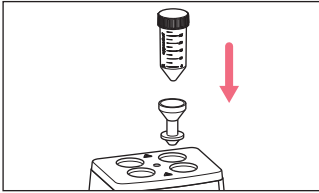
1. Insert the adapter into the bores of the thermoblock and press it down to the base.

5.4.2 Removing adapters for Conical Tubes 25 mL
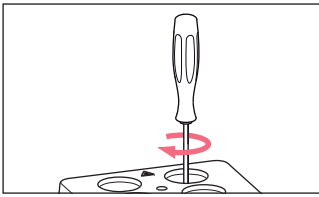
1. Screw the extraction tool into the adapter's threaded hole.
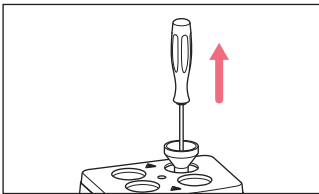
2. Use the extraction tool to remove the adapter completely from the bore of the thermoblock.

5.4.3 Inserting tubes

▸ Only use closed tubes.

▸ Insert the tubes completely into the bores of the thermoblock.

5.4.4 Inserting the plate

ⓘ The height sensor of the SmartBlock *plates* automatically differentiates between deepwell plates and microplates.

▸ When inserting microplates, make sure that the height sensor is not covered.

▸ Take care that the height sensor does not get contaminated.
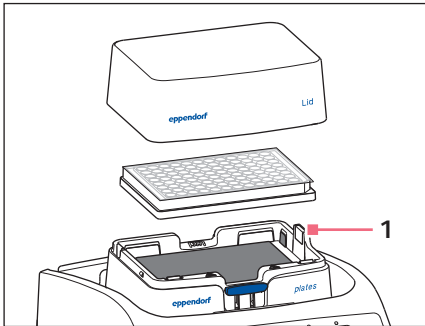
Fig. 5-3:   1 – SmartBlock *plates* height
                    sensor

▸ Only use closed plates.
▸ Insert the plate with the back edge first.
   Then press it down at the front.
▸ To ensure uniform temperature control
   in all wells, place the lid on the
   thermoblock.

5.5   Controlling the thermoblock temperature

NOTICE! Damaged plates due to temperatures that are too high.
Polystyrene microplates melt at temperatures above 70 °C.
Polypropylene deepwell plates deform at temperatures above 80 °C. Deformed
plates may become detached from the thermoblock or are more difficult to
remove.

▸ Temper polystyrene microplates up to 70 °C max.
▸ If you are heating deepwell plates above 80 °C, do not exceed the mixing
   frequency of 1000 rpm.

NOTICE! Change in the material of consumables at extreme temperatures.
Extreme temperatures (e.g., during freezing or autoclaving) affect the material.
The mechanical strength, dimensions and shape of the consumable will change.

▸ Use consumables that are suitable for the selected temperature range or the
   selected procedure.

The Eppendorf ThermoMixer C can control temperature in a range from 15 °C below
ambient temperature to 110 °C.

• When the actual temperature flashes on the display, the device is not in
  temperature control mode operation.
• As soon as the set temperature is modified with the **temp** arrow keys, the
  device will start temperature control.
• When the set temperature has been reached, the display only shows a value.

5.5.1 Temperature control with time setting

Prerequisites

The time mode is set to *Time Control* ⌐

(See chapter "Mixing/temperature control with *Time Control* or *Temp Control*")

1. To switch off the mixing function, select the 0 rpm setting with the **speed** arrow keys
   (▼ before 300 rpm or ▲ after 3 000 rpm).

			◁》	🔓	⌐
10:00	**0/37**			**0**	
min : s	℃			rpm	

2. Set the temperature control duration with the **time** arrow keys.
3. Set the temperature with the **temp** arrow keys.
4. To start the time counter, press the **start/stop** key.

   - The ⟳ symbol flashes on the display.
   - The temperature control duration is counted down.
   - The display shows the remaining temperature control duration and the actual
     temperature/set temperature.
   - A signal sounds after the temperature control duration has elapsed.

5.6 Mixing

ℹ️ You can select a mixing frequency between 300 rpm and 3 000 rpm. The mixing
   frequency can be set in increments of 50 rpm.

5.6.1 Mixing without temperature control

1. To switch off temperature control, use the **temp** arrow keys to select the *off* setting
   (▼ before 1 °C or ▲ after 110 °C).

					◁»)	⌂	⤙
01:00			**off**			**1000**	
h : min			°C			rpm	
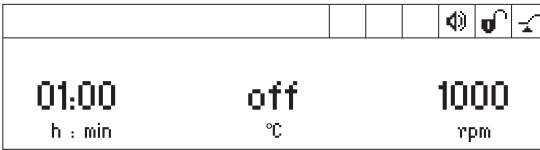
2. Set the mixing time with the **time** arrow keys.
3. Set the mixing frequency with the **speed** arrow keys.
4. To start the mixing process, press the **start/stop** key.
   - The ⟳ symbol flashes on the display.
   - The mixing time is counted down.
   - The display shows the remaining mixing time, *off* and the mixing frequency.
5. The device stops automatically when the set mixing time has elapsed.
   - A signal tone sounds.
   - The display shows the last used parameters.

5.6.2 Mixing and temperature control

1. Set the mixing time with the **time** arrow keys.
2. Set the temperature with the **temp** arrow keys.
   The device immediately starts temperature control.
3. Set the mixing frequency with the **speed** arrow keys.

					◁»)	⌂	⤙
01:00			**0/37**			**1000**	
h : min			°C			rpm	

4. To start the mixing process, press the **start/stop** key.
   - The ⟳ symbol flashes on the display.
   - The mixing time is counted down.
   - The display shows the remaining mixing time, the actual temperature/set temperature and the mixing frequency.
5. The device stops automatically when the set mixing time has elapsed.
   - A signal tone sounds.
   - The display shows the last used parameters.
   - Temperature control is continued.

5.6.3 Mixing/temperature control with continuous run

ⓘ **Icing up of the thermoblock**
Ice may form on the thermoblock if samples are tempered at low temperatures for a long time.

1. To mix without any time limits, use the **time** arrow keys to select the ∞ setting (▾ before 5 s or ▴ after 99:30 h).
2. Set the temperature with the **temp** arrow keys.
   The device will immediately start temperature control.
3. Set the mixing frequency with the **speed** arrow keys.

```
                                          ◁)) 🔓 ⌇
    ∞              15/37            1000
                    °C              rpm
```

4. To start the mixing process, press the **start/stop** key.
   - The 🔄 symbol flashes on the display.
   - The display alternately shows the mixing time and the ∞ symbol, the actual temperature/set temperature and the mixing frequency.
   - The mixing time is counted up.
5. To end the mixing process, press the **start/stop** key.
   - A signal sounds.
   - The display shows the last used parameters.
   - Temperature control is continued.

ⓘ A mixing time of more than 99:30 h is possible. After 99:30 h has passed, the display will only show the ∞ symbol.

5.6.4 Interrupting the mixing process

If you want to add reagents or exchange tubes while mixing, you can interrupt the mixing process. Temperature control will continue to run during the pause.

1. To interrupt the mixing process, keep the **start/stop** key pressed for 2 s.

```
                        ❚❚         ◁)) 🔓 ⌇
    Pause            37            1000
    h : min          °C            rpm
```
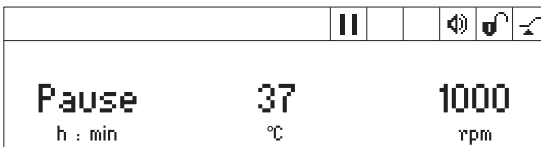
- The display shows *Pause*.
- The mixing process is interrupted.

- Time counting is stopped.
- Temperature control is continued.

2. To continue the mixing process, press the **start/stop** key.

5.6.5   Short Mix

Use the Short Mix function for short mixing times without temperature control.

1. Set the mixing frequency with the **speed** arrow keys.
2. Keep the **short** key pressed.
   The mixing process will run as long as the **short** key is pressed.
3. To end Short Mix, release the **short** key.

5.6.6   Mixing/ temperature control with *Time Control* or *Temp Control*

You can specify when time counting should begin:
- Time counting and mixing process begin immediately: ⌐ *Time Control*
- Time counting and mixing process begin when the set temperature has been reached: ⌐ *Temp Control*

1. To open the menu, press the **menu/enter** key.
2. Use the menu arrow keys to select *SmartBlock* > *Time Mode*

```
Menu/Time Mode                        ⌐
    Back
   √Time Control
    Temp Control                      ▲
                                      ▼

```
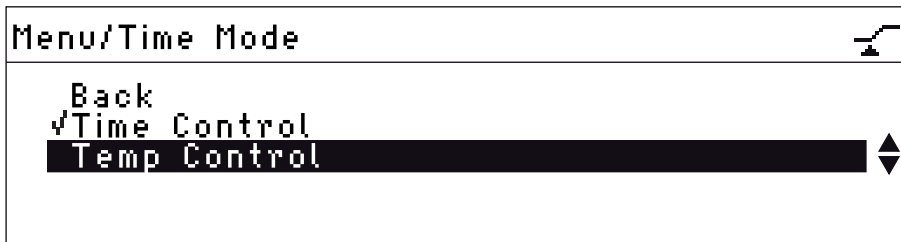
3. Use the menu arrow keys to select *Time Control* or *Temp Control*. Confirm with the **menu/enter** key.
   A tick indicates the selected setting.
4. To exit the menu, press the left ◄ menu arrow key 3 times.

5.7 Navigating in the menu

The menu has 4 levels. To change settings, proceed as follows:

1. To open the menu, press the **menu/enter** key.

2. Select the menu item with the menu arrow keys.

3. To confirm your selection, press the **menu/enter** key.

4. Change the settings with the menu arrow keys.

5. To confirm the changed setting, press the **menu/enter** key. A tick appears in front of the setting.

6. To exit the menu level, select *Back* in the menu and press the **menu/enter** key or press the left arrow key.

5.8 Menu structure
5.8.1 Overview

Menu level 1	Menu level 2	Menu level 3	Menu level 4/settings
Back			
Exit program (if it is loaded)			
SmartBlock			
	Back		
	Programs		
		Back	
		P 01 --	
			Back
			Load
			Edit
			Delete
		...	
		P 20 --	
	Time mode		
		Back	
		Time Control ⌐	
		Temp Control ⌐	
SmartExtender (if it is attached)			
Key lock			
	Back		
	Key lock on 🔒		
	Key lock off 🔓		
Settings			

Menu level 1	Menu level 2	Menu level 3	Menu level 4/settings
	Back		
	Signal tones		
		Back	
		Volume 🔊	0%, 20%, 40%, 60%, 80%, 100%
		Repetitions	1 x, 5 x, 10 x, 30 x, unlimited
	Contrast		
		Back	
		Contrast	
			0%, 25%, 50%, 75%, 100%
	Language		
		Back	
		English	
		German	
		French	
		Italian	
		Spanish	
	Service		
		Back	
		No notification	
		After 500 operating hours	
		After 1000 operating hours	
		After 2000 operating hours	

5.8.2 Key lock

Menu items and options	Description	Symbol on the display
• *Key lock on*	• Parameters cannot be changed.	🔒
• *Key lock off*	• Parameters can be changed.	🔓

5.9 Programs

A program consists of up to four program levels ("steps"). The program levels automatically run one after the other. You can save separate settings for each program level:

- Mixing time/temperature control duration
- Mixing frequency
- Temperature
- Program levels with pause interval (Interval Mix).
- Program levels with restricted ramp rates.

The program ends automatically.

> ℹ️ The Eppendorf ThermoMixer C has 20 program slots.
> At the end of this operating manual there is a printed form of a program table. The program data can be noted there.

5.9.1 Creating a program

1. To open the menu, press the **menu/enter** key.
2. Use the menu arrow keys to select the *SmartBlock* > *Programs* menu item. Confirm with the **menu/enter** key.
3. Use the menu arrow keys to select an empty program slot. Confirm with the **menu/enter** key.

```
 P 06
 ┌─────────────────────────────────────┐
 │ Cancel      ◄│ Save │►     Options   │
 │   01:00        37        1000        │
 │   h : min       ℃         rpm        │
 └─────────────────────────────────────┘
```

5.9.1.1 Creating a single-level program

1. Set the mixing time, temperature, and mixing frequency with the **time**, **temp** and **speed** arrow keys.
2. Use the menu arrow keys to select *Save*. Confirm with the **menu/enter** key.

Entering the program name

```
P 06
        Cancel        ◀     Save      ▶
    ▲   A B C D E F G H I J K L M
  ◀   ▶ N O P Q R S T U V W X Y Z
    ▼   1 2 3 4 5 6 7 8 9 0 _ ←
```

3. Select letters or numbers with the menu arrow keys and confirm with the **menu/enter** key.
   The program name can have a maximum of 15 characters.
   To delete individual characters, select ← and press the **menu/enter** key.
4. To save the program with the program name, use the menu arrow keys to select *Save*.
5. Select the program slot with the menu arrow keys. Confirm with the **menu/enter** key.

5.9.1.2 Creating a multi-level program

1. Select an empty program slot in the *Menu* > *SmartBlock* > *Programs* menu item.

Defining step 1

2. Set the mixing time, temperature, and mixing frequency for the first program level with the **time**, **temp** and **speed** arrow keys.

Adding step 2

3. Select *Options*. Confirm with the **menu/enter** key.

```
P 06 /Options
      Back
      Add step                    ◆
      Delete step
      Interval Mix
      Ramp rates
```

4. Select *Add step*. Confirm with the **menu/enter** key.

```
P 06
      Cancel          Save      ◀  Options  ▶

Step 1      01h:00 m       37 ℃       1000 rpm
Step 2      10 m:00 s      56 ℃        500 rpm  ▲
```

The set parameters have been adopted in step 1.

5. Set the parameters for the second program level.
• To save the program with 2 program levels, select *Save*.
• To program a third and a fourth program level, respectively select *Options* > *Add step*.

> ℹ️   To delete a step from a program, select *Options* > *Delete step*.

5.9.2 Interval Mix: Creating a program level with pause interval

By using the Interval Mix function, you can determine the mixing process to be interrupted by one or several pauses within one program **level**. Interval Mix can only be specified in programs. For program levels with Interval Mix, the symbol ⅍ will appear on the display.

1. Select an empty program slot under *Menu* > *SmartBlock* > *Programs*.
2. Set the mixing time, temperature, and mixing frequency with the **time**, **temp** and **speed** arrow keys.
   Select the mixing time so that it covers the entire duration, including mixing processes and pauses.
3. Select *Options*. Confirm with the **menu/enter** key.
4. Select *Interval Mix*. Confirm with the **menu/enter** key.

```
P 06 /Options/Interval Mix
   Cancel          ◀  Save  ▶

   10 m : 00 s    Mixing time         ↻
   01 m : 00 s    Pause             ❚❚ ↕
```

5. Set the mixing time (before the pause) in the *Mixing time* row using the **time** arrow keys.
6. Set the pause duration in the *Pause* row using the **time** arrow keys.
7. To save the program, select *Save*. Confirm with the **menu/enter** key.
   The Interval Mix settings are now saved for the program level.

> ℹ️   To program a change between several mixing processes and pauses within a program level, select a correspondingly longer mixing time for the program level:
> **Change between mixing process and pause:**
> • Mixing time set for the program level: 6:00 min
> • Interval Mix: *Mixing time*: 1:00 min, *Pause*: 0:30 min
>
> In the program level the device performs the setting 1 min mixing and 0:30 min pause 4 times.

5.9.3 Restricting ramp rates

You can use the Eppendorf ThermoMixer C to restrict the heating rate as well as the cooling rate. Restricted ramp rates can only be specified for programs.

Tab. 5-1: Heating rates and cooling rates

Heating rate	max. 3.0 °C/min	max. 2.0 °C/min	max. 1.0 °C/min	max. 0.1 °C/min
Cooling rate	max. 1.0 °C/min	max. 0.5 °C/min	max. 0.1 °C/min	

1. Select an empty program slot under *Menu* > *SmartBlock* > *Programs*.
2. Set the mixing time, temperature, and mixing frequency with the **time**, **temp** and **speed** arrow keys.
3. Select *Options*. Confirm with the **menu/enter** key.
4. Select *Ramp rates*. Confirm with the **menu/enter** key.

5. Use the menu arrow keys to select and change *Heating rate* or *Cooling rate*.
6. To exit the *Ramp rates* menu, select the *Back* menu item. Confirm with the **menu/enter** key.

> When you start a program that runs with restricted heating or cooling rates, a message is displayed: *The program's ramp rates are restricted.*

5.9.4 Quick save with program keys

To quickly save a single-level program, you can use the program keys.

1. Set the mixing time, temperature, and mixing frequency with the **time**, **temp** and **speed** arrow keys.
2. Keep one of the program keys **prog 1** to **prog 5** pressed for 2 seconds.
   - A signal tone sounds.
   - The LED above the program key lights blue.
   - The parameters of the program are saved.

> - If you want to assign a program name, save the program in the menu: *Menu* > *SmartBlock* > *Programs*.
> - If you want to save a multiple-level program under the program numbers 1 to 5, select the program slot under *Menu* > *SmartBlock* > *Programs*.

5.9.5   Loading a saved program

5.9.5.1   Loading program prog 1 to prog 5

On delivery, the **prog 1** to **prog 5** program keys are assigned as follows:

	Program name	Temperature	Mixing time/ temperature control duration	Mixing frequency
prog 1 key	Cooling	8 °C	∞	0 rpm
prog 2 key	Ligation	16 °C	16:00 h	0 rpm
prog 3 key	Restr. Digest	37 °C	1:00 h	1 000 rpm
prog 4 key	Prot. K Digest	56 °C	10:00 min	1 000 rpm
prog 5 key	Denaturation	95 °C	30:00 min	0 rpm

1. To call up a program on the program slots 1 to 5, press one of the program keys **prog 1** to **prog 5**.
   - The LED above the program key lights blue.
   - The display shows the parameters of the program.
2. To start the program, press the **start/stop** key.

5.9.5.2   Loading a program from the program list

1. To load a program from the program list, select the program under *Menu* > *SmartBlock* > *Programs*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select the *Load* menu item. Confirm with the **menu/enter** key.
   - The display shows the parameters of the program.
   - Programs with several program levels:
     The display shows the parameters of the first program level. To display the parameters of the other program levels, use the ◄ or ► menu arrow keys to select the corresponding step.
3. To start the program, press the **start/stop** key.

The asterisk marks the active program level Step 1. The display shows the parameters of Step 2.

ⓘ   The order of the steps cannot be changed.

5.9.6 Editing programs

There are two ways to change a saved program:
• Changing the program via the *Edit* menu item in the program list
• Changing the program during operation

5.9.6.1 Changing the program via the *Edit* menu item in the program list

1. To change the parameters of a program, select the program under *Menu* > *SmartBlock* > *Programs*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select the *Edit* menu item. Confirm with the **menu/enter** key.
   The display shows the saved parameters.

You can change all the parameters and save them.

5.9.6.2 Changing the program during operation

1. Load the program from the program list.
2. Change the parameters.
   For programs with program levels: Select a step with the ◄ or ► menu arrow keys. Change the parameters of the step.
3. Start the program.
After completion of the program, a message appears stating that the program has been changed. You can confirm or discard the changes.

5.9.7 Deleting/resetting a program

Programs 1 to 5 cannot be deleted. You can change and overwrite the program name and all the parameters of these programs.

1. To delete or reset a program, select the program under *Menu* > *SmartBlock* > *Programs*. Confirm with the **menu/enter** key.
2. Use the menu arrow keys to select the *Delete* menu item or reset. Confirm with the **menu/enter** key.
   The display shows the message *Confirm delete*. To confirm, press the **menu/enter** key.

5.9.8 Exiting the program

▸ To exit a program, press the **menu/enter** key.
▸ Select exit program. Confirm with the **menu/enter** key.

🛈 Programs P01 to P05 can also be exited by pressing the program keys **prog 1** to **prog 5**.

5.10 Special programs
5.10.1 Thawing cells

If a SmartBlock cryo thaw is installed, the ThermoMixer C can be used to thaw frozen samples in 2.0 mL cryogenic tubes.

The SmartBlock cryo thaw is not included in the delivery package of the ThermoMixer C.

> ℹ️ The thawing of eukaryotic cells has been optimized at room temperature for:
> - A 2 mL cryogenic tube filled with 1 mL of sample
> - Cells stored in the vapor phase of liquid nitrogen
> - 1 to 5 cryogenic tubes
>
> The optimized thawing time may change if these points are not observed.

5.10.1.1 Putting the SmartBlock cryo thaw into operation

Prerequisites

ThermoMixer C: Software version 3.5.0 or higher

1. Install the SmartBlock cryo thaw as described in the "Installing the thermoblock" chapter.
   In addition to the information window for SmartBlock recognition, an information window shows that a special program for thawing cells is available.

5.10.1.2 Calling the thawing program directly via the operating controls

▶ To call the thawing program directly via the operating controls, press the upper menu arrow key.

5.10.1.3 Calling the thawing program via the menu

1. To open the menu, press the **menu/enter** key.
2. Use the menu arrow keys to select the *SmartBlock* > *Thawing cells* menu item.
3. Confirm with the **menu/enter** key.

5.10.1.4 Running the program

Prerequisites

The *Next* menu item is highlighted in black on the display.
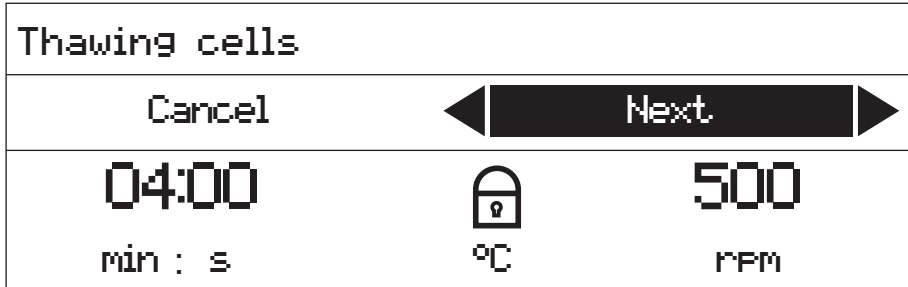
ℹ The temperature is not shown on the display while the program is running.

ℹ If the ambient temperature exceeds 30 °C, the samples should be removed from the thermoblock immediately after thawing.

1. Press the **menu/enter** or **start/stop** key.
   - The ⟳ symbol flashes on the display.
   - The thermoblock is heated up.
   - At the end of the heating phase a melody sounds, all program LEDs flash and the **Pause** symbol appears on the display.
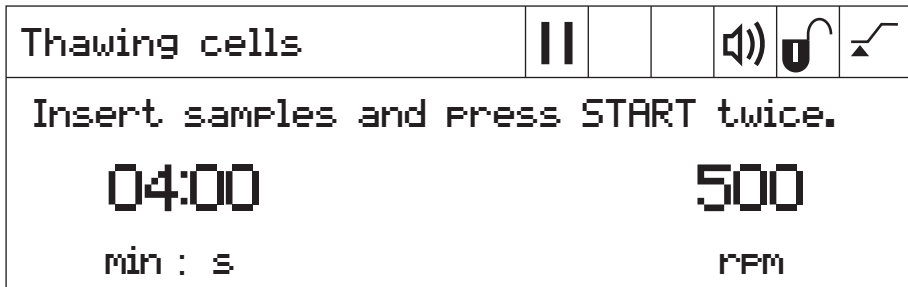
2. Place the samples into the thermoblock.
3. To start the thawing process, press the **start/stop** key 2 times.
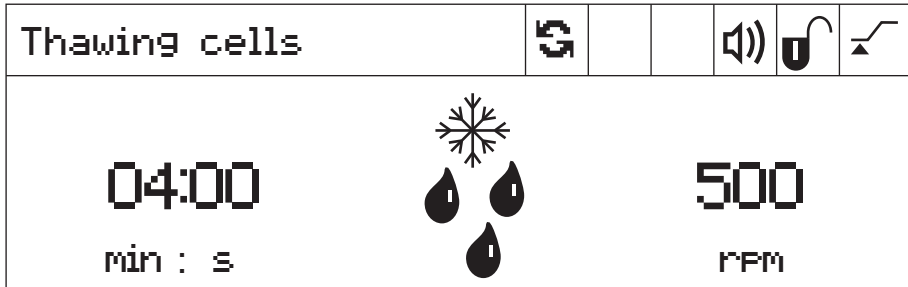
Display showing "Thawing cells", 04:00 min : s, a thawing symbol (snowflake with drops), and 500 rpm.

- The ⟳ symbol flashes on the display.
- The mixing time is counted down.
- The display shows the remaining mixing time, a thawing symbol (snowflake with drops) and the mixing frequency.

The device continues to run when the set mixing time has elapsed.

- All program LEDs flash and a melody sounds.
- The display alternately shows the elapsed time and a sample symbol.

4. To end the thawing process, press the **start/stop** key 2 times.
   The device stops.

5. Take the samples out of the thermoblock.

5.10.1.5 Changing the program before it is started

You have the option of changing the parameters before the start of the thawing process.

An overview of the program parameters can be found in the technical data.

ⓘ   The temperature cannot be changed. This is why a lock symbol is shown on the display instead of the temperature display.

▶ Enter the mixing time and the mixing frequency with the **time** and **speed** arrow keys.

5.10.1.6 Saving a program

If the settings of a program have been changed, a dialog box will prompt you to save the program when the program ends.

1. If you do not want to save the program, use the menu arrow keys to select the *No* button.
2. Confirm with the **menu/enter** key.
3. If you want to save the program, use the menu arrow keys to select the *Yes* button.
4. Confirm with the **menu/enter** key.
5. Select the program slot with the menu arrow keys.
6. Confirm with the **menu/enter** key.
   If an existing program is selected, a dialog box will ask you if you want to overwrite the program.
7. To overwrite the program, use the menu arrow keys to select the *Yes* button.
8. Confirm with the **menu/enter** key.

For a description how to quickly save a program, refer to the "Quick save with program key" section.

6   Software
6.1   Performing a software update

Prerequisites

- Computer with Windows 7 or Windows 10
  Administrator rights are not necessary.
- VisioNize box adapter cable
  Alternative: A shielded USB 2.0 high speed cable plug A to plug B

1. Switch on the device. Read the installed software version on the display.
   The installed software version appears on the display during the start-up process.

2. If the installed software version is older than the latest software version, perform an update.

3. Download the software as a ZIP file from the webpage https://www.eppendorf.com/software-downloads/.

4. Open the ZIP file.

5. Connect the device to the computer with the USB cable.

6. Switch on the device.

7. Start the "Eppendorf_ThermoMixer_Autoupdate.exe" program with a double click.

8. When prompted by the program, allow the software update to be performed.
   The software update starts immediately.

9. Wait until the prompt to close the window appears.
   Do not interrupt the update process.
   After the software update, the program will ask whether other devices should be updated.

10.If there are no other devices to be updated, answer no to the prompt.

11.If the software for another device needs to be updated, connect a new device.

12.Confirm the prompt.
   The update process is repeated.

7   Troubleshooting

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

7.1   General errors

Problem	Cause	Solution
Display remains dark.	No power supply.	▶ Check the mains connection and the power supply. ▶ Switch on the device.
Set temperature is not reached.	Set temperature is more than 15 °C below ambient temperature.	▶ Set up the device in a cooler environment.
ThermoTop LED does not light.	• No thermoblock has been attached • The thermoblock is not compatible with the ThermoTop.	▶ Use a compatible thermoblock with a **condens.protect** symbol: 〖💤〗
	The interface between the device and the ThermoTop is dirty.	▶ Remove any dirt from the front of the ThermoTop. ▶ Remove any dirt from the top of the device, especially from the viewing window beside the heating/cooling plate.
ThermoTop does not fit on the device.	• The thermoblock is not compatible with ThermoTop. • The lid is attached to the thermoblock. • TransferRack is attached. • SmartExtender is attached.	▶ Use a compatible thermoblock with a **condens.protect** symbol: 〖💤〗 ▶ If using the ThermoTop, do not use the lid. ▶ Remove the TransferRack when using the ThermoTop. ▶ Remove the SmartExtender when using the ThermoTop.
The device does not mix or control the temperature.	Various causes are possible.	▶ Contact your local Eppendorf partner.

7.2   Error messages

Problem	Cause	Solution
Thermoblock not detected.	• The thermoblock is not compatible with the device. • The thermoblock is not attached properly.	▶ Use a compatible thermoblock. ▶ Remove the thermoblock and then reattach it.
	• The interface between the device and the thermoblock is dirty.	▶ Remove any dirt from the bottom of the thermoblock. ▶ Remove any dirt from the top of the device, especially from the viewing window beside the heating/cooling plate.
Error message preceded by a number code.	• Various causes are possible.	1. Switch off the device and wait for 10 seconds. 2. Switch on the device. If the error message appears again, contact your local Eppendorf partner.
SmartExtender not detected by the device.	• Eppendorf ThermoMixer C requires software version 3.0.0 or higher to detect the SmartExtender.	▶ Perform a software update. The software can be downloaded from the Eppendorf webpage.
The special program not displayed in the menu.	• Eppendorf ThermoMixer C requires a more recent software version to recognize the special program.	▶ Perform a software update. The software can be downloaded from the Eppendorf webpage.

8 Maintenance
8.1 Setting a service interval

The Eppendorf ThermoMixer C offers the option of setting a service reminder for the device. To set a service interval, proceed as follows:

1. Under *Menu* > *Settings* select the *Service* menu item. Confirm with the **menu/enter** key.
2. Select the service interval with the menu arrow keys (after 500, 1 000 or 2 000 operating hours).
   To turn off the notification, select *No notification*.

A message will appear when the selected operating hours have been reached. Contact your local Eppendorf partner. You can find the contact addresses on the Internet at www.eppendorf.com/worldwide.

8.2 Cleaning

DANGER! Electric shock due to the ingress of liquid.

‣ Switch off the device and disconnect it from the mains/power line before commencing any cleaning or disinfection procedures.
‣ Do not allow any liquids to penetrate the inside of the housing.
‣ Use sealed vessels and sealed plates.
‣ Do not spray clean or spray disinfect the housing.
‣ Only reconnect the device to the mains/power line when it is completely dry, both inside and outside.

WARNING! Risk of burns from hot surfaces.
The thermoblock, the SmartExtender and the heating/cooling plate reach high temperatures that can lead to burns.

‣ Allow the thermoblock, the SmartExtender and the heating/cooling plate to cool down before removing the SmartExtender or the thermoblock.

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, clean it immediately using a mild cleaning agent.

> **NOTICE! Corrosion due to aggressive cleaning agents and disinfectants.**
>
> ▸ Do not use any corrosive cleaning agents, aggressive solvents or abrasive polishes.
> ▸ Do not use any laboratory cleaners with sodium hypochlorite.

▸ Clean the housing of the Eppendorf ThermoMixer C and the accessories regularly.

8.2.1   Cleaning the Eppendorf ThermoMixer C
Auxiliary equipment
- Lint-free cloth.
- Mild, soap-based lab cleaner.
- Dist. water

1. Switch off the Eppendorf ThermoMixer C and disconnect it from the power supply.
2. Allow the device to cool down.
3. Clean all external parts of the Eppendorf ThermoMixer C with a mild soap solution and a lint-free cloth.
4. Wipe off the soap solution with dist. water.
5. Dry all cleaned parts.

8.3   Disinfection/decontamination

> **DANGER! Electric shock due to the ingress of liquid.**
>
> ▸ Switch off the device and disconnect it from the mains/power line before commencing any cleaning or disinfection procedures.
> ▸ Do not allow any liquids to penetrate the inside of the housing.
> ▸ Use sealed vessels and sealed plates.
> ▸ Do not spray clean or spray disinfect the housing.
> ▸ Only reconnect the device to the mains/power line when it is completely dry, both inside and outside.

Auxiliary equipment
- Lint-free cloth.
- Disinfectant.

1. Switch off the Eppendorf ThermoMixer C and disconnect it from the mains/power supply.
2. Allow the device and the accessories to cool down.
3. Clean the device and the accessories.
4. Select a disinfection method that complies with the legal requirements and regulations in place for your range of application.
5. Wipe the surfaces with the lint-free cloth and disinfectant.

8.4 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. Observe the information in the decontamination certificate. It is available as a PDF document on our webpage (https://www.eppendorf.com/decontamination).
2. Decontaminate all the parts to be shipped.
3. Include the fully completed decontamination certificate in the shipment.

8.5 Verification of temperature control

To verify the temperature accuracy of the thermoblock, use the Eppendorf Temperature Verification System – Single Channel. In combination with the temperature sensor for the Eppendorf ThermoMixer C the exact temperature in the thermoblock can be measured.

Details on the verification process with the Eppendorf Temperature Verification System – Single Channel can be found in the corresponding operating manual.

9 Transport, storage and disposal
9.1 Transport

⚠️ **WARNING! Risk to health due to contaminated accessories.**

1. Observe the information in the decontamination certificate. It is available as a PDF document on our webpage (www.eppendorf.com/decontamination).
2. Decontaminate all the parts you want to ship.
3. Include the fully completed decontamination declaration for product returns in the shipment.

▶ Use the original packing for transport.

	Air temperature	Relative humidity	Atmospheric pressure
General transport	-25 °C – 60 °C	10 % – 75 %	30 kPa – 106 kPa
Air freight	-40 °C – 55 °C	10 % – 75 %	30 kPa – 106 kPa

9.2 Storage

⚠️ **WARNING! Risk to health due to contaminated device and accessories.**

▶ Decontaminate the device and accessories prior to storage.

	Air temperature	Relative humidity	Atmospheric pressure
In transport packing	-25 °C – 55 °C	10 % – 95 %	70 kPa – 106 kPa
Without transport packing	-5 °C – 45 °C	10 % – 95 %	70 kPa – 106 kPa

9.3 Disposal

Observe the relevant legal regulations when disposing of the product.

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. They are marked with the following symbol to indicate this:
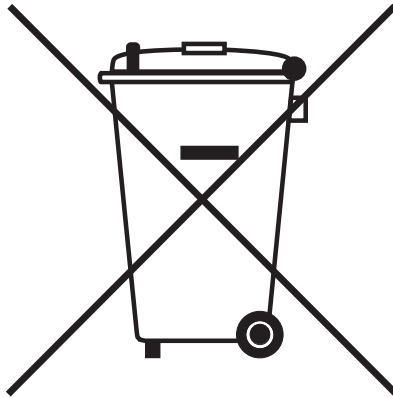
As the disposal regulations may differ from one country to another within the EU, please contact your supplier for more information.

10 Technical data
10.1 Power supply

Power connection	100 V – 130 V ±10 %, 50 Hz – 60 Hz 220 V – 240 V ±10 %, 50 Hz – 60 Hz
Power consumption	Maximum 200 W
Overvoltage category	II
Degree of pollution	2
Protection class	I

10.2 Weight/dimensions

Width	20.6 cm (8.1 in)
Depth	30.4 cm (12.0 in)
Height	13.6 cm (5.4 in)
Weight	6.3 kg (13.9 lb)

10.3 Ambient conditions

Environment	For indoor use only
Ambient temperature	5 °C – 40 °C
Relative humidity	10 % – 90 %, non-condensing
Atmospheric pressure	79.5 kPa – 106 kPa

10.4 Application parameters
10.4.1 Temperature control

Temperature control range	1 °C – 110 °C, can be set in increments of 1 °C Minimum: 15 °C (±2 °C) below the ambient temperature Maximum: 110 °C	
Temperature accuracy	Set temperature 20 °C – 45 °C	Set temperature < 20 °C or > 45 °C
SmartBlock *1.5 mL*	±0.5 °C	±1.0 °C
Temperature homogeneity	In the range of 20 °C – 45 °C	
SmartBlock *1.5 mL*	max. ±0.5 °C for all positions of the thermoblock	
Heating rate*		
SmartBlock *1.5 mL*	6.0 °C/min The change of temperature in filled tubes is slower.	

Cooling rate*	if the set temperature is above the ambient temperature	if the set temperature is between ambient temperature and 15 °C below ambient temperature
SmartBlock *1.5 mL*	2.5 °C/min	0.5 °C/min – 0.8 °C/min

*The heating rate and cooling rate can be restricted.

The heating and cooling rates listed only apply if the SmartBlock is being operated with no ThermoTop or SmartExtender.

❶ The heating and cooling rates refer exclusively to the thermoblock and can change with the filling volume in the tubes.

10.4.2 Mixing

Thermoblock	Tubes / plates	Mixing frequency	Accessories
		can be set in increments of 50 rpm	
SmartBlock *0.5 mL*	Micro test tubes volume 0.5 mL	300 rpm – 2 000 rpm	ThermoTop or Lid**
SmartBlock *1.5 mL*	Micro test tubes volume 1.5 mL	300 rpm – 2 000 rpm	ThermoTop or Lid**
SmartBlock *2.0 mL*	Micro test tubes volume 2.0 mL	300 rpm – 2 000 rpm	ThermoTop or Lid**
SmartBlock *5.0 mL*	Micro test tubes volume 5.0 mL	300 rpm – 1 000 rpm	–
SmartBlock *12 mm*	Tubes with a diameter of 11 mm to 11.9 mm	300 rpm – 2 000 rpm	–
SmartBlock *cryo thaw*	Cryogenic tubes	300 rpm – 2 000 rpm	–
SmartBlock *15 mL*	Conical tubes volume 15 mL	300 rpm – 1 000 rpm	–
SmartBlock *50 mL*	Conical tubes volume 50 mL	300 rpm – 1 000 rpm	–
SmartBlock *plates*	Microplates with various bottom contours	300 rpm – 3 000 rpm	ThermoTop or Lid**
	Deepwell plates with various bottom contours up to 80 °C	300 rpm – 2 000 rpm	ThermoTop or Lid**

Thermoblock	Tubes / plates	Mixing frequency	Accessories
	Deepwell plates with various bottom contours from 80 °C	300 rpm – 1 000 rpm	ThermoTop or Lid**
SmartBlock *PCR 96*	96-well PCR plates 0.2 mL PCR tubes	300 rpm – 2 000 rpm	ThermoTop or Lid**
SmartBlock *PCR 384*	384-well PCR plates	300 rpm – 3 000 rpm	ThermoTop or Lid**
SmartBlock *DWP 500****	Eppendorf Deepwell Plates 96/500 µL	300 rpm – 1 600 rpm	ThermoTop or Lid**
SmartBlock *DWP 1000****	Eppendorf Deepwell Plates 96/1000 µL	300 rpm – 1 600 rpm	ThermoTop or Lid**

* The height sensor of the SmartBlock *plates* automatically differentiates between deepwell plates and microplates.

** If you are using the Lid, select a mixing frequency of max. 2 000 rpm.

*** SmartBlock *DWP 500* and SmartBlock *DWP 1000* can only be used with Eppendorf Deepwell Plates (optimal fit and temperature transfer).

10.4.3 Time setting
Cycle times of 5 s to 99:30 h or unlimited.

Cycle time range	Step size
5 s – 1 min	5 s
1 min – 20 min	15 s
20 min – 1:00 h	1 min
1:00 h – 10:00 h	5 min
1:00 h – 99:30 h	30 min

10.4.4 Thawing

Parameter	Range	Step size
Run time	3 min – 5 min	15 s
Mixing frequency	300 rpm – 800 rpm	50 rpm

10.5 Interface

USB interface	For connection to VisioNize and for software updates with the Eppendorf ThermoMixer Autoupdate.

11 Program data form

program	time	temp	speed
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

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:

Eppendorf ThermoMixer® C

including accessories

Product type:

Thermomixer for test tubes and plates

Relevant directives / standards:

2014/35/EU:	EN 61010-1, EN 61010-2-010, EN 61010-2-051
	UL 61010-1, CAN/CSA C22.2 No. 61010-1
2014/30/EU:	EN 55011, EN 61326-1
2011/65/EU:	EN 50581

Date: June 06, 2016

Management Board

Portfolio Management

ISO 9001 Certified

ISO 13485 Certified

ISO 14001 Certified

5382 900.997-03

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