

# Centrifuge CM-6MT



User manual





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# 1. Introduction

Congratulations, you have acquired ELMi centrifuge, a product of advanced technology and high quality!

Centrifuge CM-6MT is easy to use and reliable in operation. We ask you to carefully read the usermanual and observe all the requirements of the maintenance and operation this will ensure long and flawless exploitation of the device.

Centrifuge CM-6MT is designed to separate solutions into fractions. The device is used in medicine, analytical chemistry, microbiology, virology, clinical biochemistry, etc.

## 1.1 Technical specifications

Rotor rotation speed, RPM	from 100 to 3500
Maximal relative centrifugal force, RCF (G)	2300
Accuracy of rotation speed maintenance, %	±2
Timer range, min	1-99
Braking levels	6
<u>Step-type behaviour of setting:</u>	
rotor rotation speed, RPM	10
centrifugal force, RCF (G)	10
time, sec	1
The level of noise 1 m in distance, db(A)	no more than 61
Working range of temperatures, °C	from +10 to +40
Relative air moisture, %	80
Total allowed imbalance of test tubes, g	no more than 7
Allowed deviations of voltage, V	110-240
Allowed deviations of frequency, Hz	50-60
Maximal consumable power, W	250
Size of the device (length x width x height), mm	431 x 410 x 247
Weight, kg	13.8

## 1.2 Delivery package

Item	Quantity
Centrifuge.....	1
Power cord.....	1
Rotor.....	1
Rotor key / emergency lid opening key.....	1
Rotor nut and spacer.....	1
User manual.....	1
Packaging.....	1

## 2. Safety precautions

### 2.1 General safety

- Use only as specified in the operating instructions provided.
- The unit should not be used if it has encountered a physical shock or has been dropped.
- The unit must be stored and transported in a horizontal position (see package label).
- After transport or storage allow the unit to dry out (2-3 hrs) before connecting to mains power.
- It is necessary to observe the safety area of 300 mm around the centrifuge in accordance with EN-61010-2-20. Persons and hazardous materials must not be located in the safety area whilst the centrifuge is in operation.
- Use only original accessories (rotors, adaptors, etc.) provided by the manufacturer and ordered specifically for this model.

### 2.2 Electrical safety

- Connect to the mains only with a voltage corresponding to that on the serial number label.
- Ensure that the switch and plug are easily accessible during use.
- Do not plug the unit into the main outlet without grounding, and do not use extension lead without grounding.
- Before moving the unit, disconnect it from the mains. To turn off the unit, disconnect the power plug from the mains outlet.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment. If liquid is split inside the unit, disconnect it from the mains and have it checked by a competent person.

### 2.3 During operation

- Do not centrifuge flammable or chemically vigorously reactive materials. If such liquids are spilled in the rotor or rotor chamber the centrifuge must be cleaned with a moist cloth and a mild soap solution.
- Do not use rotors with visible signs of corrosion, wear or mechanical damage.
- Do not fill in the containers after they are inserted in the rotor.
- Do not leave the operating unit unattended.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures.
- Do not operate the unit if it is faulty or been incorrectly installed.
- For indoor use only.
- Do not use outside laboratory rooms.
- Before using any cleaning or decontamination method except those recommended by the manufacturer, check with the manufacturer that the proposed method will not damage the equipment.
- Do not make modifications to the unit.

### 2.4 Biological safety

- Without bioseal the centrifuge is not a biosafety system in accordance to EN61010-2-20 and cannot be used for centrifuging hazardous materials contaminated with toxic, radioactive or pathogenic microorganisms.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.

### 3. Preparation to use

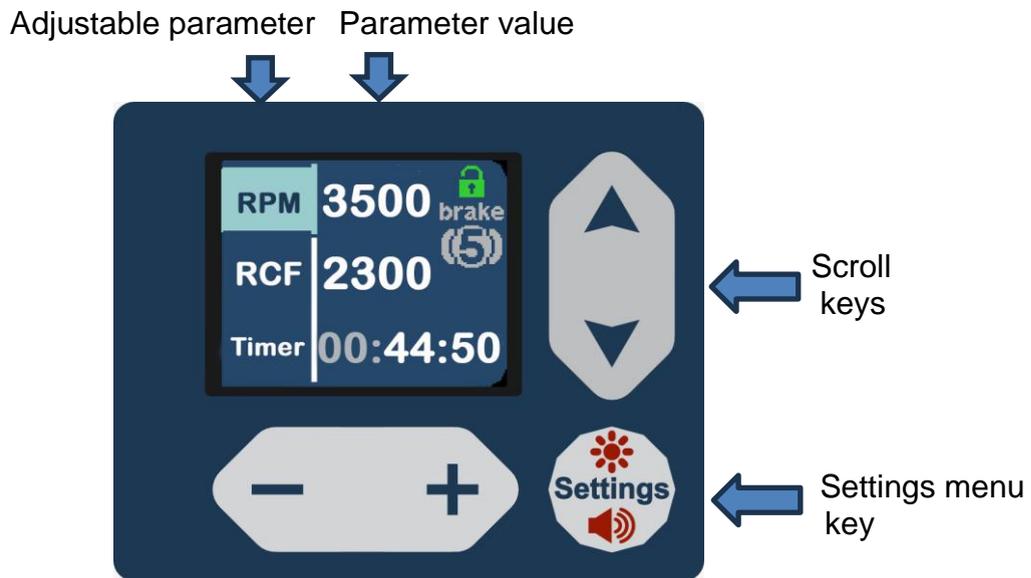
- Unpack the centrifuge. Please keep the packaging material for transportation or storage purposes.
- If the machine was stored at a temperature below 0°C, make sure that it is kept at room temperature for at least two hours before turning it on.
- Place the centrifuge onto a level, horizontal surface.
- Examine the power plug, power cord and appearance of centrifuge for damage.
- Connect the power cord to the centrifuge, insert the plug in to the socket and press network switch at ( I ) symbol. The display will light up on the control panel.
- Open the lid by pressing the "OPEN" button.
- Check the rotor, make sure that rotor nut is securely fastened. Try rotating it by hand. There should be no noise or obstacles for smooth running.
- Check the adapters. All of the adapters must be equally positioned inside the brackets.
- Check the surrounding of device. Safety distance of 30 cm must be observed around the centrifuge during operation.
- Check for other signs of damage or malfunction.

**ATTENTION!** If there is apparent damage or malfunctions, DO NOT TURN ON the centrifuge without consulting a specialist.

**ATTENTION!** To finish the unpacking of centrifuge, pull the emergency opening lever to the side(as shown on the figure on page 7) and remove all packaging materials from the rotor bucket.

## 4. Control description

Centrifuge consists of a stainless still casing, rotor mounted in it, electric motor and control system. The rotor is covered with self-locking transparent lid. A network switch is mounted in the back of the casing. Control panel on the front of the casing contains display and buttons with the following functions:



- Button to unblock the lid of centrifuge.



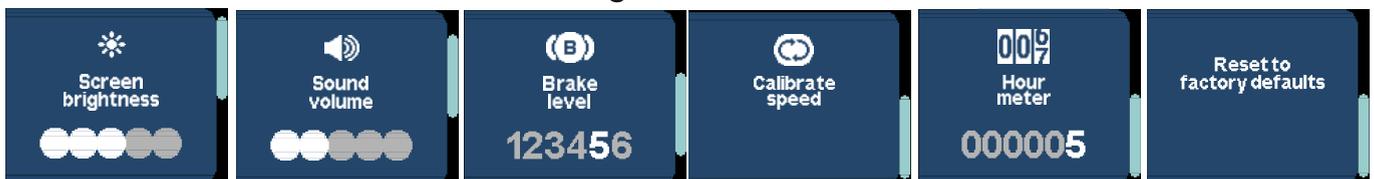
- Button to start the centrifugation or to end the cycle before the estimated time.



← Lid lock indicator (green - opened, red – closed)

← Braking level indicator

### Settings menu



Parameters such as screen brightness, beeper volume and brake level can be adjusted in the settings menu.

Parameters of each brake level are displayed on page 6.

The working hour meter of centrifuge is also located in the settings menu.

Speed calibration and factory default reset menus are for service engineers only.

## 5. Operating

Place the test tubes in the rotor adapters. Always load the rotor symmetrically by minimizing weight difference between the filled test tubes you reduce the wear on mechanical parts of centrifuge. The total imbalance of test tubes should not exceed 7 grams.

For safety reasons the centrifuge lid automatically locks when closed and unlocks at the end of centrifugation cycle. Lid can be unlocked with "OPEN" button but only with stand still rotor.

Settings and adjustments of the parameters of centrifuge must be made before the start of centrifugation cycle, with opened or closed lid. After pressing start, during the centrifugation cycle parameters can't be adjusted.

### 5.1. Setting rotor rotation speed / G force parameter:

Select the RPM / RCF parameter with scroll keys and set needed value with tuning keys.

The centrifuge is equipped with rotor detecting system that manages top speed parameter to the rotor type.

### 5.2 Setting time parameter:

Select the time parameter with scroll keys and set needed countdown timer value with tuning keys.

### 5.3 Unlocking centrifuge lid:

Unlock centrifuge lid by pressing the "OPEN" button. For safety reasons, pressing this button during centrifugation stop the cycle before the estimated time.

After the end of centrifugation cycle the lid unlocks automatically.

### 5.4 Starting the centrifuge:

Close the centrifuge lid and start the centrifugation cycle by pressing the "START/STOP" button.

### 5.5 Stopping centrifuge before estimated time runs out:

To stop the centrifuge before the end of centrifugation cycle press the "START/STOP" button. This action can be done with "OPEN" button as well.

### 5.6 Setting braking level:

To set desired braking level enter settings menu and select value from 1 to 6. Braking levels have the following parameters:

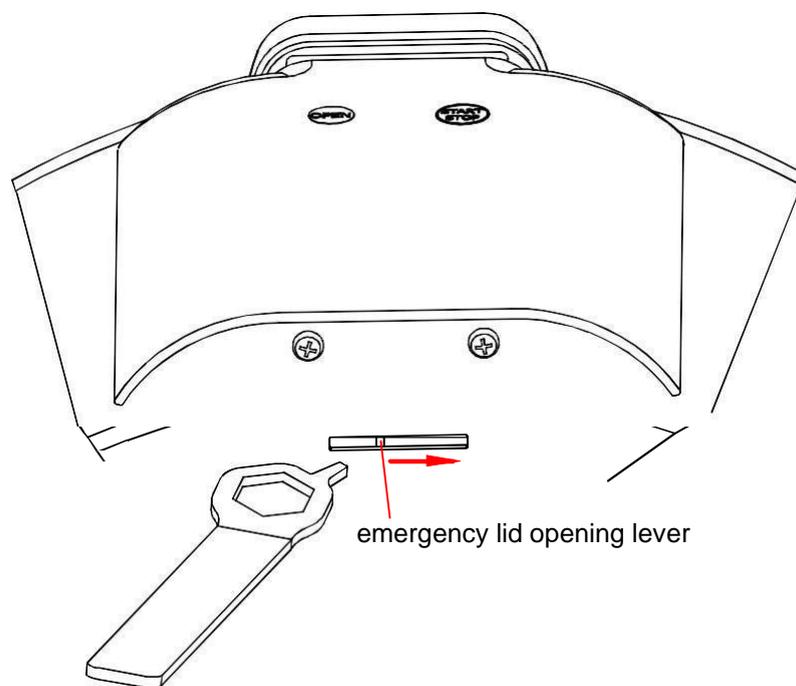
Braking level	Stopping time from 3500 RPM to 0
1	30 sec
2	45 sec (default setting)
3	60 sec
4	90 sec
5	120 sec
6	150 sec

**Attention! Operation must be stopped immediately if there are any unusual noises or vibration.**

**Attention! Check the rotor and rubber seal for wear each time before starting the centrifuge.**

## 6. Emergency opening of centrifuge lid

To open the lid of centrifuge in case of power breakdown or lid lock damage, disconnect the device from mains power supply, wait until the rotor comes to a standstill then lift the centrifuge and insert the included emergency lid opening key in to the groove and move the lever to the side (as it is shown on the figure below). The lever is located on the bottom of centrifuge in the groove near the control panel.



## 7. Applied rotors

### Rotor

### Description



#### **ROTOR 6M**

Universal stainless-steel rotor for 12 adapters  
Maximal volume of applied test tubes: 12 ml  
Maximal size of applied test tubes: (D x L) 17.5 x 115 mm  
Top speed: 3500 rpm  
Total test tube imbalance limit: 5 g  
**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.01**

Universal rotor for 4 adapters  
Maximal volume of applied test tubes: 50 ml  
Maximal size of applied test tubes: (D x L) 30 x 135 mm  
Top speed: 3500 rpm  
Total test tube imbalance limit: 3 g  
**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.02**

Universal stainless-steel rotor for 24 adapters  
Maximal volume of applied test tubes: 12 ml  
Maximal size of applied test tubes:  
Inward row (D x L) 17.5 x 115 mm  
Outward row (D x L) 17.5 x 140 mm  
Top speed: 3500 rpm.  
Total test tube imbalance limit: 7 g  
**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.05**

Universal stainless-steel rotor for 12 adapters  
Maximal volume of applied test tubes: 15 ml  
Maximal size of applied test tubes: (D x L) 17.5 x 140 mm  
Top speed: 3500 rpm  
Total test tube imbalance limit: 5 g  
**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.06**

Universal rotor for 6 adapters  
Maximal volume of applied test tubes: 50 ml  
Maximal size of applied test tubes: (D x L) 30 x 125 mm  
Top speed: 3500 rpm  
Total test tube imbalance limit: 5 g  
**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.07**

Universal rotor for 2 polyamide adapters (cone bottom) and 4 stainless steel adapters.

Maximal size of applied test-tubes (D x L):

30 x 130 mm - 2 pcs.

17.5 x 120 mm - 4 pcs.

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.08**

Universal rotor for 4 polyamide adapters (cone bottom); also suitable for platelet-rich plasma (PRP) preparation.

Maximal size of applied test-tubes (D x L):

30 x 125 mm

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.09**

Universal rotor for 2+2 polyamide adapters (cone bottom); also suitable for platelet-rich plasma (PRP) preparation.

Maximal size of applied test-tubes (D x L):

30 x 125 mm - 2 pcs.

37 x 125 mm - 2 pcs.

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.10**

Universal rotor for 2 polyamide adapters (cone bottom) and 4 stainless steel adapters; also suitable for platelet-rich plasma (PRP) preparation.

Maximal size of applied test-tubes (D x L):

30 x 125 mm - 2 pcs.

17.5 x 120 mm - 4 pcs.

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



#### **ROTOR 6M.15**

Universal rotor for 2+2 anodized aluminum adapters (flat bottom), also suitable for platelet-rich plasma (PRP) preparation.

Maximal size of applied test-tubes (D x L):

30 x 125 mm - 2 pcs.

37 x 125 mm - 2 pcs.

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



### ROTOR 7M.03

Universal rotor for 4 anodized aluminum adapters (flat bottom).

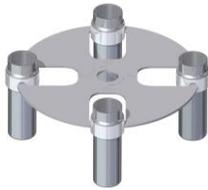
Maximal size of applied test-tubes (D x L):

44 x 125 mm

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



### ROTOR 7M.07

Universal anodized aluminum rotor for 4 adapters (flat bottom).

Maximal size of applied test-tubes (D x L):

30 x 130 mm

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



### ROTOR 7M.08

Universal rotor for 6 anodized aluminum adapters (flat bottom).

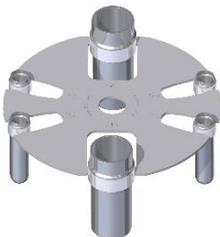
Maximal size of applied test-tubes (D x L):

30 x 125 mm

Top speed: 3500 rpm

Total test tube imbalance limit: 5 g

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



### ROTOR 7M.10

Universal rotor for 2 anodized aluminum adapters (flat bottom) and 4 stainless steel adapters.

Maximal size of applied test-tubes (D x L):

37 x 130 mm - 2 pcs.

17.5 x 120 mm - 4 pcs.

Top speed: 3500 rpm

Total test tube imbalance limit: 3 g.

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**



### ROTOR 6M.18

Universal rotor for 2 poliamide adapters (cone bottom) and 2 stainless steel adapters.

Maximal size of applied test-tubes (D x L):

30 x 135 mm – 2 pcs.

17,5 x 131 mm – 2 pcs.

Top speed: 3500 rpm.

Total test tube imbalance limit: 5 g.

**Autoclave sterilization at a temperature up to 121 °C (20 minutes) is allowed.**

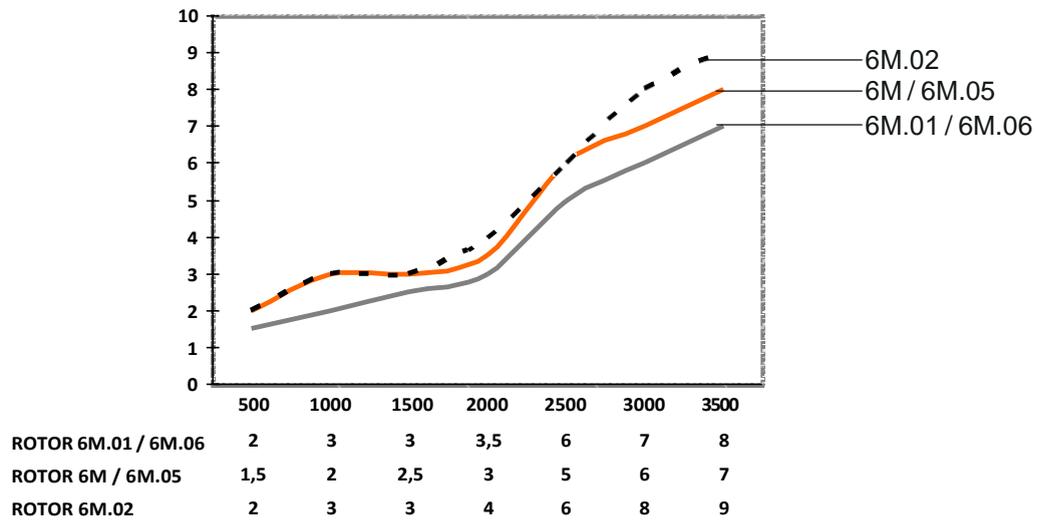
## 8. Rotor assembly and usage

**Assembly:** Place the rotor on the axis. On top of the rotor place a special spacer note that the pin of the spacer must align with the groove of the axis, then place the nut on the axis and tighten it with the included rotor key. Before each start check that the rotor is firmly tightened. Disassembly is performed in reverse sequence.

**Usage:** Always load the rotor symmetrically. By minimizing the difference of weight between the filled test tubes, you reduce the wear of mechanical parts of the centrifuge. If the overall imbalance of test tubes in the rotor exceeds 7 grams, centrifuge will start emergency braking when it reaching 1000 rpm and the display will show disbalance error. **Do not use damaged rotors!**

**ATTENTION!** Samples may contain pathological material, including pathogens of serious diseases. **Always check test tubes for damage before centrifugation.**

## 9. Graph of test tube heating after 30 minutes of centrifugation



## 10. Error code table

Error code	Cause	Solution
<b>"BLACK SCREEN"</b>	No main power connection. Power failure	Check connection of the power cable.
<b>THE LID IS NOT SHUT</b>	Centrifuge lid is left open.	Close and press on the lid till you hear a click.
<b>DISBALANCE</b>	Total imbalance of test tubes is more than 7 grams.	Load rotor symmetrically.
<b>PLEASE WAIT COOLING DOWN</b>	Processor Control Board is overheated.	Give a little time and centrifuge will cool down automatically.
<b>ROTOR SPINNING</b>	Residual rotation of the rotor.	Wait until the rotor is moveless.

Microprocessor control system self-tests and reports detected faults and errors to the user.

## 11. Disinfection and cleaning

Rotor and accessories must be cleaned once a week to avoid corrosion and changes to material. Disconnect the centrifuge from mains power supply, remove rotor, and clean it separately. The rotor, rotor chamber, and the outside of the centrifuge should be cleaned with a moist cloth. Only use neutral agents to clean these parts. To disinfect use an alcohol-based disinfectant (70% isopropanol/water mixture). If corrosive, toxic or radioactive liquids or pathogenic bacteria are spilled in the rotor or its chamber, the centrifuge must be decontaminated thoroughly.

## 12. Transportation and storage

To ensure safety during transportation, the equipment should be packed in the original manufacturer's packaging or similar packaging substitute.

Equipment can be transported in any kind of closed transport; make sure that equipment is tightly fixed and transported accordingly to transportation regulations. Equipment should be stored in original manufacturer's packaging in dry room with humidity not more than 80% and temperature range of +10 °C up to +40 °C. It is not recommended to store the equipment more than 36 months.

## 13. Warranty statements

- Warranty applies to 24-month period from the date of purchasing.
- Malfunctions that occur due to a fault of the manufacturer, during warranty period, are repaired free of charge.
- Warranty is not valid in the following cases:
  - If the serial number label of the manufacturer is damaged.
  - If damage occurs because of incorrect operation, transportation, or storage.
- These documents are necessary if applying for warranty repair:
  - User manual with serial number of the machine.
  - Officially signed report describing the reasons and circumstances of the equipment malfunctions.
- Warranty repair can be performed only if the equipment is delivered in the original manufacturer's packaging or equally safe packaging.
- Before returning for warranty repair ensure that the device is fully cleaned, decontaminated and does not present any kind of health risk to our staff.
- If the above warranty requirements are not met, repair charges are applied to the customer.
- For all further questions concerning usage and maintenance, please contact the manufacturer or product vendor.

## 14. Certificate of approval

Centrifuge CM-6MT No \_\_\_\_\_ has been inspected for the technical conditions and meets all regulations necessary for this class of device.

Quality control person \_\_\_\_\_  
(name) (signature)

Date of manufacture \_\_\_\_\_

Place for stamp

## 15. Certificate of sale

Organization \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_

Vendor \_\_\_\_\_  
(name) (signature)

Date of sale \_\_\_\_\_

Manufacturer's address:

7b Bukultu street, Riga,

LV-1005, Latvia

Phone: +371 6755 8743

E-mail: info@elmi-tech.com

WWW: www.elmi-tech.com