

Centrifuge CM-6MT



Video instruction is available!



youtube.com/elmimedia/videos

User manual



ISO 9001:2008

Version 050514

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Introduction

Dear user!

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 user manual and follow the instructions for proper operation and maintenance of the CM-50MP. This will insure excellent results and enduring performance.

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
Step-type behaviour of setting:	
rotor rotation speed, RPM	100
centrifugal force, RCF (G)	100
time, min	1
The level of noise 1 m in distance, db(A)	no more than 61
Working range of temperatures, °C	from +4 to +40
Relative air moisture, %	80
Total allowed imbalance of test tubes, g	no more than 5
Allowed deviations of voltage, V	100-240
Allowed deviations of frequency, Hz	50-60
Maximal consumable power, W	250
Size of the device (length x width x height), mm	430 x 400 x 230
Weight, kg	13

Delivery package

Item	Quantity
Centrifuge.....	1
Power cord.....	1
Rotor.....	1
Rotor key.....	1
Power nut.....	1
User manual.....	1
Packaging material.....	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 the mains.
- 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.

Electrical safety

- Connect only to the mains 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.

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.

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.

Preparation to work

Comparison table of RPM to RCF (G) and vice versa

RPM RCF			
3500	2260		
3400	2132		
3300	2001		
3200	1889		
3100	1773		
3000	1660		
2900	1551		
2800	1446		
2700	1345		
2600	1247		
2500	1153		
2400	1063		
2300	976		
2200	893		
2100	814		
2000	738		
1900	666		
1800	598		
1700	533		
1600	472		
1500	415		
1400	362		
1300	312		
1200	266		
1100	223		
1000	184		
900	149		
800	118		
700	90		
600	66		
500	46		
400	30		
300	17		
200	7		
100	2		

RCF RPM			
2300	3531		
2200	3453		
2100	3374		
2000	3292		
1900	3209		
1800	3123		
1700	3036		
1600	2945		
1500	2852		
1400	2755		
1300	2655		
1200	2551		
1100	2442		
1000	2328		
900	2209		
800	2082		
700	1948		
600	1803		
500	1646		
400	1473		
300	1275		
200	1041		
100	736		

Preparation to work

- Unpack the centrifuge. Please keep the packaging material for transportation or storing.
- In case the machine has been brought from below zero temperature make sure it stays at room temperature for at least two hours before turning 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. Thus indicators will light up on the control panel.
- Open the lid by pressing the OPEN button.
- Check the rotor, make sure rotor nut is securely fastened. Try rotating it by hand. There should be no noise or obstacles for smooth run.
- Check the adapters. All the adapters must be equally positioned inside the brackets.
- Check the surrounding of device. Safety distance of 30cm should be observed around the centrifuge during operation.
- If no other damages or malfunctions were determined the centrifuge is ready to run.

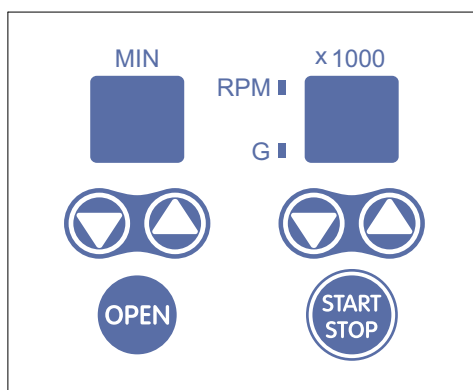
ATTENTION ! If there are damages or malfunctions DO NOT TURN ON the centrifuge without consulting a specialist.

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

Control description

Control description

Centrifuge consists of a stainless still casing, rotor mounted in it, electric motor and control system. Rotor is covered with self locking transparent lid. In the back of the casing a network switch is mounted. On the front of the casing a control panel is placed with displays, indicators and buttons having the followings functions:



- Time display.



- Rotation speed RPM or centrifugal force RCF (G) display.



- Rotation speed in RPM indicator.



- Relative centrifugal force RCF (G) indicator.



- Buttons to reduce / increase the parameter.



- Button to unblock the lid of centrifuge.



- Button to start centrifugation or to stop before the estimated time.

Operation

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 5 grams. After closing centrifuge lid it automatically blocks and unblocks at the end of centrifugation cycle or by pressing "OPEN" button before the start of centrifugation. Settings and adjustments of the parameters of centrifuge are made before the start of centrifugation cycle with opened or closed lid. During the centrifugation cycle only the RPM's (RCF) parameter can be adjusted.

1. Setting rotor rotation speed / G force parameter:

Set the desired parameter value by pressing "UP/DOWN" buttons under the "X1000" display.

2. Setting time parameter:

Set the desired parameter value by pressing "UP/DOWN" under the "MIN" display.

3. Opening centrifuge lid:

Open centrifuge lid by pressing the "OPEN" button. During centrifugation, the button does not work.

4. Starting the centrifuge:

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

5. Stopping centrifuge before estimated time runs out:

To stop the centrifuge before the end of centrifugation cycle press the "START/STOP" button.

6. Switching from RPM to RCF (G) and vice versa:

To switch from RPM to RCF (G) press and retain **for 5 sec. both buttons** "UP/DOWN" under the "X1000" display. Corresponding indicator on the control panel will light up.

7. Setting braking level:

To select desired braking level press and retain **for 5 sec. both buttons** "UP/DOWN" under the "X1000" display.

To exit braking level selection don't press any buttons for 5 sec. and the device will exit automatically. There are 6 braking levels with following parameters:

Braking levels	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! The 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.

Operation

Operation

During centrifugation **MIN** display shows the remaining time of given cycle in minutes, last minute of cycle is counted in seconds. Display **x1000** after the launch shows the actual speed or force of centrifugation.

If the centrifuge does not start, you hear a beep and the displays show **ErOP**, it means that the lid is not closed properly. Press on the lid and start the centrifuge.

If the centrifuge does not start, you hear a beep and the displays show **Erbd**, it means that there is a mechanical obstruction of the rotor, or malfunction in the engine.

If the overall imbalance of test tubes in the rotor exceeds 5 grams, centrifuge when reaching 1000 rpm will start emergency braking and the displays will show **Erdb** - error code for imbalance.

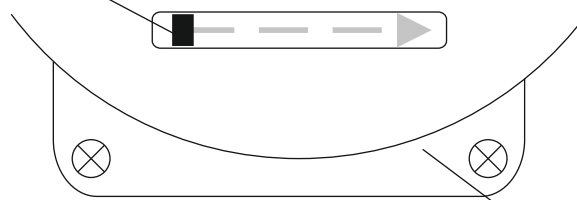
Other possible errors are listed in the table of error codes.

At the end of the centrifugation cycle, after full stop of the rotor the device will beep and lid will be unblocked. The set parameters will be saved in memory of device after disconnecting mains plug from socket or switching the mains switch.

Emergency opening of centrifuge lid

To open the lid of centrifuge in case of power brake down or lid lock damage it is necessary to disconnect the device from mains supply, wait until the rotor comes to a standstill then lift the centrifuge and move the lever to the side as it is shown on the figure. The lever is located on the bottom of centrifuge near the control panel.

Emergency lid opening lever



Control panel (view from bottom)

Rotors



ROTOR 6M

Universal rotor for 12 adapters.

Maximal volume of applied test tubes: 12 ml.

Maximal sizes of the applied test tubes: (D x L) 16.8 x 115mm.

Top speed: 3500 rpm.



ROTOR 6M.01

Universal rotor for 4 adapters.

Maximal volume of applied test tubes: 50 ml.

Maximal sizes of the applied test tubes: (D x L) 30 x 135 mm.

Top speed: 3500 rpm.



ROTOR 6M.02

Universal rotor for 24 adapters.

Maximal volume of applied test tubes: 12 ml.

Maximal sizes of the applied test tubes:

Inward row (D x L) 16.8 x 115 mm.

Outward row (D x L) 16.8 x 140mm

Top speed: 3500 rpm.



ROTOR 6M.05

Universal rotor for 12 adapters.

Maximal volume of applied test tubes: 15 ml.

Maximal sizes of the applied test tubes: (D x L) 16.8 x 140mm.

Top speed: 3500 rpm.



ROTOR 6M.06

Universal rotor for 6 adapters.

Maximal volume of compatible test tubes: 50 ml.

Maximal sizes of the applied test tubes: (D x L) 30 x 135 mm.

Top speed: 3500 rpm.



ROTOR 6M.04

Rotor for 2 plates.

Size of applied plates: (W x L x H) 86 x 128 x 20 mm.

Top speed: 2500 rpm.

Rotor assembly and usage

Assembly: put the rotor on the axis, on top of the rotor place a special spacer note that the pin of the spacer must get in to the groove of the axis, then put the nut on the axis and tighten it with a special rotor key. Before each start check that the rotor is firmly tightened.

Disassembly is made in reverse sequence.

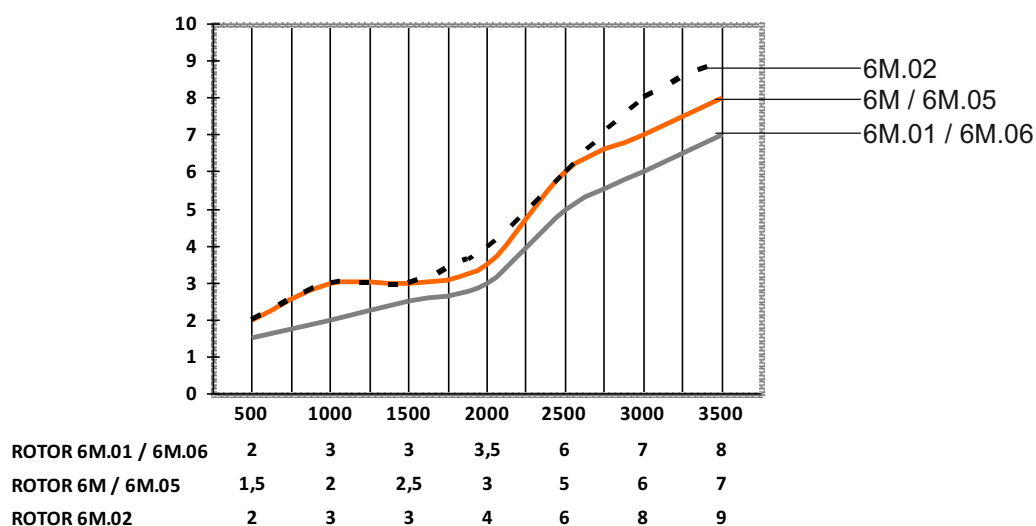
Usage: always load the rotor symmetrically. By minimizing the difference of weight between the filled test tubes, you reduce the wear of mechanical parts of the centrifuge. If the overall imbalance of test tubes in the rotor exceeds 5 grams, centrifuge when reaching 1000 rpm will start emergency braking and the displays will show **Erdb** - error code for imbalance.

Do not use damaged rotors!

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

Troubleshooting

Graphic of test tube heating after 30 minutes working time



Error code table

MIN display	X1000 display	Sound signal	Cause	Solution
Er	OP	+	Opened lid	Close and press on lid
Er	bd	+	Rotor or motor is blocked	Eliminate mechanical obstacle
Er	HE	+	Centrifuge overheat	Be convinced of absence of objects blocking air circulation vents of centrifuge
Er	LV	-	Not enough voltage to run the centrifuge	Use voltage stabilizer
Er	dd	+	Residual rotation of the rotor	Wait till the rotor becomes moveless
Er	db	+	Total imbalance of test tubes is more than 5gr	Reload the rotor symmetrically

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

General information

Disinfection and cleaning

To avoid corrosion and changes to material, the rotor and accessories must be cleaned once a week. Disconnect the centrifuge from mains 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 neutral agents may be used for cleaning purposes. For disinfection purposes use an alcohol-based disinfectant (70% isopropanol/water mixture). If corrosive, toxic or radioactive liquids or pathogenic bacteria are accidentally spilled in the rotor or its chamber, the centrifuge must be decontaminated thoroughly.

Transportation and storage

To insure safety during the transportation, transported equipment should be packed in the original manufacturers packaging or similar packaging substitute.

Equipment can be transported by any kind of closed transport make sure that equipment is tightly fixed and transportation runs accordingly to regulations applied to this way of transport. Equipment should be stored in original manufacturers packaging in dry room with humidity not more than 80% and temperature range from +10 C up to +40 C. It is not recommended to store the equipment more than 36 month.

Warranty statements

- Warranty applies to 24 month period from the date of purchasing.
- Malfunctions arisen by the fault of manufacturer during warranty period are removed free of charge.
- Warranty is not valid in the following cases:
 - If the serial number label of the manufacturer is damaged.
 - If damages appear as a result of the 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 conditions of equipment malfunctions.
- Warranty repair could be performed only if the equipment is delivered in the original manufacturers packaging or equally safe packaging.
- Before returning to warranty repair ensure that the device is fully cleaned and decontaminated and do not present any kind of health risk to our staff.
- If the above warranty requirements are disturbed, repair charges are applied to the consumer.
- For all further questions concerning exploitation and maintenance please contact manufacturer or product vendor.

General information

Certificate of approval

Centrifuge CM-6MT___ N_____ has been inspected for the technical conditions and meets all regulations necessary for such class of device.

Quality control person _____
(name) (signature)

Date of manufacture _____.

Place for stamp.

Certificate of sale

Organization _____.

Address _____.

Phone _____.

Vendor _____
(name) (signature)

Date of sale _____.

Manufacturers' address.
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Video instruction is available!



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