



Fugamix³TM

Centrifuge-mixer CM-50M



User manual



ISO 9001:2008

Version 050514

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Introduction

Dear users!

Centrifuge-mixer Fugamix CM-50M 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.

General information

The Fugamix CM-50M can be used with a range of rotor options, including for 12 x 1.5/2ml tubes, as well as PCR Strips and tubes. This microprocessor-controlled system provides smooth rotor acceleration and braking during all segments of the operation. A big graphical display offers instant readout of all the relevant parameters, including time, braking level, mixing level and rotor speed (simultaneous RPM and RCF). The centrifuge lid locks during rotation and unlocks at the end of each run. Adjustable sound alarm, brightness and sleep mode are also standard. Imbalance detection and a temperature sensor protect the unit from imbalancing and overheating.

Technical specifications

	Rotors: 50.01(50.02/50.03)
Rotor rotation speed, RPM	15000 (12500)
Speed step selection, RPM	100
Centrifugal force, RCF	15294 (10621)
Centrifugal force step selection, RCF	10
Timer settings, Min	0.1-99
Number of braking levels	5
Number of mixing levels	12
Total possible imbalance of test tubes: rotor 50.01 (50.02,50.03) g	1.5 (0.7)
Environmental temperature, °C	10-40
Relative air moisture at 20°C, %	80
Power supply adapter,	24V-5A
Power consumption, W	not more than 120
Size of the device (length x width x height), mm	200x180x145
Weight	3.1

Delivery package

Item	Quantity
Centrifuge.....	1
Rotor nut.....	1
Rotor key.....	1
Power supply adapter 24V- 5A 120W.....	1
Power cord.....	1
User manual.....	1
Packaging material.....	1

(Attention! Type and quantity of rotors are determined by customer)

Getting started

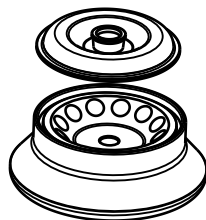
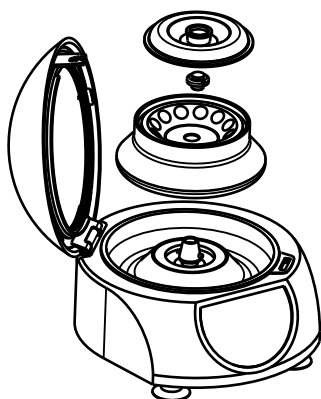
Preparation to work

- Unpack the device.
- Inspect the appearance of the device, the adapter and the power cord for damage.
- Open the lid of the CM-50M with the emergency lid opening lever and remove the packaging material.(see emergency opening of the centrifuge lid p.8).
- In the cold season keep centrifuge at room temperature for at least 2 hours.
- Assembly the rotor.
- Rotor must rotate freely without jamming.
- Centrifuge it self determines and configures to the installed rotor.
- Connect the centrifuge to the adapter and the adapter to the socket.
- Thus the light indicators will light up.
- In the absence of faults or damage the centrifuge can be considered ready to work.
- In the presence of faults and damage, do not use the centrifuge without consulting a specialist.

ATTENTION! Automatic rotor detection system seamlessly detect a type of rotor installed and reprogram the parameters of the operation accordingly.

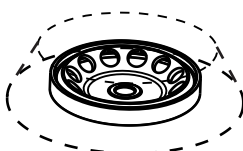
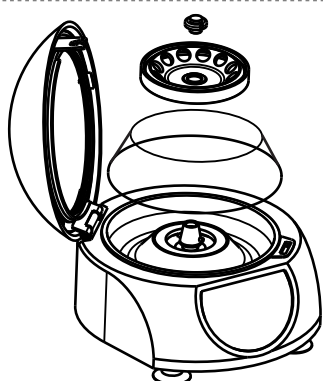
ATTENTION! Network socket must correspond to the adapter plug. In case of non compliance with this condition the rules of electrical safety are violated.

Rotor assembly and usage



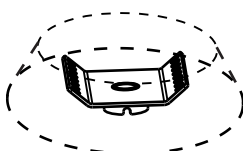
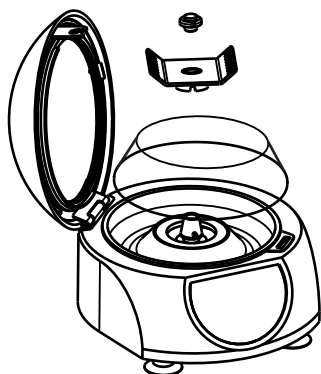
Rotor 50.01

Highspeed rotor 50.01 for 12 test tubes with aerodynamic, hermetic lid.
Maximal rotation speed 15 000 RPM.
Maximal centrifugation force 15 294 RCF.
5 braking levels.
Short run mode.



Rotor 50.02

MIX rotor 50.02 for 12 test tubes with aerodynamic housing.
Maximal rotation speed 12 500 RPM.
Maximal centrifugation force 10 621 RCF.
12 mixing levels.
Full range of available modes.



Rotor 50.03

Strip rotor 50.03 for 2 strips with aerodynamic housing.
Maximal rotation speed 12 500 RPM.
Maximal centrifugation force 10 621 RCF.
12 mixing levels.
Full range of available modes.

Assembly: Put the rotor on the shaft first and then tighten the nut with a provided hand driven key.

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 exceeds 1gram, centrifuge will stop and the display will show DISBALANCE error code.

Always apply the accessories for the rotor:

Rotor 50.01 must be used with the aerodynamic lid which seals the contents of the rotor, reduces noise level and heating of test tubes.

Rotors 50.02 and 50.03 must be used with the aerodynamic housing which reduces noise level and heating of the tubes.

ATTENTION! It is prohibited to apply the aerodynamic housing with the rotor 50.01.

Interface and controls

Control buttons



Fig. 1 Control panel.



Lid opening.



“Custom” mode view and configuration.



Mode selection.



Up and Down menu scroll and parameter change.



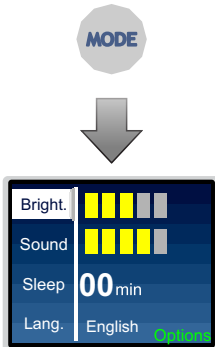
Start/stop and custom program launch.



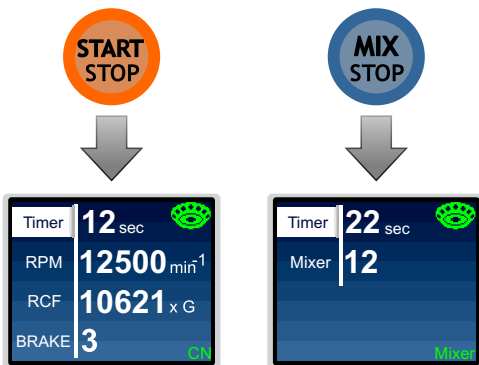
Mixer start/stop.

Interface and controls

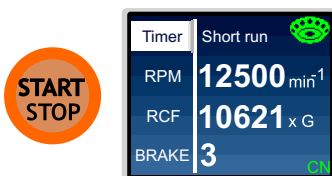
Additional commands of the buttons



By pressing and holding down “MODE” for 3 seconds you enter “Options” menu to adjust screen brightness, beeper volume and more.



Use “START/STOP” and “MIX/STOP” buttons to switch between centrifugation “CN” and vortexing “Mixer” modes swiftly. One single click takes to the given mode immediately.



When timer is set to “Short run” you can push and spin the centrifuge. Operation will stop when button released.



When timer is set to “Short run” you can push and mix. Operation will stop when button released.

Operation

Operating centrifuge with a rotor 50.01



Automatic rotor recognition displays an icon of a rotor currently installed.



When rotor 50.01 is installed system will automatically reprogram itself to allow maximum speed 15000 RPM. Also all the other operation modes will be hidden away, allowing user to use the centrifuge in “CN” mode only.



Rotor icon also has a color code.



- Green color means that the lid is opened.

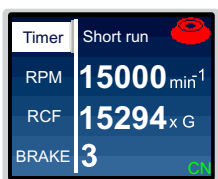
- Red color means the lid is closed and you can now run the centrifuge.



Settings adjustments are made using the “+/- up/down” keyboard. Parameters can only be changed while the centrifuge is not running.



To run centrifugation just press “START/STOP” button.



By reducing the timer to the minimum you will reach a “Short run” mode. This mode allows using “START/STOP” button to manage the duration of the spindown.

Centrifuge will run while the button is depressed and will stop automatically when released.

Braking levels (15000 rpm, full rotor)

Level	Seconds
1.....	28
2.....	20
3.....	15
4.....	13
5.....	11

ATTENTION! DO NOT use the Aerodynamic housing with the rotor 50.01.

Operation

Operating centrifuge with rotors 50.02 and 50.03



Automatic rotor recognition displays an icon of a rotor currently installed.


Rotor 50.02,
Rotor 50.03.

When rotor 50.02/50.03 is installed system will automatically reprogram itself to allow mixing functions and limit speed to 12500 RPM.


green

Rotor icon also has a color code.


red

- Green color means that the lid is opened.

- Red color means the lid is closed and you can now run the centrifuge.

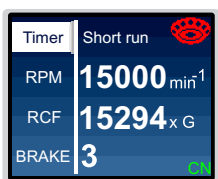


Settings are made using the “+/- up/down” keyboard.

Parameters can only be change while the centrifuge is not running.

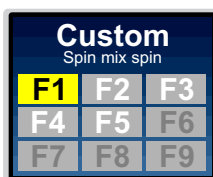


To run centrifugation just press “START/STOP” button.



By reducing the timer to the minimum you will reach a “Short run” mode. This mode allows using “START/STOP” button to manage the duration of the spindown.

Centrifuge will run while the button is depressed and will stop automatically when released.



In addition to “CN” mode 3 modes become available:

SP - sample preparation.

Custom - Spin mix spin programmable mode.

Mixer - Vortexer mode.

ATTENTION! Use the Aerodynamic housing with rotors 50.02 and 50.03.

Operation

Operating centrifuge in “SP” mode

Sample preparation is a programmable sequence of mixing and spin down that allows effectively mix small volumes of reagents and collect them on the bottom of a test tube.



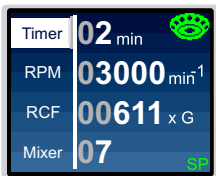
“Timer” - Controls the overall duration of the procedure.

“RPM / RCF” - Variable spin down speed.

“Mixer” - Vortexing speed.



When all the settings are made just press “START/STOP” button to launch the program.

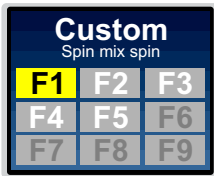


When timer is done operation will stop and automatically open up the lid. Rotor indicator will change from Red to Green and a sound notification will beep.

ATTENTION! Use the Aerodynamic housing with rotors 50.02 and 50.03.

Operation

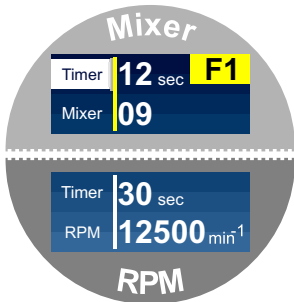
Operating centrifuge in “Custom” mode Understanding the interface



Custom mode is a step by step program with 9 independently programmable steps F1-F9.

Understanding the color code for program steps.

- F1** - Yellow field: selection marker. This step is currently selected for editing or running.
- F1** - Grey field, grey letters: this step is empty and has no user settings.
- F1** - Grey field, white letters: this step contains user created program.
- F1** - Grey field, black letters: this step contains user created program and it has already been executed.



Every step has two parts that are individually programmable:

- Mixer: Variable speed vortexing
- RPM: Spin down with an optional speed.

Way to program individual steps.



- Fully programmed both Mixing and RPM part of a step. This step will do 12 second mixing with a level 9 speed and then do 30 sec spin down with 12500 RPM speed.



- This step is programmed to do only the spin down and skip the mixing part. It will do 30 sec spin down with 12500 RPM speed. Same way you can disable the spin down part and do only the Mixing.

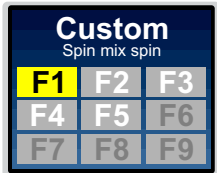


- This step has both parts deactivated “Off” and will appear on a main screen as a grey cell with grey number “Empty”. Programm will just skip this step.

ATTENTION! Use the Aerodynamic housing with rotors 50.02 and 50.03.

Operation

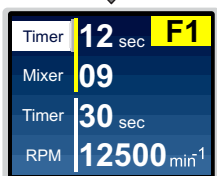
Operating centrifuge in “Custom” mode Creating a program



Find mode “Custom” in a mode list by pressing “MODE” button.



In order to start programming steps of the program press “SET”.



Cell editing screen will open up. Here you can modify the settings of Mixer and RPM by using “+/- up/down” keyboard.



When the first F1 step editing is finished press “MODE” to proceed to step F2 then F3 and so on.



When all the steps are edited press “SET” and return to main screen of the “Custom” mode. You will see your edited steps as a grey cells with white letters.

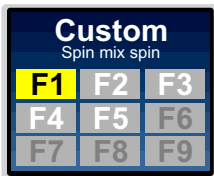


You can also move between steps by pushing “up and down” buttons on the control keyboard.

ATTENTION! Use the Aerodynamic housing with rotors 50.02 and 50.03.

Operation

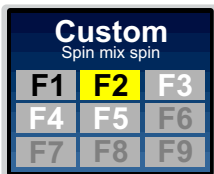
Operating centrifuge in “Custom” mode Running a program



Selector is automatically placed at the beginning of the program to the first step F1.



Press START/STOP to run the program.



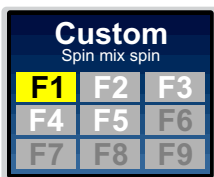
Upon completion of every step centrifuge will stop, open the lid and wait to proceed to the next step F2.
Steps that are already completed are marked black color.



To proceed to step two F2 press START/STOP.



If needed you can move selector from one step to another to change the sequence using the “+/- up/down” keyboard.



When all the steps are completed the system will return to main screen of the “Custom” mode. You can now repeat the program again.

ATTENTION! Use the Aerodynamic housing with rotors 50.02 and 50.03.

Operation

Operating centrifuge in “Mixer” mode

Mixer mode is a fully functional vortexer. Easy to set vibration speed from 1 to 12.



Settings adjustments are made using the “+/- up/down” keyboard. Parameters can also be change while the centrifuge is running.



To run vortexing just press “MIX/STOP” button.



By reducing the timer to the minimum you will reach a “Short run” mode. This mode allows using “MIX/STOP” button to manage the duration of vortexing. Vortexer will run while the button is depressed and will stop automatically when released.



Open



Shut

Centrifuge lid can be either open or shut while vortexer is running.

Vortexing levels explained.

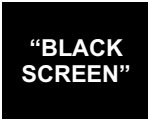




Vortexing level	RPM
1	105
2	375
3	525
4	575
5	732
6	945
7	1082
8	1220
9	1332
10	1400
11	1540
12	1620

Vortexing mode 1 is a Smart function which resembles hand shaking motion!

Relative speed in rounds per minute from level 2 to lever 12.

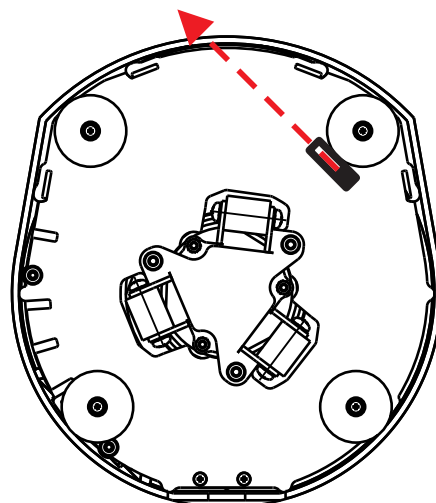
Troubleshooting

Error codes and solutions

Error code	Cause	Solution
	No main power connection. Power failure	Check connection of the power cable. Check if the power supply adapter is functioning.
	Centrifuge lid is left open.	Close and press on the lid till you hear a click.
	Total imbalance of test tubes is more than 1 gram.	Load rotor symmetrically.
	Processor Control Board is overheated.	Give a little time and centrifuge will cool down automatically.
	Motor is overheated.	Give a little time and centrifuge will cool down automatically.
Rotor detection fails. Centrifuge does not start. Power supply cuts off. Disbalance detection failure.	Controller factory settings mismatch.	Go to "TO" special menu.

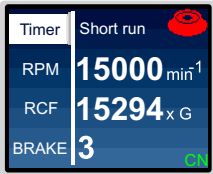
Emergency opening of centrifuge lid

To open the lid of centrifuge in case of power failure or lock damage of the lid it is necessary to raise the centrifuge and move the lever, which is located on the bottom of a centrifuge under the control panel, to the side as it is shown on the figure.

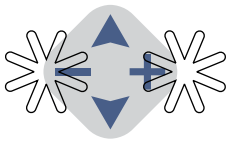


Troubleshooting

Restoring factory settings using special “TO” menu



When in “CN” mode turn the centrifuge off by clicking the main power switch to “off” position.



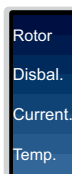
Press and hold down both buttons (-) and (+). While holding down the buttons click the power switch to “on” position.



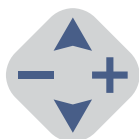
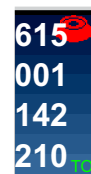
Centrifuge will enter to a special service menu “TO”.

Understanding the screen readouts:

Parameter



Modifiable parameter Actual parameter



Compare the “modifiable parameter” figures with corresponding factory default figures that you can find on the “**certificates**” page in the end of this manual. If figures does not match - correct them manually using “up/down +/-” keyboard.

General information

Safety features

Service personnel are prohibited to:

- Plug the device in to a power outlet with configuration that differs from the power adapters configuration.
- Use the device with damaged adapter, power cord, rotor aerodynamic lid or housing.
- Move the device during centrifugation.
- Run the unit without rotor aerodynamic lid or housing.
- Load the rotor asymmetry.
- Use damaged tubes.

ATTENTION! Studied Samples may contain pathological material, including pathogens of serious diseases.

Disinfection and cleaning

Before you start disinfection or cleaning make sure the power adapter is unplugged. It is recommended to perform cleaning with water and universal washing liquids. Afterwards the machine should be carefully dried. Do not let the water get inside the centrifuge-mixer.

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 appears 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 malfunction.
- Warranty repair could be performed only if the equipment is delivered in the original manufacturers packaging or equally safe packaging. Therefore please save the packaging after unpacking the device.
- 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.

Certificates

Certificate of approval

Centrifuge-mixer CM-50M ___ 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.
21-136 Aizkraukles Str., Riga LV-1006
Tel: (+371) 6755 8743
Fax: (+371) 6755 1934
E-mail: info@elmi-tech.com
WWW: www.elmi-tech.com

Default factory settings

Rotor	
Disbal.	
Current	



elmi Ltd.
laboratory equipment

ELMI Ltd.
21-136 Aizkraukles Str.
Riga, LV-1006, Latvia
T: +371 6755 8743
F: +371 6755 1934
E: info@elmi-tech.com
W: www.elmi-tech.com