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Chapter 1: Introduction.

Centrifuge CM-50 Pro 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 centrifuge CM- 50 Pro.

This will ensure excellent results and enduring performance.

Centrifuge CM-50 Pro is designed to separate solutions into fractions.

This microprocessor-controlled system provides smooth rotor acceleration and braking during all segments of the operation. A touchscreen display offers instant readout of all the relevant parameters, including time, braking 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.

Part1: Technical specifications.

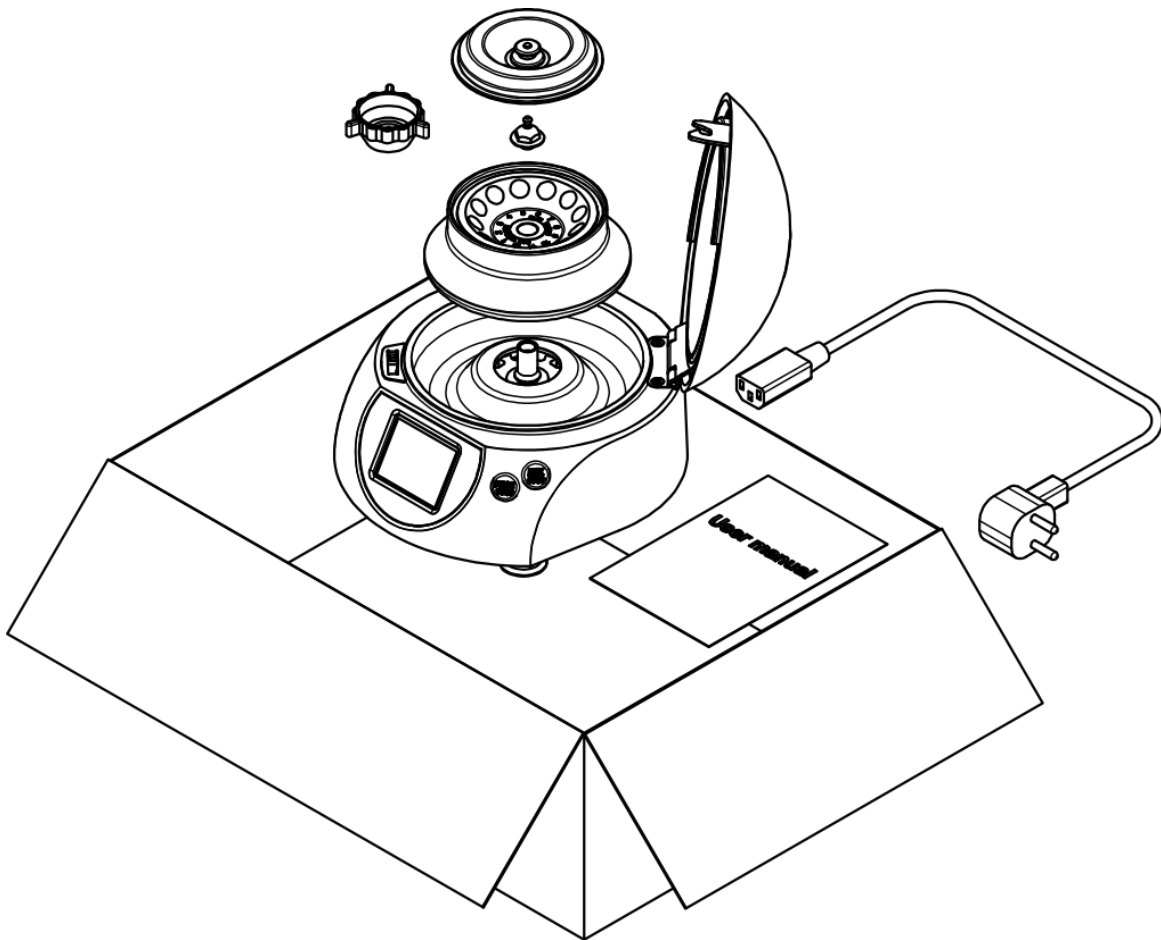
Rotor rotation speed, RPM	from 800 to 16000
Maximal relative centrifugal force, RCF (G)	17400
Accuracy of rotation speed maintenance, %	±1
Timer range	1 second – 99 minutes 59 seconds
HOLD mode	Applicable
Rotor speed step (RPM)	1
Centrifugal force step, RCF (G)	1
Timer step	1 second, 1 minute
Number of centrifuge brake levels	10
Electromagnetic compatibility	according to EN 61326-1: 2013
Ambient conditions:	
Ambient temperature, °C	from +10 to +40
Relative humidity, %	80
Do not use in humid premises (above 80% humidity)	
Use up to a height of 2000 m above sea level	
Total test tube imbalance limit, g	2
Mains voltage, V	90 - 250
Mains frequency, Hz	50-60 Hz
Overvoltage category	II
Nominal consumable power (16000 RPM), W	< 92
Size of the device (length x width x height), mm	206x188x140
Approximate weight, kg (without rotor and cord)*	2.4
Pollution degree	2
Custom user programs	11
The maximum overheating of samples in test tubes during centrifugation for 20 minutes at 16,000 rpm is about 8 degrees	
The maximum rotor acceleration time to 16,000 rpm is no more than 13 seconds	

Part 2: Braking levels (16000 rpm, full rotor).

Level	Seconds
1	11
2	13
3	15
4	20
5	25
6	30
7	35
8	40
9	50
10	60

Chapter 2: Contents of the packaging and getting prepared for operation.

Item	Quantity
Centrifuge	1
Rotor nut	1
Rotor key	1
Power cord	1
User manual	1
Packaging material	1

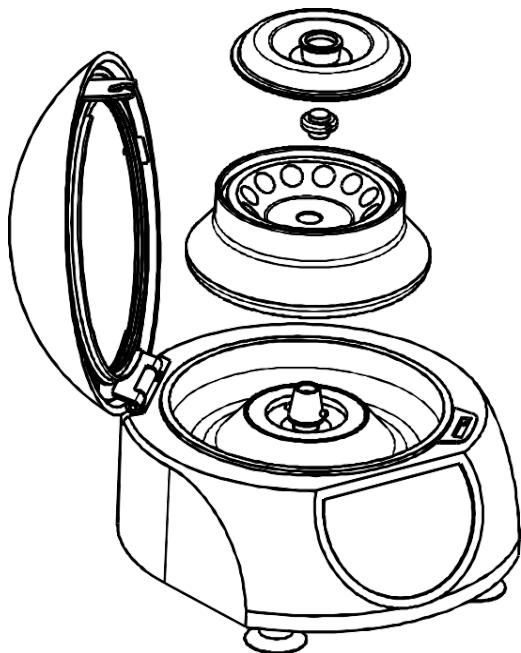


Step by step guide before start

- Unpack the device.
- Inspect the appearance of the device, the adapter and the power cord for damage.
- Open the lid of the CM-50 Pro with the emergency lid opening lever and remove the packaging material (see emergency opening of the centrifuge lid).
- In the cold season, keep the centrifuge at room temperature for at least 2 hours.
- Assembly the rotor.
- Rotor must rotate freely without jamming.
- Connect the centrifuge to the socket.
- Before operating the centrifuge, be sure that the power switch on the back of the unit is in the "ON" position.
- 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! Network socket must correspond to the adapter plug. In case of non-compliance with this condition the rules of electrical safety are violated.

Chapter 3: Rotor assembly and usage.



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 2 grams, the centrifuge will not start, and the display will show a DISBALANCE error code.

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



High speed **rotor 50.01** for 12 test tubes with aerodynamic, hermetic lid. Maximal rotation speed 15 000 RPM.

Maximal centrifugation force 15 294 RCF.

Applied test tubes: 1.5-2 ml



0.5 ml test tubes adapter



0.2 ml test tubes adapter

Chapter 4. Operating.

Carefully place the test tubes into the rotor adapters, ensuring they are inserted symmetrically on opposite sides of the rotor. To prevent imbalance and protect the centrifuge, fill each test tube to the same weight. Every test tube should be counterbalanced by one of equal weight on the opposite side. The total imbalance between test tubes should not exceed 2 grams. Following these guidelines will help minimize wear on the centrifuge's mechanical components.

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

Chapter 5: Setting centrifugation parameters.

Settings and adjustments of the parameters of the centrifuge must be made before the start of the centrifugation cycle, with an open or closed lid.

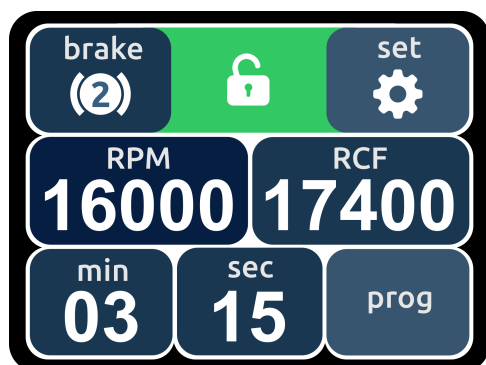
Using the TOUCHSCREEN DISPLAY STANDARD MENU, you can set the basic parameters of centrifugation (speed, time, and braking level) and set the programming mode.

To set additional parameters for the centrifuge, use the ADDITIONAL SETTINGS MENU.

Standard menu

This menu is displayed a few seconds after the centrifuge has been switched on.

The following parameters can be displayed and modified:



Braking levels (from 1 to 10)



The centrifuge lid is open



The centrifuge lid is locked



Additional settings menu



Rotor rotation speed - RPM



Relative Centrifugal Force - RCF



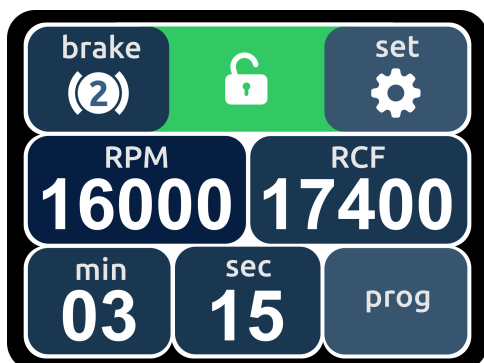
Timer (minutes, seconds):



Programming mode

Setting speed

By pressing on the touchscreen display, choose the unit of measurement (RPM or RCF):



RPM
16000

Choose this window to set speed in RPM

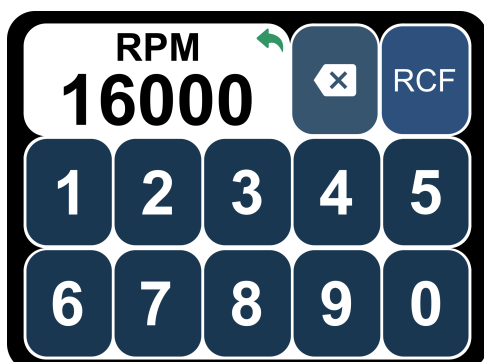
RCF
17400

Choose this window to set speed in RCF (G)

By setting speed in either unit the window showing the opposite speed units will update accordingly.

Editing and saving

The selected parameter lights up on a white background. Enter the desired value on the numerical keyboard.

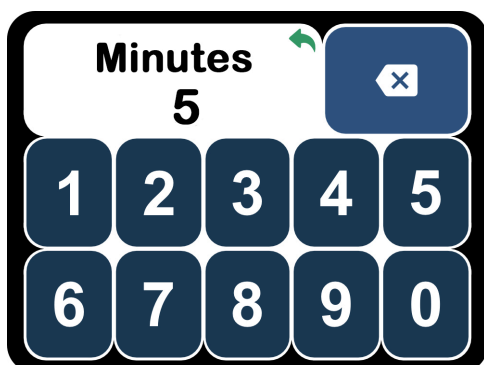


The Backspace button allows editing value on the screen by deleting numbers from left to right.

If the selected value of the parameter is accidentally set below or above the allowed limit, the system will automatically display the minimum or maximum permissible value

To confirm the entered value of the parameter, press the white field again.

Setting timer

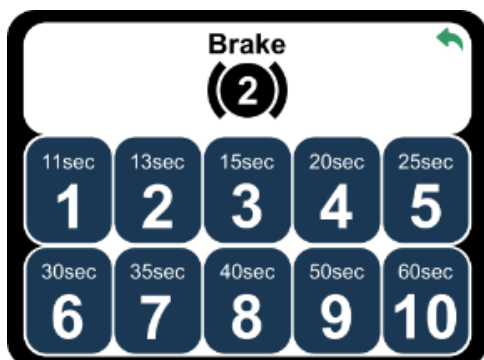


Select the necessary unit of measurement (minutes or seconds) by pressing on the touchscreen display.

Enter the desired value of the parameter using numerical keys. Press the selected units (minutes, seconds) in the upper part of the touchscreen to confirm the entered value of the parameter.

To confirm the entered value of the parameter, press the white field again.

Setting brake



Click on the "Brake" key on the left side of the touchscreen display.

Using the numeric keyboard, select the desired braking level (1 to 10).

The time indicated on the numerical keys means the maximum braking time from the maximum rotational speed (15000 RPM).

Once brake value is selected system will update and return to the main screen automatically.

Chapter 6: Additional settings menu.

Additional setting menu

Here is the list of additional setting



To access the additional settings menu, press the “gear” key in either the standard menu or programming mode.



Key to lock and unlock user programs.



Language: the English, German, Spanish and Portuguese languages are selected as the menu language.



Key to exit the additional settings menu.



Speaker volume.



Screen brightness.



Information about the centrifuge.



Hour meter for tracking lifetime of centrifuge.



Resetting the factory settings.



Password protection (for use by service engineers only).

Locking a program



Press this key (additional settings menu)

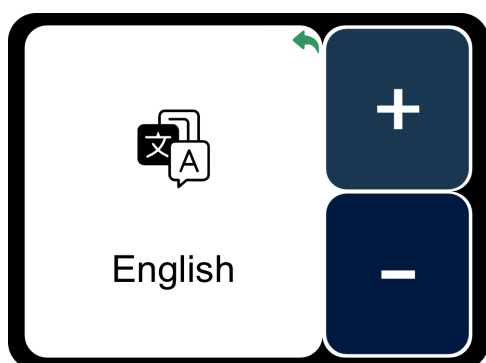


Tap on the desired program to lock it. The key icon will appear, indicating this program is now locked.



To unlock the program, reenter the lock mode and tap on the locked program to unlock. Key symbol will disappear, indicating the program is now unlocked.

Choosing interface language

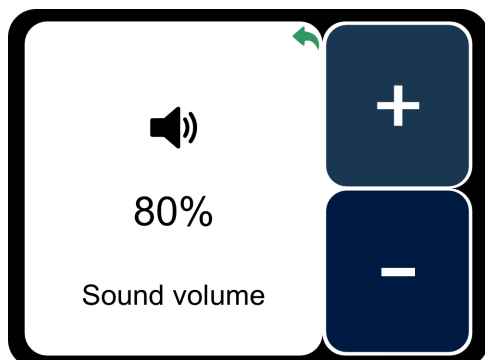


Press language key in the "Additional Settings Menu" to set interface language.

Using the navigation keys (+/-) select the desired language.

To confirm selection, tap on the white field where the language option is displayed. Centrifuge will return back to the "additional settings" screen, with language selection activated.

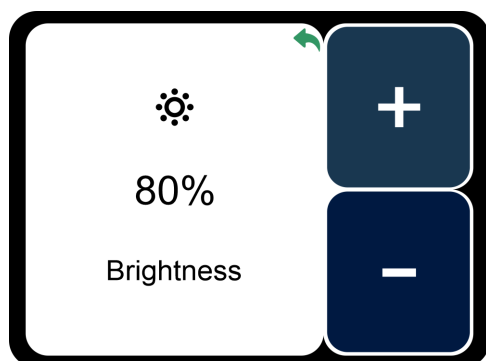
Adjusting speaker volume



To set the sound signal volume, you need to press the "Speaker" key (Additional Settings Menu).

Select and set the sound volume (100%, 80%, 60%, etc.). 0% means work without any sound signal.

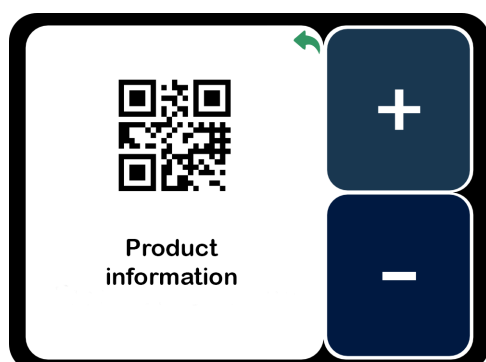
Adjusting screen brightness



To set the brightness of the screen, you need to press the "Brightness" key (Additional Settings Menu).

Select and set the required screen brightness (100%, 80%, 60%, etc.).

Information about centrifuge



For information about the centrifuge, you need to press the key (Additional Settings Menu).

By scanning QR code with your smartphone you will be directed onto product information resources.

Runtime counter



Indication of the total number of spindown hours.

Restoring factory default settings



Restoring factory settings allows you to delete all the changes made and the programs created by users as well as to restore the factory settings.

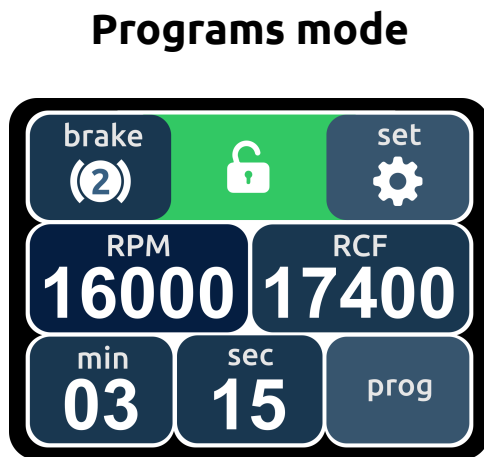
Password protection



To protect information about the factory settings from unauthorized access, a password is set at the factory. The password is available in the service instructions, designed for service engineers and technicians.

Chapter 7: Programs mode.

Part 1: how to enter programs mode and how to exit.



Press the "Prog" key to enter programs mode

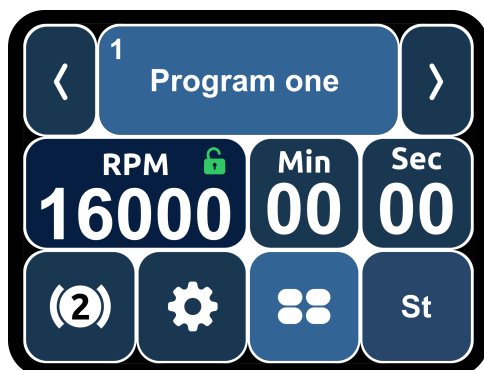


To exit the programs mode, you need to press the "St" key.

Users have the ability to make and store their own centrifugation programs in the centrifuge's memory, with a limit of up to 11 programs.

Part 2: how to navigate the list of programs.

Programming mode options



Use < and > buttons to navigate between different programs. Press < to move to the previous program and > to advance to the next one.

Use corresponding buttons to adjust the settings for centrifugation (speed, time, and braking levels).

Using “program launcher”



Press the “program launcher” key to enter programs list.

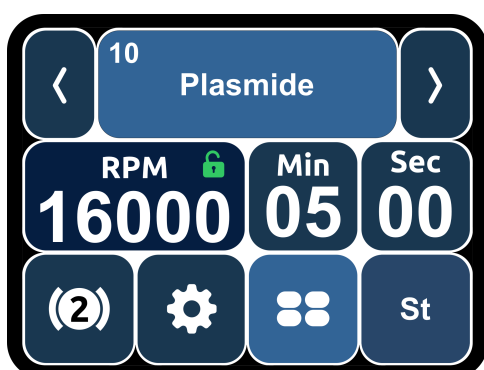


To select the desired program tap on its name. Program cell will light up white.



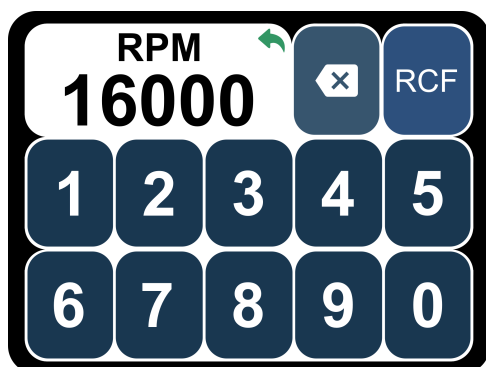
Once the program is selected you can start/stop it using an external button.

You can Start/Stop the centrifugation from any screen (Launcher or Editor)



By pressing the “exit” icon you will enter the editing screen for the selected program .

Setting speed

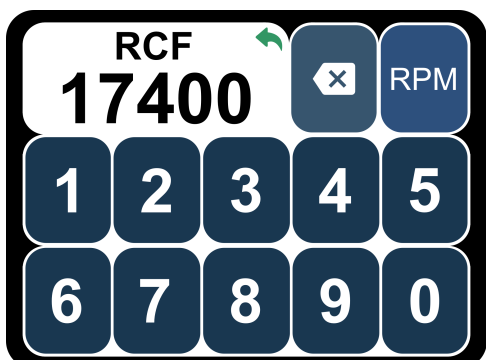


You can see the speed indicated in white field. To change it, use a numeric keyboard.

By pressing RCF you are going to switch scale to RCF. Value of the speed will be recalculated accordingly and will be displayed in the white field.



Use delete key to erase settings from right to left.

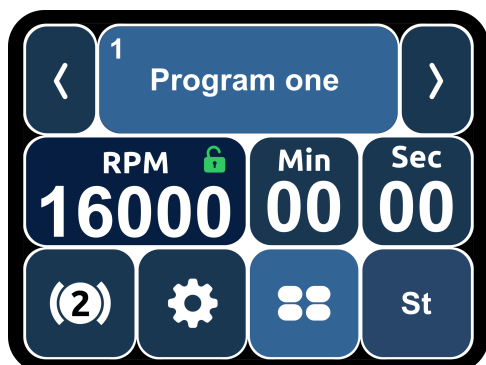


You can see the speed indicated in white field. To change it, use a numeric keyboard.

By pressing RPM you are going to switch scale to RPM. Value of the speed will be recalculated accordingly and will be displayed in the white field.

NOTE: Setting time is done in the same way as in Standard mode.

Part 3: How to name the program or modify existing name.



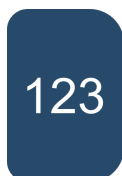
1 Program one

Tap the program name to enter the naming/renaming screen. Only latin alphabet letters are allowed when naming a program.

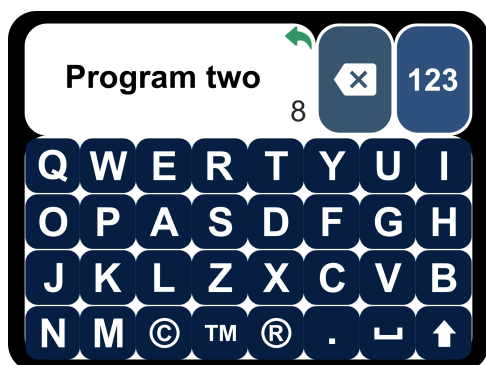
Program name may contain both uppercase and lowercase latin letters, numbers, and special symbols. Total length of a name - 20 characters including spaces.



Press this button to delete symbols from right to the left. Press and hold to fast delete.



Press this button to turn on digits and special symbols keyboard.



Press this symbol to finish editing and return to previous screen.



Press this button to turn on the CAPS lock.



Press this button to turn on the letters keyboard.



When using long program names it is recommended to use the "line break" function, then the program name will be nicely displayed in two lines. To do that insert space symbol twice at the point of line break. (This will only affect program launcher screen)



In the bottom right corner you can see the symbol counter, showing how many more symbols are left.

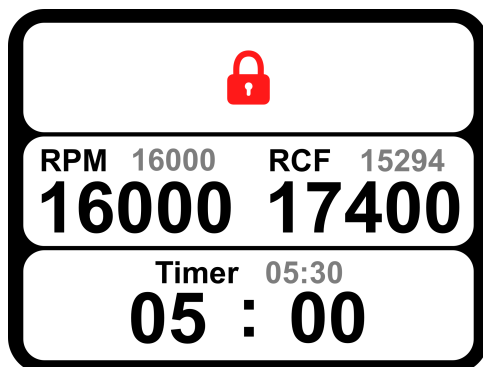


Using a “program launcher” mode is a convenient and fast way of operating the centrifuge given you have multiple programs in your work protocol. All you have to do is tap to select the desired program and press Start/Stop to run it. Last selected program will remain in the memory even after the centrifuge is turned off.

Chapter 8: Understanding the Start/Stop button and operational screens.

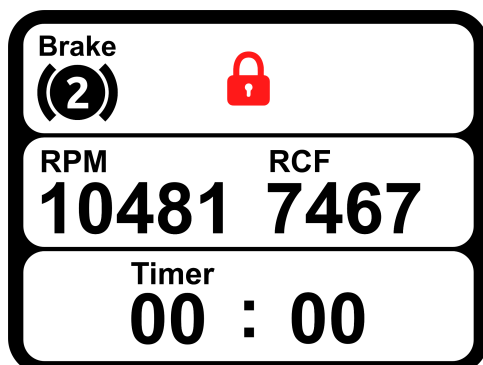
Part 1: Standard mode.

Centrifuge running



On this screen you can see actual parameters like speed and timer in large digits. Smaller (grey) digits reflect set parameters.

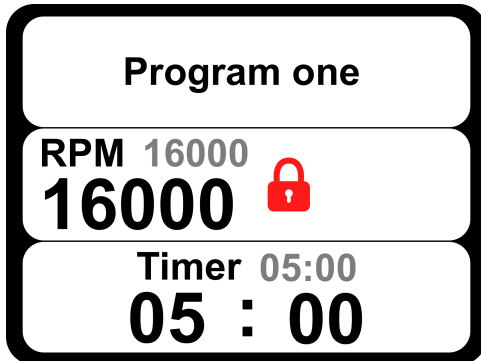
Centrifuge braking



The braking process starts after the CENTRIFUGATION TIMER is over.

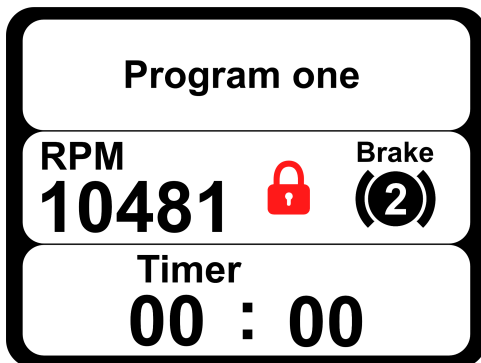
Part 2: Programs mode.

Centrifuge running



During the centrifugation process, the set parameter values are reflected by grey (small) numbers. The actual parameters of the centrifugation process are reflected by black (large) numbers.

Centrifuge braking



The braking process starts after the CENTRIFUGATION TIMER is over.

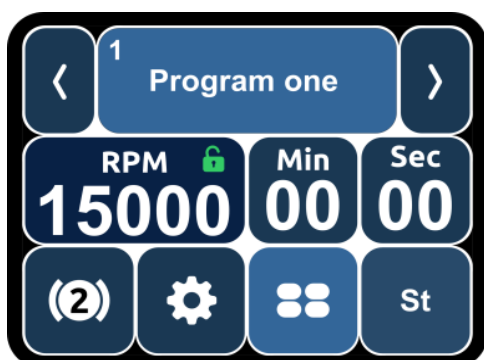
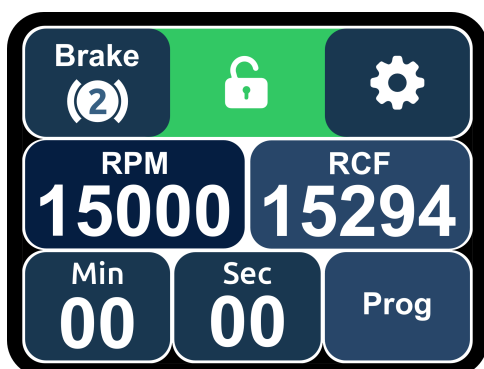
Attention! During the centrifugation process, RPM/RCF, timer and additional parameter setting is not possible!

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.

Part 3: Continuous centrifugation (HOLD mode).

Setting up



To enable continuous operation (HOLD mode) timer should be set to 00 min 00 sec.

The HOLD MODE can be set on any program, both in standard menu and program mode.

Start/Stop HOLD mode Standard mode



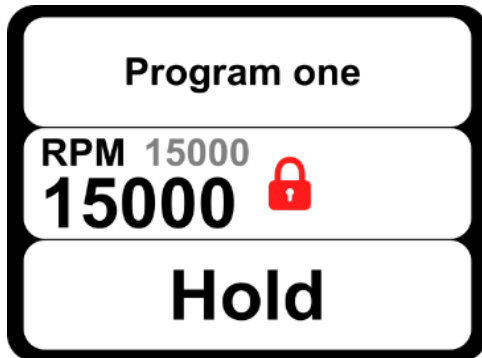
Press Start/Stop physical button to start or stop centrifugation.

Centrifuge braking. Standard mode



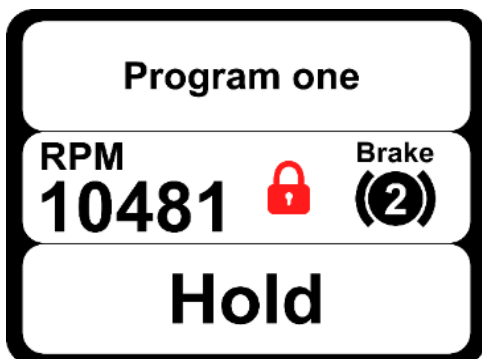
Standard mode (braking process)

Start/Stop HOLD mode Programs mode



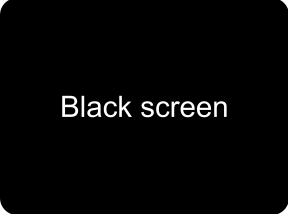

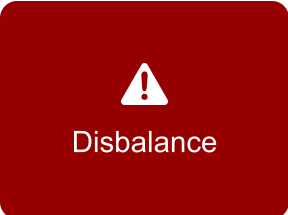

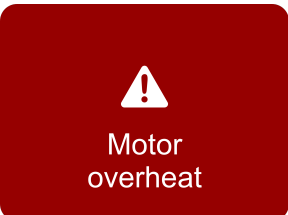
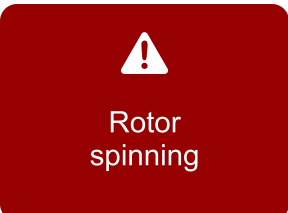
Press Start/Stop physical button to start or stop centrifugation.

Centrifuge braking. Programs mode

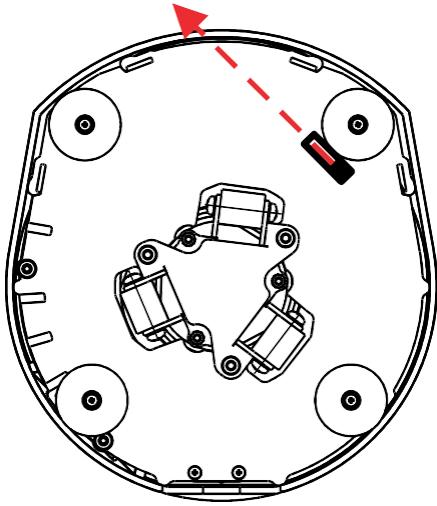


Programs mode (braking process)

Chapter 9: Error codes and solutions.

Error code	Cause	Solution
 <p>Black screen</p>	<p>No main power connection. Power failure.</p>	<p>Check connection of the power cable.</p>
 <p>The lid is not shut</p>	<p>Centrifuge lid is left open.</p>	<p>Close and press on the lid till you hear a click.</p>
 <p>Disbalance</p>	<p>Total imbalance of the test tubes is more than 2 grams.</p>	<p>Load rotor symmetrically.</p>
 <p>PCB overheat</p>	<p>The Processor Control Board is overheated.</p>	<p>Give a little time and the centrifuge will cool down automatically.</p>
 <p>Motor overheat</p>	<p>Motor is overheated.</p>	<p>Give a little time and the centrifuge will cool down automatically.</p>
 <p>Rotor spinning</p>	<p>Poor network quality. Poor connection of the power cable.</p>	<p>Turn off and on the machine with a network switch. Check all the connections.</p>

Chapter 10: 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.

Chapter 11: Safety features.

1. Power Configuration:
Only connect the device to a power outlet that matches the configuration of the power adapter.
2. Damaged Equipment:
Do not use the device if the adapter, power cord, rotor aerodynamic lid, or housing is damaged.
3. Operating Safety:
 - Never move the device during operation or centrifugation.
 - Do not run the unit without the rotor aerodynamic lid or housing properly secured.
 - Avoid loading the rotor unevenly or asymmetrically.
 - Do not use damaged tubes for centrifugation.
4. Hazardous Environments:
The device must not be operated in explosive atmospheres.
5. Hazardous Materials:
 - Do not centrifuge explosive, toxic, or radioactive liquids, nor any other hazardous substances.
 - Be aware that studied samples may contain pathological materials, including pathogens of serious diseases. Handle with caution.
6. Its recommended to place a centrifuge at least 30 cm from the edge of a desktop.

Chapter 12: Disinfection and cleaning.

Important: Always unplug the machine before cleaning or disinfection, as it operates on 220V (or 110V, depending on the model).

1. Preparation:
Before starting any cleaning or disinfection, ensure the power cord is disconnected from the power source.
2. Cleaning:
Use water and a universal cleaning solution to clean the machine's exterior surfaces. Take care to thoroughly dry the machine afterward.
3. Precautions:
It is essential to prevent water or cleaning solutions from entering the centrifuge to avoid damaging internal components.

Chapter 13: Temporary storage.

1. Transportation:
To ensure safe transport, the equipment should be packed in its original manufacturer's packaging or an equivalent protective substitute.
The equipment may be transported using any enclosed vehicle, provided that:
 - It is securely fastened to prevent movement during transit.
 - All applicable transportation regulations are followed.
2. Storage:
The equipment should be stored in its original packaging in a dry, well-ventilated room.
 - The storage area must have a humidity level of no more than 80%.
 - The temperature should be maintained between +10°C and +40°C.
 - It is not recommended to store the equipment for more than 36 months.

Chapter 14: Warranty terms and conditions.

1. Warranty Period:
The warranty covers a period of 24 months from the date of purchase.
2. Coverage:
Any malfunctions caused by manufacturing defects within the warranty period will be repaired free of charge.
3. Exclusions:
The warranty is void in the following cases:
 - The serial number label is damaged or tampered with.
 - Damage resulting from improper use, transportation, or storage.
4. Required Documentation for Warranty Claims:
To request warranty service, you must provide the following:
 - The user manual contains the machine's serial number.
 - An officially signed report detailing the reasons and conditions of the equipment malfunction.
5. Packaging Requirements:
Warranty repairs will only be performed if the equipment is returned in its original packaging or in equally secure packaging. Please retain the original packaging for this purpose.
6. Non-compliance:
If the above warranty conditions are not met, the consumer will be responsible for repair costs.
7. Support:
For any additional questions regarding operation or maintenance, please contact the manufacturer or the authorized product vendor.

Chapter 15: Certificate of approval.

Centrifuge CM-50 Pro _____ No has been inspected for the technical conditions and meets all regulations necessary for devices of this class.

Quality control person

(name) (signature)

Date of manufacture _____.

Place for stamp

Chapter 16: Certificate of sale.

Organization _____.

Address _____.

Phone _____.

Vendor _____

(name) (signature)

Date of sale _____.