Medical–Biological
Research & Technologies

LMC-3000
Laboratory centrifuge

Operating Manual
Certificate

for versions:
V.5AD
V.5AE

Contents

1. Safety Precautions

The following symbols mean:

Caution: Make sure you have fully read and understood the present Manual before using the equipment. Please pay special attention to sections marked by this symbol.

GENERAL SAFETY

- Use only as specified in the Operating Manual provided.
- Do not use a dropped or damaged unit.
- Store and transport the unit in a horizontal position (see package label).
- After transportation or storage and before connecting to electric circuit, keep the unit under room temperature for 2-3 h.
- According to EN 61010-2-20, people and hazardous materials must not be within a 300 mm area around the device during the centrifuge operation.
- Use only original accessories (rotors, adaptors, etc.) provided by the manufacturer and ordered specifically for this model.
- Before using any cleaning or decontamination methods 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 design of the unit.

ELECTRICAL SAFETY

- Connect only to electric circuit with 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 an ungrounded power socket, and do not use an ungrounded extension lead.
- Disconnect the unit from electric circuit before moving. Switch the unit off and disconnect the power cord plug from power socket to disconnect the unit from electric circuit.
- It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or penetrates into the equipment. If liquid penetrates into the unit, disconnect it from electric circuit and have it checked by a repair and maintenance technician.
- Do not operate the unit in premises where condensation can form. Operating conditions of the unit are defined in the Specifications section.

DURING OPERATION

- Do not centrifuge flammable or chemically active substances. If such liquids are spilled on the rotor or rotor chamber, the centrifuge must be cleaned with a most cloth and a mild soap solution.
- Do not use rotors with visible signs of corrosion, wear or mechanical damage.
- Do not fill in the tubes after they have been inserted in the rotor.
- Do not leave the operating unit unattended.
- Do not operate the unit in environments with aggressive or explosive chemical mixtures. Please contact manufacturer for possible operation of the unit in specific atmospheres.
- Do not operate the unit if it is faulty or has been installed incorrectly.
- Do not use outside laboratory rooms.
- Use only cleaning and decontamination methods recommended by the manufacturer.

BIOLOGICAL SAFETY

- According to EN 61010-2-20 a centrifuge without a gasket is not considered a biologically safe system and therefore 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 penetrates into the equipment.

2. General information

LMC-3000 is a modern desktop laboratory centrifuge useful for sedimentation of cells, bacteria, yeast, formed blood elements. It provides operation with tubes, gel cards and microtest plates. LMC-3000 is designed for safe work (metal protecting housing), easy maintenance and wide application range in medical, biochemical, industrial and other type laboratories.

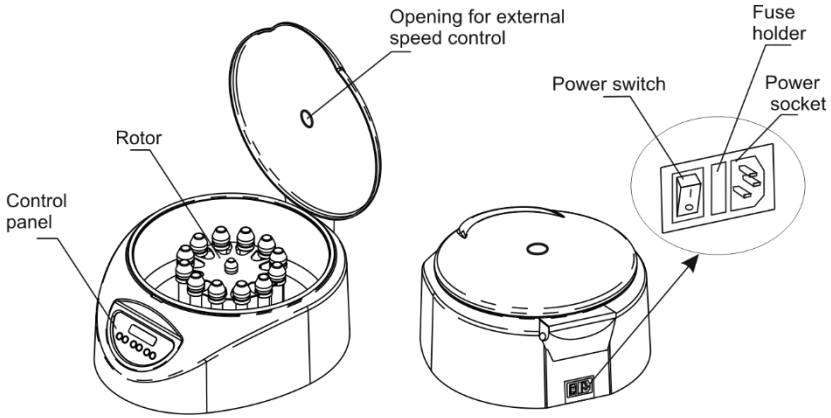

Fig.1 Overall view

FEATURES:

- User-friendly centrifugation parameters (time and speed) input and simultaneous display of the set and actual parameter values.
- Safe assay performance: metal protective housing and metal lid, automatic imbalance switch-off, lid lock during the centrifuge operation provide safe operation at all speeds.
- Rotor imbalance automatic diagnostics (emergency stop, indication “IMBALANCE”).
- Low noise level (not more 60 dBA).
- Soft run-up and run-down of the rotation.
- Possibility to switch off forced braking.
- Wide choice of accessory rotors.

Centrifugation process causes moderate heating of the operating chamber, which does not exceed 15°C above room temperature during one and a half hour. In case where quickly inactivating samples are to be centrifuged, the preliminary cooling or use of LMC-4200R refrigerated centrifuge is recommended.

3. Getting started

3.1. Unpacking.

Remove packing materials carefully and retain for them future shipment or storage of the unit.

Examine the unit carefully for any damage incurred during transit. The warranty does not cover in-transit damage.

Warranty covers only the units transported in the original package.

3.2. Complete set. Package contents:

Standard set:

- LMC-3000 Laboratory centrifuge ..... 1 pce
- spare fuse (inside the fuse holder) ..... 1 pce
- power cord ..... 1 pce
- wrench for rotor replacement (13 mm) ..... 1 pce
- Operating manual, Certificate .....1 copy

Optional accessories:

- R-6 rotor ❶ ..... on request
- R-6P rotor ❷ ..... on request
- R-12/10 rotor ❸ ..... on request
- R-12/15 rotor ❹ ..... on request
- R-2 rotor ❺ ..... on request
- R-24GC rotor for gel cards ❻ ..... on request
- RR-U rotor support stand ❼ ..... on request
- BN-13/75, BN-13/100 and BN-16/100 (for R-12/10) and BN-11/30 (for R-6P) adapter sets ❽ ..... on request

3.3. Set up:

- place the unit on the even stable and clean surface;
- remove protective film from the display;
- plug the power cord into the socket on the rear, and position the unit so that there is easy access to the power switch and mains;
- according to EN 61010-2-20, people and hazardous materials must not be within a 300 mm area around the device during the centrifuge operation;
- do not place any objects 100 mm behind the centrifuge to ensure unimpeded air circulation.

3.4. Rotor replacement.

Caution! Check the rotor and adapters for any signs of wear or corrosion and replace if necessary.

Hold the rotor with one hand and, using the supplied wrench for rotor replacement (13 mm), turn the fixation nut (fig.2/1) counterclockwise to release the rotor.

Caution! Do not hold the rotor by rings or adapters mounting when mounting and fixing it. Hold the rotor as shown on Fig. 2 (Correct).

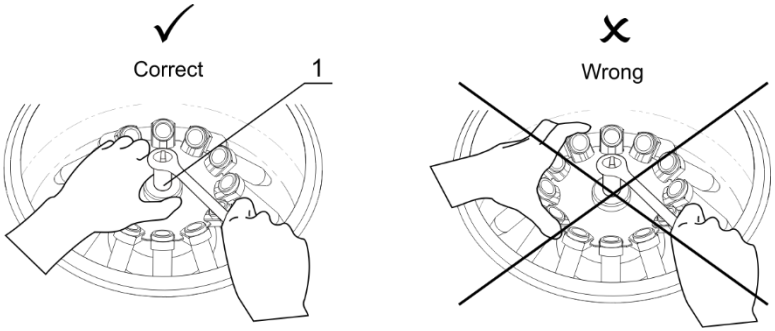

Fig.2 Rotor fixation

Replace the rotor and secure the new rotor carefully by turning the fixation nut tightly.

4. Operation

Recommendations during operation

Use even numbers of tubes arranged symmetrically (one opposite another) when loading to give the unit even balance during operation. The opposite tubes must be filled up equally.

- Centrifuge rotors must not be filled over the volume specified by the manufacturer.
- Rotor must always be fixed securely. Stop the operation immediately by pressing the **RUN/STOP** key if any unusual noise occurs during acceleration which can be due to improper rotor fixation.

4.1. Check the power cord preliminary for any signs of damage. Connect the power cord to a properly grounded power socket. Set the power switch on the rear side to position I (ON).

4.2. The centrifuge will turn on and the lid opens automatically.

The following readouts appear on the display:

- previously set time and speed in the upper line (Set);
- mode indication (STOP - lid closed and 🔒 - lid locked or OPEN - lid is open, rotor stopped) and current speed - 0 rpm in the lower line (Actual).

4.3. Check the rotor and buckets for any signs of wear or corrosion and replace if necessary. Insert EVEN number of tubes/microtest plates in rotor one opposite another. The loading in the opposite tubes must be equal.

4.4. Using the ▲ and ▼ **TIME** keys (fig. 3/1) set the required time interval (0-90 min, increment 1 min).

4.5. Using the ▲ and ▼ **RPM** keys (fig. 3/2) set the required speed (100 – 3000 rpm, increment 100 rpm). Note that the speed can also be adjusted during operation.

Note: Some plastic tubes and microtest plates can be damaged at higher speeds. Refer to the tube material specifications to make sure that it will not get damaged at the set speed. Do not set speed higher than 2000 rpm when working with microtest plates or 1500 rpm when working with gel cards!

4.6. **Changing the braking mode of the rotor**. By default, centrifuge applies force to stop the rotor after program completion. To toggle between forced braking and free braking, press ⏏ **Open** key (fig.3/4) and hold it for 8 s. Using ▼ and ▲ **TIME** keys, chose between BRAKE OFF (free braking) и BRAKE ON (forced braking). Press and hold ⏏ **Open** key for 8 s to exit choosing mode.

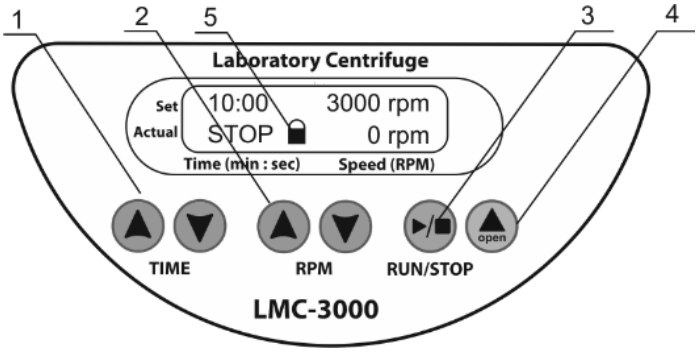

Fig.3 Control panel.

4.7. Close the lid carefully and smoothly until the clicking sound is heard. STOP indication and 🔒 symbol appear in the lower line of the display (fig. 3/5)

Note: If any of these readings (STOP or 🔒) has not appeared on the display, the program will not start centrifugation. Try to open and close the lid again.

4.8. Press the **RUN/STOP** key (fig. 3/3) to start centrifugation. Blinking indication RUN and current speed is displayed in the lower line. The timer in the upper line starts countdown after the set speed is achieved (stable indication RUN).

Note: If the rotor imbalance occurs causing vibration the centrifuge stops automatically (IMBALANCE indication will be shown on the display). In such a case open the lid after the rotor has stopped and remedy the cause of imbalance.

4.9. Centrifugation is stopped automatically after the set time elapses while display shows blinking indication STOP. A sound signal is emitted after full stop of the rotor (press the **RUN/STOP** key (fig.3/3) to stop the signal).

4.10. Centrifugation can be stopped before the set time elapses if necessary by pressing the **RUN/STOP** key. The set time interval will be shown on the display.

4.11. Press the ▲ **Open** key (fig.3/4) and open the lid lifting it upwards with a hand (it is possible to open the lid only when the rotor is stopped). Display shows OPEN.

4.12. At the end of operation set the power switch in position **O** (OFF) on the rear.

4.13. Disconnect the power cord from electric circuit.

Note: The electrical lid lock allows opening the lid only when the unit is connected to the mains and is turned on. Do not force the lid to open when the unit is switched off!

4.14. Lid emergency opening

4.14.1. Disconnect the power cord from electric circuit

4.14.2. Slide the unit to the front of the bench to access the emergency opening slot on the underside of the unit (located in the front side). Avoid tilting the unit as this may cause spilling of the materials from the containers inside the unit.

4.14.3. Insert a small screwdriver (or similar tool with diameter up to 3 mm) into the emergency opening slot in front of the dot on the label “Open” at a depth of 10-15 mm.

4.14.4. Move the lever to the arrow direction to release the lid lock.

5. Specifications

The unit is designed for operation in cold rooms, incubators and closed laboratory rooms at ambient temperature from +4°C to +40°C in a non-condensing atmosphere and maximum relative humidity 80% for temperatures up to 31°C decreasing linearly to 50% relative humidity at 40°C.

5.1. Speed setting range ..... 100 — 3000 rpm (increment 100 rpm)
5.2. Digital time setting ..... 1 — 90 min (increment 1 min)
5.3. Acceleration time up max. speed, not more ..... 20 s
5.4. Deceleration time
forced braking, not more ..... 35 s
free braking, not more ..... 100 s
5.5. Rotor imbalance automatic diagnostics..... emergency stop, indication “IMBALANCE”
5.6. Rotation direction ..... counterclockwise
5.7. Display..... LCD
5.8. Maximum noise level, not more ..... 60 dBA
5.9. Working diameter ..... 335 mm
5.10. Dimensions ..... 495x410x235 mm
5.11. Operating voltage/ power consumption ..... 230 V, 50 Hz / 110 W (0.5 A) or 120 V, 50/60 Hz / 120 W (1 A)
5.12. Weight*..... 11.8 kg

Biosan is committed to a continuous program of improvement and reserves the right to alter design and specifications of the equipment without additional notice.

* Accurate within ±10%.

Table 1. Rotors and rotor holder

Model	Description	Tube, plate and gel card manufacturer	Catalogue number
R-6	For 6 conical centrifuge tubes of 50 ml, with aluminium tube holders, ØxH: 40x103 mm, max speed / RCF* 3000 rpm / 1700g	Corning, Falcon, Greiner Bio-one, Nunc, Sarstedt	BS-010208-DK
R-6P	For 6 conical centrifuge tubes of 50 ml, with plastic tube holders, ØxH: 40x103 mm, max speed / RCF* 3000 rpm / 1700g		BS-010208-XK
R-12/15	For 12 conical centrifuge tubes of 15 ml, ØxH: 17x120 mm, max speed / RCF* 3000 rpm / 1700g		BS-010208-EK
R-12/10	For 12 round-bottom centrifuge tubes of 10-15 ml, ØxH: 16x90 mm, max speed / RCF* 3000 rpm / 1700g		BS-010208-BK
R-2	For 2 standard 96-well microplates, max speed / RCF* 2000 rpm / 560g, $LxWxH_{max}$ 128x85.6x45 mm		BS-010208-AK
R-24GC	For 24 of 8-column gel cards for blood group serology testing, max speed / RCF* 1500 rpm / 375g, LxW 53x74 mm	Grifols, Diamed	BS-010208-VK
RR-U	Rack for rotors		BS-010208-UK

Table 2. Optional accessories, rotor adapter sets

Model	For rotor	Description	Catalogue number
BN-13/75	R-12/10	For 12 of 2-5 ml vacutainers (ØxH: 13x75 mm)	BS-010208-PK
BN-13/100	R-12/10	For 12 of 4-8 ml vacutainers (ØxH: 13x100 mm)	BS-010208-QK
BN-16/100	R-12/10	For 12 of 8-9 ml vacutainers (ØxH: 16x100 mm)	BS-010208-RK
AP-96	R-2	For two unskirted or semi-skirted 96-well microplates ($LxWxH_{max}$: 128x85.6x45 mm)	BS-010219-DK
AP-384	R-2	For two 384-well microplates ($LxWxH_{max}$: 128x85.6x45 mm)	BS-010219-EK

Table 3. Replacement parts, rotor adapter sets

Model	For rotor	Description	Catalogue number
BN-11/30	R-6P	For 6 of 50 ml centrifuge tubes (ØxH: 40x103 mm)	BS-010208-ZK
BN-17/120	R-12/15	For 12 of 15 ml centrifuge tubes (ØxH: 17x120 mm)	BS-010208-TK
BN-16/90	R-12/10	For 12 of 10-15 ml centrifuge tubes (ØxH: 16x90 mm)	BS-010208-SK

* Relative Centrifugal Force

6. Maintenance

6.1. If the unit requires maintenance, disconnect the unit from electric circuit and contact Biosan or your local Biosan representative.

6.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

6.3. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.

It is recommended to perform disinfection after operation session by cleaning the parts inside the centrifuge chamber. The rotor and other accessories are autoclavable (120°C, 20 min).

6.4. Fuse replacement

Disconnect from electric circuit.

Remove the power plug from the rear of the unit. Pull out the fuse holder by applying leverage in recess (A). Remove the fuse from the holder. Check and replace with the correct fuse if necessary: for 230 V, M 1 A or for 120 V, M 2 A (type **M** - time lag: **M**edium).

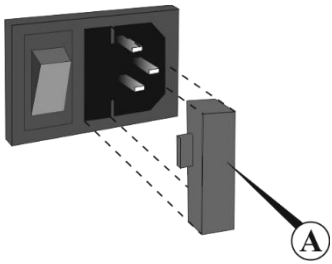

Fig.4 Fuse holder

7. Warranty and Claims

7.1. The Manufacturer guarantees the compliance of unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.

7.2. All rotors and accompanying metal buckets have maximum operating life of 7 years from the date of use. The plastic buckets have an operating life of two years form the date of use.

7.3. The warranted service life of unit from date of delivery to the Customer is 24 months (excluding the consumables, i.e. adapters, see tables 2 and 3). Contact your local distributor to check availability of extended warranty.

7.4. Warranty covers only the units transported in the original package.

7.5. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor address. Please visit www.biosan.lv, Technical support section to obtain the claim form.

7.6. The following information will be required in the event that warranty or post-warranty service comes necessary. Complete the table below and retain for your records.

Model	LMC-3000 Laboratory centrifuge
Serial number	
Date of sale	

8. Declaration of Conformity

Declaration of Conformity

Equipment name:	**LMC-3000**
Type of equipment:	Laboratory Centrifuge
Directive:	EMC Directive 2014/30/EC Low Voltage Directive 2014/35/EC RoHS 2011/65/EC WEEE 2002/96/EC & 2012/19/EU
Manufacturer:	SIA BIOSAN Ratsupites 7, build.2, Riga, LV-1067, Latvia
Applied Standards:	**EN 61326-1:** Electrical equipment for measurement, control and laboratory use EMC requirements. General requirements. **EN 61010-1:** Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements. **EN 61010-2-20:** Particular requirements for laboratory centrifuges.

We declare that this product conforms to the requirements of the above Directive(s)

Signature

Svetlana Bankovska
Managing director

28.01.2015
Date

Signature

Aleksandr Shevchik
Engineer of R&D

28.01.2015
Date

Biosan SIA
Ratsupites 7, build.2, Riga, LV-1067, Latvia
Phone: +371 67426137 Fax: +371 67428101
http://www.biosan.lv

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