

LMC-3000 & LMC-4200R Laboratory centrifuges



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1. About this edition of user manual

The manual applies to the following versions and models of Laboratory centrifuges:

- **LMC-3000** V.6AD, V.6AE
- **LMC-4200R** V.4AD

2. 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) at ambient temperatures between -20°C and +60°C and maximum relative humidity of 80%.
- 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 mains 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 mains 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 moist cloth and a mild soap solution.
- Do not use rotors with visible signs of corrosion, wear or mechanical damage.
- Do not use the rotor without fixation nut (see figure below). Fixation procedure is described in **4.4** on page 7.
- Do not fill in the tubes after they have been inserted in the rotor.
- Select the correct type of rotor. Some rotors have limited maximum speed (see figure below). Selection procedure is described in **5.5.3** on page 9.
- 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 lid 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.



Rotor label.

3. General information

LMC-3000 and LMC-4200R are modern desktop laboratory centrifuges designed for convenient sedimentation, centrifugation and collection of necessary samples. They provides operation with tubes, blood collection systems, gel cards, microtest and ELISA plates.

Our centrifuges are designed for safe work (metal protecting housing), easy maintenance and wide application range in medical, biochemical, chemical, industrial and other type of laboratories.

LMC-4200R Refrigerated Laboratory Centrifuge provides temperature control during centrifugation. Temperature control of the so-called “cold-shelf” is a gold standard for enzymologists, cell biologists, medical laboratory specialists and different discipline professionals because it ensures conditions necessary for reproducibility of sample preparation stage and reliable testing results connected with temperature sensitive components (metabolites, enzymes, hormonal factors, cytokines, chemical compounds etc.) and material itself (blood components, CSF and other thermolabile materials). Temperature control absence at this stage causes unpredictable results.

FEATURES:

- User-friendly centrifugation parameter 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, imbalance indication).
- Low noise level (not more than 65 dBA).
- Wide choice of accessory rotors and adapters.

NEW

- Rotor mode selection.
- Different modes of acceleration and deceleration, including deceleration mode with switched off forced braking.
- Possibility to set the speed both in revolutions per minute and by relative centrifugal force.
- Temperature control (model **LMC-4200R**)

4. Getting started

- 4.1. **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.



Caution! Due to the weight of the unit, its unpacking and installing must be carried out by two persons.

4.2. Package contents.

4.2.1. Standard set:

- Laboratory centrifuge 1 pce
- Spare fuse (inside the fuse holder) 1 pce
- Power cable 1 pce
- Wrench for rotor replacement (13 mm) 1 pce
- Emergency opening tool (for **LMC-4200R**)..... 1 pce
- Operating manual, declaration of conformity..... 1 copy

4.2.2. Optional accessories:

- R-6 rotor ❶on request
- R-6P rotor ❷on request
- R-12/10 rotor ❸on request
- R-24/10 rotor ❹ (only for **LMC-4200R**)on request
- R-12/15 rotor ❺on request
- R-2 rotor ❻on request
- R-24GC rotor for gel cards ❼on request
- Adapter sets: BN-13/75, BN-13/100 and BN-16/100 (for R-12/10), AP-96 and AP-384 (for R-2) ❽on request
- RR-U rotor support stand ❾on request



4.3. Setup.

- 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 unit, and position it so that there is easy access to the power switch and the 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;
- (**LMC-4200R**) Be sure to cork the drain hose (fig. 2/1) on the left side of the unit with a stopper to prevent the rising of chamber temperature.

4.4. Rotor replacement.

- Check the power cord for any signs of damage. Connect the power cord to a properly grounded mains socket. Set the power switch on the unit to position **I** (on). Press the **▲ Open** key (fig. 4/9 or 5/11) and lift the lid by hand.



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. 1/1) counter clockwise to release the rotor.
- Replace the rotor and secure the new rotor carefully by turning the fixation nut tightly.



Caution! Do not hold the rotor by rings or adapters mounting when mounting and fixing it. Hold the rotor as shown on figure 1 (Correct).



Caution! Since some plastic tubes and microtest plates can be damaged at higher speeds, maximum speed is limited for some rotors. Before centrifugation, select the type of installed rotor on the display, see p. **5.5.3** on page 9.

- If the unit will not be used, close the lid carefully and smoothly until a clicking sound is heard. Set the power switch on the side to position **O** (off). Disconnect the power cord from electric circuit.

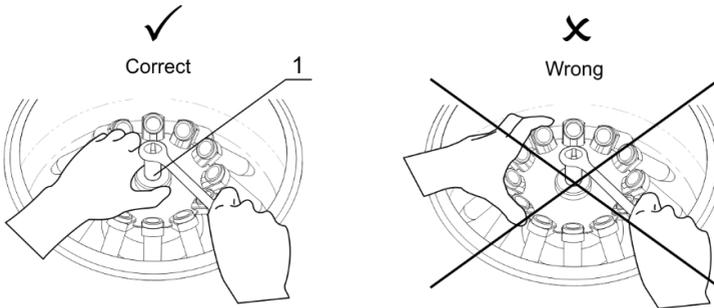


Figure 1. Rotor fixation

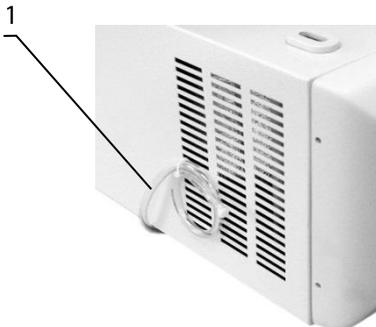


Figure 2. LMC-4200R, left side



Figure 3. LMC4200R, right side

5. Operation

5.1. 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 and holding the **RUN/STOP**  key for more than 2 seconds if any unusual noise occurs during acceleration, which can be due to improper rotor fixation.

 Since some plastic tubes and microtest plates can be damaged at higher speeds, maximum speed is limited for some rotors. Before centrifugation, select the type of installed rotor on the display, see **5.5.3** on page 9.

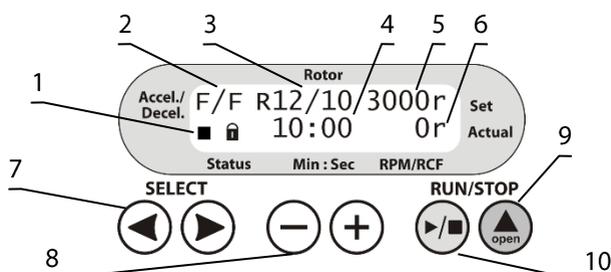


Figure 4. LMC-3000 control panel

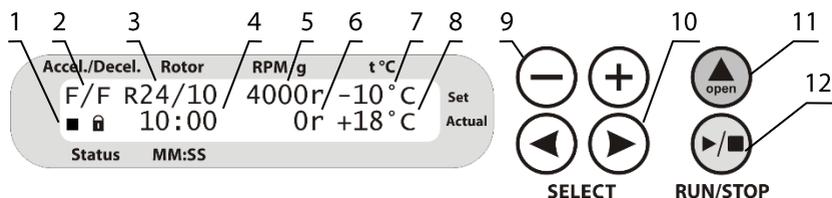


Figure 5. LMC-4200R control panel

5.2. Check the power cord for any signs of damage. Connect the power cord to a properly grounded mains socket. Set the power switch on the side to position **I** (on).

 **Caution!** In model **LMC-4200R**, cooling system requires some time for start-up. After powering up, wait for about 4 minutes before centrifugation.

5.3. The centrifuge turns on. The following readouts appear on the display:

- Acceleration and deceleration modes (fig. 4/2 or 5/2);
- Rotor selection (fig. 4/1 or 5/1);
- Set rotor speed in RPM or RCF* (fig. 4/6 or 5/6);
- Set chamber temperature, in degrees Celsius (only **LMC-4200R**, fig. 5/7);
- Status icons of rotor, ■ stopped or ► running (fig. 4/1 or 5/1, first symbol);
- Status icons of lid, ■ closed or ◻ open (fig. 4/1 or 5/1, second symbol);
- Set time of centrifugation, in minutes and seconds (fig. 4/4 or 5/4);
- Actual rotor speed, in RPM or RCF (fig. 4/6 or 5/6);
- Actual chamber temperature, in degrees Celsius (only **LMC-4200R**, fig. 5/8).

* Relative Centrifugal Force

- 5.4. Press the **▲ Open** key (fig. 4/9 or 5/11) and lift the lid by hand. 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.



Warning! Check the rotor fixation every 10 days. Tighten the fixation nut if necessary, see figure 1.

- 5.5. **Setting parameters.** Use the **SELECT** ◀ and ▶ keys (fig. 4/7 or 5/10) to choose a parameter and the – and + keys (fig. 4/8 or 5/9) to modify it. Selected parameter will be blinking. Program automatically saves any changes made after no keys are pressed for 2 seconds.

5.5.1. Acceleration modes (fig. 4/2 or 5/2, first letter). Three modes of acceleration are available, slow (shortened to **S**), normal (**N**) and fast (**F**).

5.5.2. Deceleration modes (fig. 4/2 or 5/2, second letter). Four modes of deceleration are available, free brake (**0**), slow (**S**), normal (**N**) and fast (**F**).



Note. Acceleration and deceleration speed values can be found in the **Specifications** section.

This information can also be found on the lid of the unit.

- 5.5.3. Installed rotor (fig. 4/3 or 5/3). Select the rotor that is currently installed in the centrifuge. Combinations of rotors, adapters and their maximum allowed speed is listed below in the Table 1.

Table 1.

Code on the display (fig. 4/3 or 5/3)	Rotor	Adapter	Maximum speed, RPM		Maximum RCF, g	
			LMC-3000	LMC-4200R	LMC-3000	LMC-4200R
R6	R-6	-	3000	4200	1610	3160
	R-6P	-				
R12/15	R-12/15	-	3000	4200	1610	3160
R24/10	R-24/10	-	N/A	4000	N/A	2860
	R-24/10	BN-16/100				
	R-24/10	BN-13/100				
R12/10	R-12/10	-	3000	4200	1610	3160
	R-12/10	BN-16/100				
	R-12/10	BN-13/100				
BN13/75	R-12/10	BN-13/75	3000	4200	1360	2660
R2	R-2	-	2000		560	
	R-2	AP-96				
	R-2	AP-384				
R24GC	R-24GC	-	1500		280	

5.5.4. Rotation parameters (fig. 4/5 or 5/5). Rotor speed can be set in RPM and in RCF, denoted after numeric value by **r** and **g**, accordingly. Values convert after changing units. RCF depends on selected rotor or adapters, as shown in Table 1.

5.5.5. Chamber temperature (fig. 5/7, only for **LMC-4200R**). Select the chamber temperature, step 1 °C. Cooling starts independently from centrifugation.



Warning! Chamber surface may become very cold. Avoid touching the surface.

5.5.6. Time setting (fig. 4/4 or 5/4). Select duration of centrifugation in minutes, step 1 minute.

5.6. Close the lid carefully and smoothly until a clicking sound is heard. Icon  appears on the display (fig. 4/1 or 5/1).



Note: If the  icon did not appear on the display, program does not start the centrifugation. Try to open and close the lid again.

- 5.7. Press the **RUN/STOP** / key (fig. 4/10 or 5/12) to start centrifugation. Icon  (fig. 4/1 or 5/1) and actual speed (fig. 4/6 or 5/6) are shown in the lower line of the display. The timer (fig. 4/4 or 5/4) starts the countdown after set speed is achieved.



Note: If the rotor imbalance occurs causing vibration the centrifuge stops automatically (IMBALANCE indication appears on the display). In this case, open the lid after the rotor has stopped and remedy the cause of imbalance.

- 5.8. Centrifugation is stopped automatically after the set time elapses. A sound signal is emitted after full stop of the rotor. Press the **RUN/STOP** / key to stop the signal.
- 5.9. If necessary, centrifugation can be stopped before the set time elapses. Press the **RUN/STOP** / key. Rotor stops according to set deceleration mode.



Note: For emergency, to apply fast braking regardless of set deceleration mode, press and hold **RUN/STOP** / key for more than 2 seconds.

- 5.10. Press the  **Open** key and open the lid by lifting it upwards with your hand. It is possible to unlock and open the lid only when the rotor is stopped. Display shows  icon.
- 5.11. (For **LMC-4200R**) Wipe clean the chamber from ice and condensation, see **7.3.2** on page 13 for additional information.
- 5.12. At the end of operation, set the Power switch in position **O** (OFF) on the rear panel of the unit. Disconnect the power cord from the mains.



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!

5.13. Lid emergency opening.

- 5.13.1. Disconnect the power cord from the mains. Ensure that the rotor has stopped.
- 5.13.2. **LMC-3000.** 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. 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. Move the lever to the arrow direction until a click is heard and open the unlocked lid..
- 5.13.3. **LMC-4200R.** Insert the emergency opening tool into the slot on the right side of the unit, above the power switch (fig. 3/1). Push until a click is heard and open the unlocked lid.

6. 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.

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

		LMC-3000	LMC-4200R
Speed setting range	In RPM	100 – 3000 RPM	100 – 4200 RPM
	In RCF*	10 – 1610 g	10 – 3160 g
Speed increment		100 RPM or 10 g	
Digital time setting		1 – 90 min	
Time setting increment		1 min	
Acceleration	Slow mode	50	50
	Normal mode	75	75
	Fast mode	135**	150**
Deceleration	Brakes off	30**	30**
	Slow mode	8	8
	Normal mode	45	50
	Fast mode	135**	150**
Temperature setting range		-	-10 °C ... +25 °C
Stable temperature maintenance range		-	25 °C below ambient ... +25 °C
Temperature setting resolution		-	1 °C
Rotor imbalance automatic diagnostics		Emergency stop, display indication "IMBALANCE"	
Rotation direction		Counterclockwise	
Display		LCD 2x16 symbols	LCD 2x24 symbols
Noise level		≤ 60 dBA	≤ 65 dBA
Chamber diameter		340 mm	360 mm
Dimensions		495x410x235 mm	635x580x335 mm
Power consumption		110 W (V.6AD); 120 W (V.6AE)	990 W
Input voltage		230 V, 50 Hz (V.6AD); 120 V, 50/60 Hz (V.6AE)	230 V, 50/60 Hz
Weight***		11.8 kg	56 kg

* Relative Centrifugal Force

** Depending on the load

*** Accurate within ±10%.

Table 2. Rotors and rotor holder

Model	Description	Max. speed* / RCF**		Catalogue number
		LMC-3000	LMC-4200R	
R-6	For 6 conical centrifuge tubes of 50 ml, with aluminium tube holders, ØxH: 40x103 mm	3000 RPM / 1610g	4200 RPM / 3160g	BS-010208-DK
R-6P	For 6 conical centrifuge tubes of 50 ml, with plastic tube holders, ØxH: 40x103 mm	3000 RPM / 1610g	4200 RPM / 3160g	BS-010208-XK
R-12/15	For 12 conical centrifuge tubes of 15 ml, ØxH: 17x120 mm	3000 RPM / 1610g	4200 RPM / 3160g	BS-010208-EK
R-12/10	For 12 round-bottom centrifuge tubes of 10-15 ml, ØxH: 16x90 mm	3000 RPM / 1610g	4200 RPM / 3160g	BS-010208-BK
R-24/10	For 24 round-bottom centrifuge tubes of 10-15 ml, ØxH: 16x90 mm	-	4000 RPM / 2860g	BS-010212-JK
R-2	For 2 standard 96-well microplates, LxWxH _{max} : 128x85.6x45 mm	2000 RPM / 560g	2000 RPM / 560g	BS-010208-AK
R-24GC	For 24 of 8-column gel cards for blood group serology testing, LxW 53x74 mm	1500 RPM / 280g	1500 RPM / 280g	BS-010208-VK
RR-U	Rack for rotors			BS-010208-UK

- Tube and plate manufacturers: Corning, Falcon, Greiner Bio-one, Nunc, Sarstedt.
- Gel card manufacturers: Grifols, Diamed.

Table 3. Optional accessories, rotor adapter sets

Model	For rotor	Description	RCF**	Catalogue number
BN-13/75	R-12/10	Adapters for 2-5 ml vacutainers (ØxH: 13x75 mm)	1360g	BS-010208-PK
BN-13/100	R-12/10	Adapters for 4-8 ml vacutainers (ØxH: 13x100 mm)	1610g	BS-010208-QK
	R-24/10		3160g	
BN-16/100	R-12/10	Adapters for 8-9 ml vacutainers (ØxH: 16x100 mm)	1610g	BS-010208-RK
	R-24/10		3160g	
AP-96	R-2	Adapters for unskirted or semi-skirted 96-well microplates (LxWxH _{max} : 128x85.6x45 mm)	560g	BS-010219-DK
AP-384	R-2	Adapters for 384-well microplates (LxWxH _{max} : 128x85.6x45 mm)	560g	BS-010219-EK

Table 4. Replacement parts, rotor adapter sets

Model	For rotor	Description	RCF**	Catalogue number
BN-11/30	R-6P	Adapters for 6 of 50 ml centrifuge tubes (ØxH: 40x103 mm)	1610g	BS-010208-ZK
BN-17/120	R-12/15	Adapters for 12 of 15 ml centrifuge tubes (ØxH: 17x120 mm)	1610g	BS-010208-TK
BN-16/90	R-12/10	Adapters for 12 of 10-15 ml centrifuge tubes (ØxH: 16x90 mm)	1610g	BS-010208-SK
	R-24/10		3160g	

* Accurate within ±5%

** Relative Centrifugal Force

7. Maintenance

- 7.1. If the unit requires maintenance, disconnect the unit from electric circuit and contact Biosan or your local Biosan representative.
- 7.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.
- 7.3. **Cleaning & disinfection.** Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.
 - 7.3.1. Disinfect the unit after operation by cleaning the parts inside the centrifuge chamber. The rotor and other accessories are autoclavable (120°C, 20 min).
 - 7.3.2. (For **LMC-4200R**) Wipe away any ice and condensation in the working chamber after operation. For the ease of cleaning, chamber is equipped with a drain hole with tube (fig. 2/1).
 - 7.3.3. (For **LMC-4200R**) Clean the condenser of the unit at least once per year. Disconnect from electric circuit. Unscrew 4 screws and remove the grate on the rear panel of the unit, then vacuum the condenser. Replace the grate and screws.
- 7.4. **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 (fig. 6/A). Remove the fuse from the holder. Check and replace with the correct fuse if necessary. Consult with the table 5 below (type **M** - time lag: **Medium**):

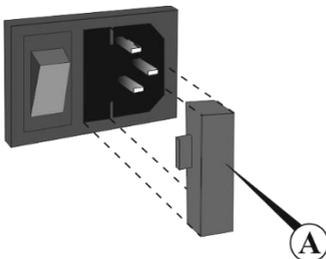


Figure 6. Fuse holder

Table 5. Fuse types

Model version	Fuse type
LMC-3000 V.6AD	M 1 A
LMC-3000 V.6AE	M 2 A
LMC-4200R V.4AD	M 6.3 A

8. Warranty and Claims

- 8.1. The Manufacturer guarantees the compliance of unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.
- 8.2. 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 2 years from the date of use.
- 8.3. The warranted service life of unit from date of delivery to the Customer is 24 months (excluding the consumables, see tables 3 and 4). For extended warranty, see **8.6**.
- 8.4. Warranty covers only the units transported in the original package.
- 8.5. 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 the **Technical support** section on our website at the link below to obtain the claim form.
- 8.6. Extended warranty.
- For **LMC-4200R**, a *Premium* class model, one year of extended warranty is available free of charge after registration, during 6 months from the date of sale. Online registration form can be found in section **Warranty registration** on our website at the link below.
 - For **LMC-3000**, a *Basic Plus* class model, extended warranty is a paid service. Contact your local Biosan representative or our service department through the **Technical support** section on our website at the link below.
- 8.7. Description of the classes of our products is available in the **Product class description** section on our website at the link below.

Technical support



biosan.lv/en/support

Warranty registration



biosan.lv/register-en

Product class description



biosan.lv/classes-en

- 8.8. 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 & LMC-4200R, Laboratory centrifuge
Serial number	
Date of sale	

9. EU Declaration of Conformity

EU Declaration of Conformity

Unit type	Mini-centrifuge, laboratory centrifuges
Models	Microspin 12, LMC-3000, LMC-4200R
Serial number	14 digits styled XXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.
Manufacturer	SIA BIOSAN Latvia, LV-1067, Riga, Ratsupites str. 7/2
Applicable Directives	EMC Directive 2014/30/EU LVD Directive 2014/35/EU RoHS2 2011/65/EU WEEE 2012/19/EU
Applicable Standards	<u>LVS EN 61326-1: 2013</u> Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements. <u>LVS EN 61010-1: 2011</u> Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. <u>LVS EN 61010-2-020: 2006</u> Particular requirements for laboratory centrifuges.

We declare that this product conforms to the requirements of the above Directives



Signature

Svetlana Bankovska
Managing director

19.07.2016.

Date



Signature

Aleksandr Shevchik
Engineer of R&D

19.07.2016

Date

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