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biosan
Medical–Biological
Research & Technologies

Multi Bio RS-24
Programmable rotator

Operating Manual
Certificate

for version
V.4AW

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

- Save the unit from shocks or falling.
- Store and transport the unit in a horizontal position (see package label).
- After transportation or storage, keep the unit under room temperature for 2-3 hrs before connecting it to the mains.
- 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 in design of the unit.

ELECTRICAL SAFETY

- Connect only to external power supply with voltage corresponding to that on the serial number label.
- Use only the external power supply provided with this product.
- Ensure that the external power supply is easily accessible during use.
- Disconnect the unit from the mains before moving.
- Turn off the unit by disconnecting the external power supply from the power socket.
- If liquid penetrates into the unit, disconnect it from the external power supply 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 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.
- Do not place a load exceeding the maximum load value mentioned in the Specifications section of this Manual.

BIOLOGICAL SAFETY

- 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

Multi Bio RS-24 programmable rotator provides: 1) orbital rotational motion, 2) reciprocal motion, 3) vibro motion of the platform in different planes according to the microprocessor protocol. The protocol enables making not only programs that include mixing motion of one particular type, but also programs that alternate mixing motions of different types cyclically. There are options for setting:

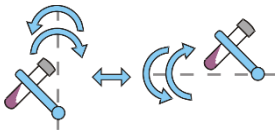
Orbital Rotational motion. Ordinary orbital rotational motion (360º) of the platform for a duration of 0-250 s or non-stop, with speed of 1-100 rpm.

Reciprocal motion. Segment of reciprocal motion when the direction orbital rotational motion of the platform from the vertical plane is changing in turns within the limits of the set segment (turning angle 1-90º for a duration 0-250 s, or non-stop) at set speed of the Orbital rotational motion.

Vibro motion. Segment and duration of the Vibro motion of the platform run inside the borders of reciprocal motion segment. Turning angle 0-5º, duration 1-5 s. It is available only when the reciprocal motion is on.

Pause. Duration of the Pause runs inside the borders of reciprocal motion segment, when Vibro motion turning angle is set to 0º, and pause duration is 1-5 s. It is available only when the reciprocal motion is on.

Working period from 1 min to 24 hours or nonstop.



Reciprocal motion can be started in two modes, tube position – either **horizontal** or **vertical**.

Apart from the unique operation modes the **Multi Bio RS-24** rotator possesses attractive miniature and elegant BioForm design and offers user-friendly interface, which provides options not only for changing the program during the operation, but also for simultaneous control over different steps of mixing protocol realization.

The **Multi Bio RS-24** programmable rotator will undoubtedly provide increased methodical means to researchers working in the field of modern molecular and cell biology and the developing biodiagnostics technology based on the use of magnetic particles, for which unexpected and disturbing hydrodynamic shifts of the reactants are essential.

The **Multi Bio RS-24** programmable rotator is designed for mixing biological solutions, cell suspensions, magnetic particles conjugated with specific antibodies as well as incubation and cultivation of biological liquids according to the operator set program.

The unit is applicable in all areas of laboratory research in biotechnology, microbiology, chemistry, and medicine.

3. Getting started

3.1. Unpacking.

Remove packing materials carefully and retain them for 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

- **Multi Bio RS-24** programmable rotator..... 1 piece
- PRS-26 platform ❶ ..... 1 piece
- External power supply unit ..... 1 piece
- Operating Manual; Certificate..... 1 copy

Optional accessories

- PRS-5/12 platform ❷ .....on request
- PRS-10 platform ❸ .....on request
- PRSC-22 platform ❹.....on request
- PRSC-10 platform ❺.....on request
- PRS-1DP platform ❻ .....on request

❶

❷

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3.3. Setup:

- Place the unit on the horizontal even working surface;
- Remove protective film from the display;
- Plug the external power supply into the 12 V socket at the rear side of the unit.

3.4. Platform replacement:

- Unscrew the two fixing screws on the platform.
- Replace the platform and install the new platform securing it with the screws.
- Fix the screw tightly.

4. Operation

Recommendation during operation

- Arrange the tubes symmetrically in relation to the rotation axis when loading.

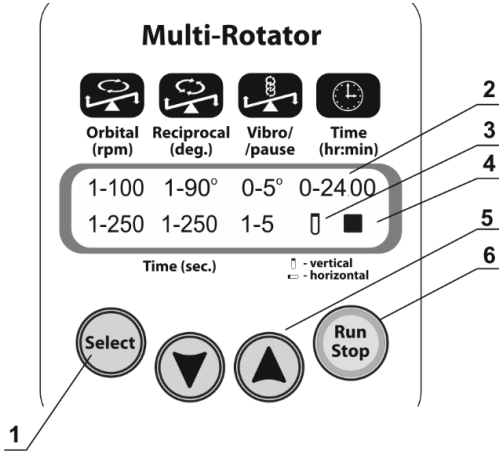


Fig. 1. Control panel

4.1. Connect the external power supply unit to the electric circuit.

4.2. Place samples on the platform: microtubes - up to the end; vacutainers and tubes with caps - half size.

4.3. Set the appropriate program and operation time (see the Program Setting Section of this Manual) according to the methodical prescriptions.

4.4. Press the **Run Stop** key (Fig.1/6) to start the program.

4.5. The platform motion will begin and the corresponding indication (►, Fig.1/4 and the changing time values) will be shown on the display.

4.6. If the operation time is not set and the timer indicator (Fig.1/2) shows 0:00, pressing the **Run Stop** key will cause continuous operation of the rotator until the **Run Stop** key is pressed again.

4.7. If the operation time is set the platform movement will stop after its expiring (flashing indication ■ will be shown on the display) and will start giving a sound signal about the end of operation (press the **Run Stop** key to stop the signal).

4.8. Press the **Run Stop** key to repeat the set program.

4.9. The rotator can be stopped at any time during operation before the set time expires if necessary by pressing the **Run Stop** key. In this case, the platform motion stops when the platform achieves horizontal position. Pressing the **Run Stop** key again will start the program from the beginning (countdown timer will be restarted).

4.10. Disconnect the external power supply unit from electric circuit to turn off the unit.

Note: A step motor is used in this model. Briefly stopping the platform with hand is allowed and does not damage the mechanical parts of the device. If the platform is stopped with hand during operation, the program does not stop and the platform motion is automatically resumed after the platform is released.

5. Program setting

Note. When setting program parameters, please mind that the unit may be unable to operate properly in reciprocal and vibration modes with maximum load. The recommended load is indicated in table 1 on page 13.

5.1. Press the **Select** key (Fig.1/1) to choose the parameter to change (the active parameter is flashing).

5.2. Use the ▼ and ▲ keys (Fig.1/5) to set the necessary value. If the key is pressed for more than 2 s, the numerical values change quickly.

5.3. Saving the program does not require additional operations: the microprocessor saves the last parameter changes as the working program automatically.

5.4. The countdown timer is used to control the operation time. The timer can be set for the period from 1 min to 24 hours.

5.5. Press and hold the **Select** key for 4 seconds to change the reciprocal motion mode (tube position – either vertical or horizontal).

When the tube icon (Fig. 1/3) is in vertical position, reciprocal rotation starts from tubes in vertical position (platform in horizontal position).

When the tube icon is in horizontal position, reciprocal rotation starts from tubes in horizontal position (platform in vertical position).

5.6. The examples below show separate motion types and their available combinations in cycles. The data to the right show the possible parameter values for each type.

5.6.1. **Orbital Rotation**. Set the speed of Orbital rotation (1-100 rpm), time of Orbital rotation (1-s) and time for Reciprocal motion to zero (OFF).

5.6.2. **Orbital + Reciprocal Rotation**. Set the speed (1-100 rpm) and time (1-250 s) of Orbital rotation. Set the turning angle (1-90º) and time (1-250 s) for Reciprocal motion. Switch off the Vibro motion by setting the time of Vibro motion to 0 (OFF).

5.6.3. **Orbital + Reciprocal + Vibro**. Set the speed (1-100 rpm) and time (1-250 s) of Orbital rotation. Set the angle (1-90º) and time (1-s) for Reciprocal motion. Set the turning angle (0-5º) and time (1-s) for Vibro motion. Note that if the set time of Reciprocal motion is shorter or equal to the set time of Vibro motion, then the Reciprocal motion will be omitted (Orbital + Vibro).

Orbital (rpm)	Reciprocal (deg.)	Vibro / pause
1-100	1-90°	0-5°
1-250	OFF	OFF

Time (sec.)

Orbital (rpm)	Reciprocal (deg.)	Vibro / pause
1-100	1-90°	1-5°
1-250	1-250	OFF

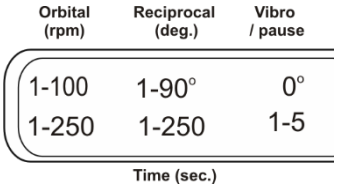
Time (sec.)

Orbital (rpm)	Reciprocal (deg.)	Vibro / pause
1-100	1-90°	1-5°
1-250	1-250	1-5

Time (sec.)

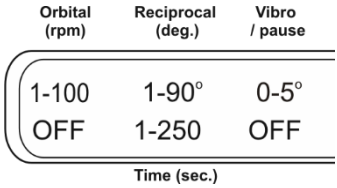
Caution! To avoid the platform drift while performing Vibro motion, do not load the platform over the weight that is specified in the Table 1 of the Specifications section on page 13.

5.6.4. **Orbital + Reciprocal + Pause**. Set the speed (1-100 rpm) and time (1-250 s) of Orbital rotation. Set the turning angle (1-90º) and time (1-250 s) for Reciprocal motion. Set the angle of Vibro motion mode to zero. Set the time for Vibro/pause mode (1-s), which is the time of pause duration.

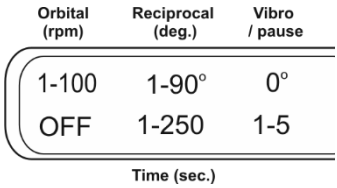


Note that if the set time of Reciprocal motion is shorter or equal to the set time of Vibro/pause mode, the Reciprocal motion mode will be omitted (Orbital + Pause).

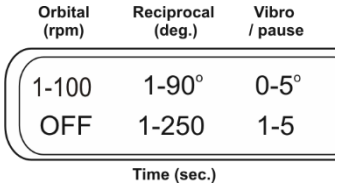
5.6.5. **Reciprocal Rotation**. Set the speed (1-100 rpm) for Orbital rotation. Set time for Orbital rotation to zero (OFF). Set the turning angle (1-90º) and time (1-250 s) of Reciprocal motion. Set the time for Vibro motion to zero (OFF).



5.6.6. **Reciprocal + Pause**. Set the speed (1-100 rpm) of Orbital rotation. Set time of Orbital rotation to zero (OFF). Set the angle (1-90º) and time (1-250 s) of Reciprocal motion. Set the time for Vibro motion type (1-s), which is the time of pause duration. Set the angle of Vibro type motion to zero.



5.6.7. **Vibro + Reciprocal Rotation**. Set the speed (1-100 rpm) of Orbital rotation. Set the time of Orbital rotation to zero (OFF). Set the angle (1-90º) and time (1-250 s) of Reciprocal motion. Set the angle (0-5º) and time (1-5 s) of Vibro type motion.



Caution! To avoid the platform drift while performing Vibro motion, do not load the platform over the weight that is specified in the Table 1 of the Specifications section on page 13.

When working with the unit in vibro motion mode for long period nonstop and using the platform with rubber clamps, choose the tubes smaller than 7 cm from cap to bottom.

6. Specifications

The unit is designed for operation in cold rooms, incubators (excluding CO_2 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.

6.1. Rotation
Speed control range ..... 1-100 rpm (increment 1 rpm)
Time setting range ..... 0-250 s (increment 1 s)
Vertical rotation movement..... 360°
6.2. Reciprocal rotation mode
Tilt angle range ..... 1-90° (increment 1°)
Time setting range ..... 0-250 s (increment 1 s)
6.3. Vibro/pause mode
Tilt angle range ..... 0-5° (increment 1°)
Time setting range ..... 0-5 s
6.4. Digital time setting..... 1 min -24 hours, or non-stop
6.5. Maximum load..... 0.5 kg
6.6. Dimensions ..... 365x195x155 mm
6.7. Input current/power consumption ..... 12 V, 660 mA / 8 W
6.8. External power supply unit ..... input AC 100-240 V 50/60Hz,
..... output DC 12V
6.9. Weight*..... 1.7 kg

Optional platforms	Capacity	Tubes		Catalogue number
		Volume, ml	Diameter, mm	
PRS-5/12**	5/12	50/2-15	20-30/ 10-16	BS-010117-HK
PRS-10**	10	50	20-30	BS-010117-IK
PRSC-22**	22	15	10-16	BS-010117-LK
PRSC-10**	10	50	20-30	BS-010117-JK
PRS-1DP**	Platform for microplates and racks for 0.5-1 ml tall tubes (e.g. Thermo 3741MTX, 3742MTX, 3744MTX)			BS-010117-DK

Replacement platform	Capacity	Tubes		Catalogue number
		Volume, ml	Diameter, mm	
PRS-26**	26	2-15	10-16	BS-010117-GK

* Accurate within ±10%.

** PRS platforms are equipped with universal rubber clamps for different size tube fixation; PRSC platforms have metal clamps able to hold heavier solutions (e.g. soil, sand).

Table 1. Recommendation of maximum allowed platform load depending on motion types

Motion type		Weight
Rotation		Up to 500 g
Reciprocal rotation		PRS platforms - up to 350 g PRSC platforms - up to 500 g
Vibro	1-3°	Up to 500 g
	4°	Up to 350 g
	5°	Up to 150 g

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

7. Maintenance

7.1. If the unit requires maintenance, disconnect the unit from the mains 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. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and decontamination of the unit.

8. Warranty and Claims

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

8.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months (excluding platforms mentioned in the table on page 10). For extended warranty, see p. 8.5.

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

8.4. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment claim shall be compiled, certified and sent to the local distributor ad-dress. To obtain the claim form, visit section **Technical support** on our website at link below.

8.5. Extended warranty. For **Multi Bio RS-24**, 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.

8.6. Description of the classes of our products is available in the **Product class description** section on our website at the link below.

Technical support	**Warranty registration**	**Product class description**
biosan.lv/en/support	**biosan.lv/register-en**	**biosan.lv/classes-en**

8.7. 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	**Multi Bio RS-24**, Programmable rotator
Serial number	
Date of sale	

9. EU Declaration of Conformity

EU Declaration of Conformity

Unit type	Rockers, shakers, rotators, vortexes
Models	**MR-1, MR-12;** **3D, Multi Bio 3D, PSU-10i, PSU-20i, MPS-1, PSU-2T;** **Bio RS-24, Multi Bio RS-24, Multi RS-60;** **V-1 plus, V-32, MSV-3500**
Serial number	14 digits styled XXXXXXYYMMZZZZ, 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	LVS EN 61326-1: 2013 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements. LVS EN 61010-1: 2011 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. LVS EN 61010-2-051: 2015 Particular requirements for laboratory equipment for mixing and stirring.

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

Signature	Signature
Svetlana Bankovska Managing director	Aleksandr Shevchik Engineer of R&D
19.07.2016. Date	19.07.2016 Date

HOW TO CHOOSE
A PROPER SHAKER, ROCKER, VORTEX

biosan
Medical–Biological Research & Technologies

Sample volume 10^3 ... 10^2 ml
Erlenmeyer flasks and Cultivation flasks

Sample volume 10^1 ml
Petri dishes, vacutainers and tubes up to 50 ml

Sample volume 10^0 ... 10^{-3} ml
PCR plates, microtest plates and Eppendorf type tubes

PSU-20i, Orbital Shaker

ES-20/60, Orbital Shaker–Incubator

Applications:
Microbiology
Extraction
Cell cultivation

PSU-10i, Orbital Shaker

ES-20, Orbital Shaker–Incubator

MR-12, Rocker–Shaker

Multi RS-60, Programmable rotator

Multi Bio RS-24, Programmable rotator

Applications:
Microbiology
Extraction
Cell cultivation
Hematology

Bio RS-24, Mini–Rotator

V-1 plus, Vortex

NEW

RTS-1 and RTS-1C, Personal bioreactors

MSV-3500, Multi Speed Vortex

MR-1, Mini Rocker–Shaker

Applications:
Agglutination
Gel staining/ destaining

Multi Bio 3D, Mini Shaker

Applications:
Agglutination
Extraction
Blot hybridisation
Gel staining/destaining

PST-60HL-4, Thermo–Shaker

PST-100HL, Thermo–Shaker

TS-DW, Thermo–Shaker for deep well plates

PST-60HL, Thermo–Shaker

NEW

Applications:
ELISA Analysis
Genomic Analysis
Hybridization
Immunology

Applications:
Nucleic acid Analysis
Molecular Analysis
Protein Analysis
Genomic Analysis

MPS-1, Multi Plate Shaker

PSU-2T, Mini–Shaker

NEW

CVP-2, Centrifuge vortex for PCR plates

TS-100, TS-100C, Thermo–Shakers

V-32, Multi-Vortex

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