

Bio RS-24, Multi Bio RS-24 & Multi RS-60 Mini-rotator & programmable rotators



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1. About this edition of user instructions

The current edition of the user manual applies to the following models and versions of rotators:

- Mini-rotator **Bio RS-24** version V.1AW
- Programmable rotator **Multi Bio RS-24** version V.4AW
- Programmable rotator **Multi RS-60** version V.3AY

2. Safety precautions



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

- The protection provided can be ineffective if the operation of the appliance does not comply with the manufacturer's requirements.
- Save the unit from shocks and falling.
- 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 it to the electric circuit, keep the unit under room temperature for 2-3 hrs.
- Use only original parts and accessories, provided by manufacturer for this product.
- 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 the mains with voltage corresponding to that on the serial number label.
- Use only the external power supply provided with this product.
- Ensure that the power plug is easily accessible during use.
- Disconnect the unit from the mains before moving.
- If liquid penetrates into the unit, disconnect it from the mains 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 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.

3. General information

The rotator series include three instruments: **Bio RS-24**, **Multi Bio RS-24** and **Multi RS-60**. Models provide vertical rotation, have low power consumption and can be used in cold rooms or incubators, operating at ambient temperature range +4°C to +40°C. The rotators are applicable in all areas of laboratory research, including biochemistry and clinical diagnostics.

Bio RS-24 mini-rotator is very simple to operate and is designed as a low-cost solution for laboratories with routine tasks. Model provides orbital rotational motion (360°) of the platform for a duration of up to 24 hours with speed of 1-30 RPM.

Multi Bio RS-24 and **Multi RS-60** programmable rotators provide three movement types: orbital rotational motion, reciprocal motion and vibro motion of the platform in different planes. The program features allow performing mixing motions of a particular type as well as alternating mixing motions of different types cyclically. There are options for setting:



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



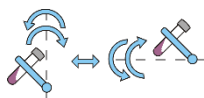
Reciprocal motion. Segment of reciprocal motion when the direction orbital rotational motion of the platform from the vertical plane is changing in turns within the limits of the set segment (turning angle 1-90° for a duration 0-250 s, or non-stop) at set speed of the Orbital rotational motion.



Vibro motion. Segment and duration of the Vibro motion of the platform run inside the borders of reciprocal motion segment. Turning angle 0-5°, 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 0°, 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 non-stop.

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

Multi Bio RS-24 and **Multi RS-60** programmable rotators offer 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. Models will undoubtedly provide increased methodical means to researchers working in the field of modern molecular and cell biology and the developing medical diagnostics technology. Programmable rotators are 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.

4. Getting started

4.1. **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.

4.2. **Complete set.** Package contents:

4.2.1. **Bio RS-24:**

- Bio RS-24, Mini-rotator..... 1 pce.
- PRS-22 platform..... 1 pce.
- External power supply 1 pce.
- Operating manual, declaration of conformity 1 copy
- PRS-4/12 platform.....on request
- PRSC-18 platform.....on request



PRS-22



PRS-4/12



PRSC-18

4.2.2. **Multi Bio RS-24:**

- Multi Bio RS-24, Programmable rotator..... 1 pce.
- PRS-26 platform..... 1 pce.
- External power supply 1 pce.
- Operating manual, declaration of conformity 1 copy
- PRS-5/12 platform.....on request
- PRS-10 platform.....on request
- PRSC-22 platform.....on request
- PRSC-10 platform.....on request
- M-8/50 platform.....on request
- PRS-1DP platform.....on request



PRS-26



PRS-5/12



PRS-10



PRSC-22



PRSC-10



M-8/50



PRS-1DP

4.2.3. Multi RS-60:

- Multi RS-60, Programmable rotator..... 1 pce.
- PRS-48 platform..... 1 pce.
- External power supply 1 pce.
- Operating manual, declaration of conformity 1 copy
- PRS-8/22 platform.....on request
- PRS-14 platform.....on request



PRS-48



PRS-8/22



PRS-14

4.3. Setup.

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

4.4. Platform installation or 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.

5. Operation

Recommendations during operation

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

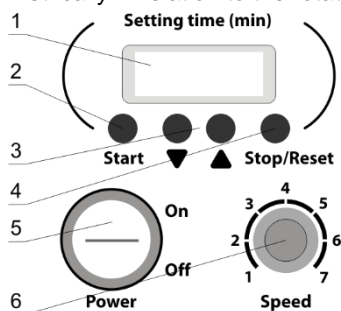


Figure 1. Bio RS-24

5.1. Working with model **Bio RS-24**

- 5.1.1. Connect the external power supply to the mains. Move the **Power** switch (fig. 1/5) to position **on**.
- 5.1.2. Place samples on the platform: microtubes - up to the end, vacutainers and tubes with caps - half way.
- 5.1.3. Set the rotation speed using the **Speed** knob (fig. 1/6).
- 5.1.4. Set the operation time using the ▼ and ▲ keys (fig. 1/3).
- 5.1.5. Press the **Start** key (fig. 1/2) to start the program.
- 5.1.6. The platform motion begins. Operation timer on the display (fig. 1/1) starts the count-down. Intervals less than 1 hour are displayed in minutes and seconds, intervals more than 1 hour - in hours and minutes.
- 5.1.7. If the operation timer is not set and display shows 0:00, pressing the **Start** key causes continuous operation of the rotator until the **Stop/Reset** key (fig. 1/4) is pressed.
- 5.1.8. If the operation timer is set, after timer expires, the platform movement stops and the display shows the set time interval. To reset it, press the **Stop/Reset** key and hold for more than 3 seconds.
- 5.1.9. To repeat the set program, press the **Start** key.
- 5.1.10. If necessary, the rotator can be stopped at any time during operation by pressing the **Stop/Reset** key. Pressing the **Start** key restarts the motion and the timer.
- 5.1.11. After finishing the operation, move the **Power** switch to position **off**. Disconnect the external power supply from the mains.

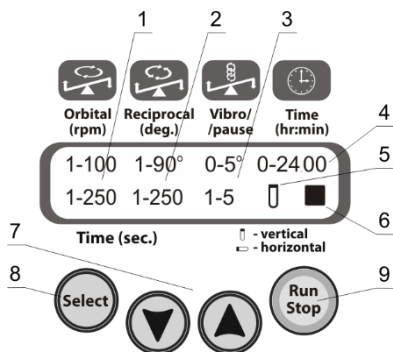


Figure 2. Multi Bio RS-24

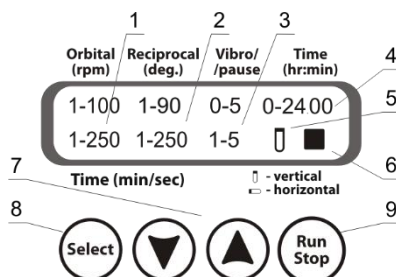


Figure 3. Multi RS-60

5.2. Working with models **Multi Bio RS-24** and **Multi RS-60**.

- 5.2.1. Connect the external power supply to the mains.
- 5.2.2. Place samples on the platform: microtubes - up to the end, vacutainers and tubes with caps - half way.
- 5.2.3. Set the appropriate program and operation time. See the **Program Setting** section of this manual.
- 5.2.4. Press the **Run Stop** key (fig. 2/9 or 3/9) to start the program.
- 5.2.5. The platform motion begins and the corresponding indication is shown on the display: icon ► (fig. 2/6 or 3/6), the changing time values of the current movement type in seconds (fig. 2/1-2/3 or 3/1-3/3, lower line) and the operation timer in hours and minutes (fig. 2/4 or 3/4).
- 5.2.6. If the operation timer is not set and display shows 0:00 (fig. 2/4 or 3/4), pressing the **Run Stop** key causes continuous operation of the rotator until the **Run Stop** key is pressed again.
- 5.2.7. If the operation timer is set, after timer expires, the platform movement stops, display shows flashing indication ■ (fig. 2/6 or 3/6) and the unit sounds a signal about the end of operation. Press the **Run Stop** key to stop the signal.
- 5.2.8. To repeat the set program, press the **Run Stop** key.
- 5.2.9. If necessary, the rotator can be stopped at any time during operation by pressing the **Run Stop** key. In this case, the platform motion stops when the platform achieves starting position. Pressing the **Run Stop** key restarts the program and the timer.



Note:

A step motor is used in the **Multi Bio RS-24** and **Multi RS-60** models. Briefly stopping the platform with hand is allowed and does not damage the mechanical parts. While the platform is held, the program does not stop. The platform motion is automatically resumed after the platform is released.

- 5.2.10. After finishing the operation, disconnect the external power supply from the mains.

6. Program setting



Caution! Current section is applicable only for models **Multi Bio RS-24** and **Multi RS-60**.



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 of the **Specifications** section.

- 6.1. Press the **Select** key (fig. 2/8 or 3/8) to choose the parameter to change. The active parameter is flashing.
- 6.2. Use the **▼** and **▲** keys (fig. 2/7 or 3/7) to set the necessary value. If the key is pressed for more than 2 s, the numerical values change quicker.
- 6.3. Saving the program does not require additional operations: the microprocessor saves the last parameter changes as the working program automatically.
- 6.4. The countdown timer (fig. 2/4 or 3/4) is used to control the operation time. The timer can be set for the period from 1 min to 24 hours.
- 6.5. 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. 2/5 or 3/5) 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).



- 6.6. 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.

- 6.6.1. **Orbital Rotation.** Set the speed of Orbital rotation (1-100 rpm), time of Orbital rotation (1-250 s) and time for Reciprocal motion to zero (OFF).

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

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

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

- 6.6.3. **Orbital + Reciprocal + Vibro.** Set the speed (1-100 rpm) and time (1-250 s) of Orbital rotation. Set the angle (1-90°) and time (1-250 s) for Reciprocal motion. Set the turning angle (0-5°) and time (1-5 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).

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



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.

6.6.4. **Orbital + Reciprocal + Pause.** Set the speed (1-100 rpm) and time (1-250 s) of Orbital rotation. Set the turning angle (1-90°) and time (1-250 s) for Reciprocal motion. Set the angle of Vibro motion mode to zero. Set the time for Vibro/pause mode (1-5 s), which is the time of pause duration.

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

Time (sec.)

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).

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

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

Time (sec.)

6.6.6. **Reciprocal + Pause.** Set the speed (1-100 rpm) of Orbital rotation. Set time of Orbital rotation to zero (OFF). Set the angle (1-90°) and time (1-250 s) of Reciprocal motion. Set the time for Vibro motion type (1-5 s), which is the time of pause duration. Set the angle of Vibro type motion to zero.

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

Time (sec.)

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

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

Time (sec.)

6.6.8. **Hard Vibro** (only for **Multi RS-60**). Set the speed (1-100 rpm) of Orbital rotation. Set the time of Orbital rotation and Vibro motion to zero (OFF). Set the angle of Reciprocal motion to 1°. Set the starting position of the tubes to horizontal (see 6.5).

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

Time (sec.)



Caution!

To avoid the platform drift while performing Vibro or Hard Vibro motion, do not load the platform over the weight that is specified in the Table 1 of the **Specifications** section.

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

7. Specifications

The unit is designed for operation in cold rooms, incubators (except CO₂ 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 programme of improvement and reserves the right to alter design and specifications of the equipment without additional notice.

		Bio RS-24	Multi Bio RS-24	Multi RS-60
Orbital rotation	Speed control range	5-30 RPM (linear increment)	1-100 RPM (increment 1 RPM)	
	Time setting range	N/A	0-250 s (increment 1 s)	
	Vertical rotation	360°		
Reciprocal rotation ¹	Tilt angle range	N/A	1-90° (increment 1°)	
	Time setting range		0-250 s (increment 1 s)	
Vibro/pause mode	Tilt angle range	N/A	0-5° (increment 1°)	
	Time setting range		0-5 s (increment 1 s)	
Digital countdown timer		1 min - 24 h (increment 1 min), or non-stop		
Maximum operation time		8 h ²	7 days	
Maximum load		375 g	500 g	800 g
Dimensions		325x190x155 mm	365x195x155 mm	430x230x230 mm
Input current		DC 12 V, 110 mA	DC 12 V, 660 mA	DC 24 V, 750 mA
Power consumption		1.3 W	8 W	18 W
External power supply		input AC 100-240 V, 50/60 Hz		
		output DC 12 V		output DC 24 V
Weight ³		1.4 kg	1.7 kg	3.8 kg

Optional platforms	Model	Tubes		Capacity	Catalogue number
		Volume, mL	Diameter, mm		
PRS-4/12	Bio RS-24	50/1.5-15	20-30/10-16	4/12	BS-010117-AK
PRSC-18		15	16	18	BS-010117-EK
PRS-5/12		50/1.5-15	20-30/10-16	5/12	BS-010117-HK
PRS-10	Multi Bio RS-24	50	20-30	10	BS-010117-IK
PRSC-22		15	16	22	BS-010117-LK
PRSC-10		50	25-30	10	BS-010117-JK
M-8/50		50	25-30	8	BS-010117-PK
PRS-1DP		Platform for microplates and racks for 0.5-1 ml tall tubes (e.g. Thermo 3741MTX, 3742MTX, 3744MTX)			BS-010149-DK
PRS-8/22	Multi RS-60	50/1.5-15	20-30/10-16	8/22	BS-010118-AK
PRS-14	60	50	20-30	14	BS-010118-BK

¹ Reciprocal motion uses the same set speed as Orbital motion

² If extended operations are necessary, see **8.4**

³ Accurate within ±10 %

Replacement part	Model	Tubes		Capacity	Catalogue number
		Volume, mL	Diameter, mm		
PRS-22	Bio RS-24	1.5-15	10-16	22	BS-010117-FK
PRS-26	Multi Bio RS-24	1.5-15	10-16	26	BS-010117-GK
PRS-48	Multi RS-60	1.5-15	10-16	48	BS-010118-CK

- 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 (Bio RS-24 – up to 375 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

8. Care and maintenance

- 8.1. If the unit requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.
- 8.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.
- 8.3. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and decontamination of the unit.
- 8.4. **Extended operation of Bio RS-24.** To provide reliable operation and conserve the resource of the motor, we recommend operation up to 8 hours, followed by a stop for 1 hour. If you require extended operation, obligatory make a 1 hour stop for each 8 hours of operation (e.g. 3 hour stop after 24 hour operation).

9. Warranty

- 9.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.
- 9.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months. For extended warranty, see **9.5**.
- 9.3. Warranty covers only the units transported in the original package.
- 9.4. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment report shall be compiled, certified and sent to the local distributor address. To obtain the claim form, visit section **Technical support** on our website at link below.
- 9.5. Extended warranty.
- For **Multi Bio RS-24 & Multi RS-60**, the *Premium* class models, 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 **Bio RS-24**, 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.
- 9.6. Description of the classes of our products is available in the **Product class description** section on our website at the link below.

Technical support



biosan.lv/en/support

Registration



biosan.lv/register-en

Product class description



biosan.lv/classes-en

- 9.7. 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	Mini-rotator Bio RS-24 Programmable rotators Multi Bio RS-24 & Multi RS-60
Serial number	
Date of sale	

10. 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 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 61010-2-051: 2015</u> Particular requirements for laboratory equipment for mixing and stirring.


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

HOW TO CHOOSE

A PROPER SHAKER, ROCKER, VORTEX

bioSan
Medical-Biological
Research & Technologies

Sample volume
10³ ... 10² ml

Erlenmeyer flasks and
Cultivation flasks



Sample volume
10¹ ml

Petri dishes, vacutainers
and tubes up to 50 ml



Sample volume
10⁰ ... 10⁻³ ml

PCR plates, microtest plates
and Eppendorf type tubes



PSU-20i, Orbital Shaker



ES-20/60, Orbital
Shaker-Incubator



PSU-10i,
Orbital Shaker



ES-20, Orbital
Shaker-Incubator



MR-12,
Rocker-Shaker



Multi RS-60,
Programmable rotator



Bio RS-24,
Mini-Rotator



NEW

RTS-1 and RTS-1C,
Personal bioreactors



MR-1,
Mini Rocker-Shaker



Applications:
Agglutination
Gel staining/
destaining



Multi Bio 3D, Mini Shaker

Applications:
Agglutination
Extraction
Blot hybridisation
Gel staining/destaining



Multi Bio RS-24,
Programmable
rotator

Applications:
Microbiology
Extraction
Cell cultivation
Hematology



V-1 plus,
Vortex



MSV-3500,
Multi Speed Vortex

Applications:
Nucleic acid Analysis
Molecular Analysis
Protein Analysis
Genomic Analysis



PST-60HL-4,
Thermo-Shaker

PST-60HL,
Thermo-Shaker



PST-100HL,
Thermo-Shaker

TS-DW, Thermo-
Shaker for deep
well plates



Applications:
ELISA Analysis
Genomic Analysis
Hybridization
Immunology

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>