

**Grant-bio**

# **Orbital Shaker PSU-20i**

*Operating instructions*



# Contents

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# 1. Safety















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## 1.1 Caution symbol



This symbol means Caution – risk of danger.

Where this symbol appears on the centrifuge, consult these operating instructions - the relevant passages in the instructions have the symbol marked beside them.

-  Use only as specified by the operating instructions, or the intrinsic protection may be impaired.
-  Connect only to a power supply with a voltage corresponding to that on the serial number label, and with an earth (ground) connector.
-  Do not operate the unit outside the laboratory premises.
-  Do not impede the platform motion during operation.
-  Do not use other power supply units than recommended by the manufacturer.
-  Do not operate the unit in premises with aggressive or explosive chemical mixtures.
-  Before using any cleaning or decontamination method except those recommended by the manufacturer, user should check with the manufacturer that the proposed method will not damage the equipment.
-  The unit should be saved from shocks and falling.
-  If liquid is spilt inside the unit, disconnect it from the power supply and have it checked by a competent person.
-  The PSU-20i must be installed on a firm, stable working surface.
-  When power is restored after interruption the unit turns on automatically and resumes operation (the timer is restarted).
-  Do not place a load exceeding 8 kg on PSU-20i.
-  Do not operate this product above 200 rpm for loads between 5 - 6kg and not above 170 rpm for loads exceeding 6 kg.
-  The unit must be stored and transported only in a horizontal position (see marking on the package).

## 2. General Information

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PSU-20i is the new orbital shaker in multi-functional mixing device range. New design, Direct drive system, Brushless motor (service life up to 35000 hours), Automatic loading balancing system makes the new series even more reliable especially for the long non-stop operation and expands the product specifications in the both high and low value ends.

PSU-20i provides: 1) orbital rotational motion, 2) reciprocal motion, 3) vibrating motion of the platform according to the microprocessor protocol. The protocol allows to set a program for realisation of not only separate mixing motions but also for the consecutive realisation of different motion types on the cyclical principle.

### Rotating motion (Orbital)



Simple orbital motion with an option of shifting direction (clockwise/anti-clockwise) after set time.

Adjustable speed from 20 to 250 RPM (increment 5 RPM).

### Reciprocating Rotating motion (Reciprocal)



Orbital rotation with changing direction of rotation.

Adjustable turning angle (from 0 to 360, increment 30°) sets the limits for this type of motion. The speed is the same as set for rotational motion (from 20 to 250 RPM).

### Vibration mode



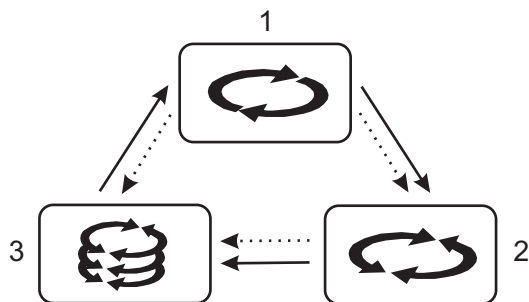
Intensive mixing of samples at high speed with small amplitude - Vibro motion.

Adjustable turning angle (from 0 to 5, increment 1°) sets the limits for this type of motion.

Reciprocating and Vibration motion types can be replaced with a pause.

These 3 motions are combined in a cycle (Fig. 1) and can be used:

- separately (only 1; 2; or 3);
- in combinations by two (1+2; 2+3; or 1+3);      ..... ➤
- all three in one cycle (1+2+3).      ➔



**Fig.1. Innovative “mixing cycle”**

The countdown timer is used to control the operation time. The timer can be set for the period from 1 min to 96 hours.

By combining the provided types of rotational motion the researcher gets unlimited options for choosing the necessary parameters of mixing the examined materials.

Apart from the unique operation modes the programmable orbital shaker PSU-20i possesses attractive 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 realisation.

The external power supply (DC adapter 12V 4,16 A) ensures the electrical safety of the device.

Orbital Shaker PSU-20i is specially designed for gentle and intensive mixing of biological and chemical compounds in a laboratory. It is a table-top laboratory instrument applicable for:

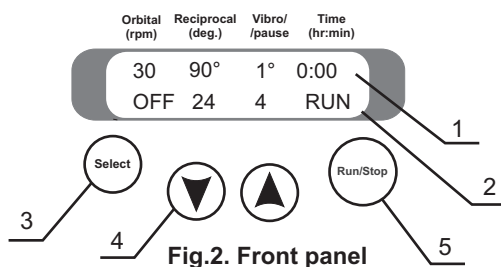
- extracting, dissolving slow-reacting samples;
- cultivation of cells;
- extraction of mineral oil of soil, of tissue culture for analytical diagnostics;
- de-aeration of tested biodegradable materials and samples;
- rotating closed containers for dialysis.

# 3. Getting started

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- 3.1. Unpacking.**  
Remove packing materials carefully, and retain them for future shipment or storage of the stirrer.
  - 3.2. Orbital Multi PSU-20 standard equipment includes:**
    - Orbital Shaker PSU-20i.....1 piece
    - Platform.....on order
    - External power supply.....1 piece
    - Specifications; Operating Manual; Certificate .....1 copy
  - 3.3. Place the device on the horizontal even working surface.**
  - 3.4. Plug the external power supply unit into the 12 V socket at the rear side of the unit.**
  - 3.5. Platform installation:**
    - remove the rubber mat from the platform;
    - secure the platform on the stands on top of the unit with the four screws;
    - cover the platform with the rubber mat.

To assemble and install the multi-level platform follow the instruction supplied with the platform.

## 4. Operation of Orbital Shaker



- 4.1. Connect the external power supply to the mains.
- 4.2. Place and fix laboratory vessels on the platform.  
Do not operate this product above 200 rpm for loads between 5 - 6kg and not above 170 rpm for loads exceeding 6 kg.
- 4.3. Set the appropriate program and operation time (see part 5. Program Setting) according to the methodical prescriptions.
- 4.4. Press **Run/Stop** button (Fig.2/5) to start the program.
- 4.5. The platform motion starts and the corresponding indication "RUN" (Fig.2/2) and the changing time values are shown on the display.
- 4.6. If the operation time is not set and the timer indicator (Fig.2/1) shows "0:00", pressing **Run/Stop** key cause Shaker to operate continuously until the **Run/Stop** button is pressed again.
- 4.7. If the operation time is set then Shaker stops after the set time interval is expired (flashing indication "STOP" on the display) and gives a sound signal about the end of operation (press **Run/Stop** button to stop the signal).
- 4.8. To repeat the operation according to the set program press **Run/Stop** button.  
*Note!* When power is restored after interruption the unit turns on automatically and resumes operation (the timer is restarted).
- 4.9. If necessary the Shaker can be stopped at any time during operation before the set time is expired by pressing **Run/Stop** button. Pressing **Run/Stop** key again will start the program from the beginning (timer will be restarted).
- 4.10. At the end of operation unplug the external power supply from the mains to turn off the device.

# 5. Program setting

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The program consists of cycles. Each cycle includes three different types of platform motion (Orbital, Reciprocating and Vibro) set one after another with the duration from 0 to 250 seconds for Orbital and Reciprocal motion types and from 0 to 5 seconds for Vibrating motion.

- 5.1. Press Select button (Fig.2/3) to choose the parameter to change (the active parameter is flashing). Use ▲ and ▼ buttons (Fig.2/4) to set the necessary value (note: if the button is pressed for more than 2 sec the numerical changes quickly).
- 5.2. The program can also be changed during operation - microprocessor automatically enters the last changes into the memory as the working program.
- 5.3. It is necessary to set speed, turning angle, time for each motion type and the overall operation time.
- 5.4. If the time for a motion is not set (indication "OFF"), this type of motion will be skipped in the cycle.
- 5.5. It is possible to set a pause instead of Reciprocal (0-250 sec) or Vibration (0-5 sec) motion. To set a pause set the turning angle of Reciprocal or Vibration motion to zero and set the time for this motion, which will be the time of pause duration. (During the operation the platform will not move in this mode but the time will be counted down.)
- 5.6. The countdown timer is used to control the operation time. The timer can be set for the period from 1 min to 96 hours (timer increment 1 min) (note: the set time cannot be changed during operation).
- 5.7. Table below shows different cycle variants:

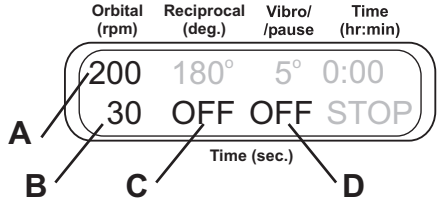
	<b>Orbital</b>	<b>Reciprocal</b>	<b>Vibro</b>
<b>1</b>	On	On	On
<b>2</b>	On	OFF	On
<b>3</b>	On	Pause	On
<b>4</b>	On	OFF	OFF
<b>5</b>	On	Pause	OFF
<b>6</b>	On	OFF	Pause
<b>7</b>	On	Pause	Pause
<b>8</b>	On	On	OFF
<b>9</b>	On	On	Pause
<b>10</b>	OFF	On	On
<b>11</b>	OFF	Pause	On
<b>12</b>	OFF	On	Pause
<b>13</b>	OFF	OFF	On
<b>14</b>	OFF	On	OFF



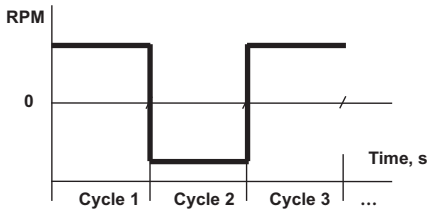
5.8. Further examples illustrate program setting for four different cycle variants.

**5.8.1. Orbital motion**

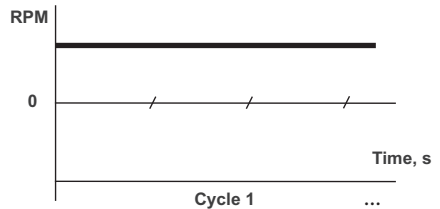
Set the speed (A) (20 - 250 RPM) and time (B) (1 - 250 sec) of Orbital motion. Turn off Reciprocal motion (C) by setting time of Reciprocal motion to zero (OFF). Turn off Vibration type motion (D) by setting time of Vibrating motion to zero (OFF).



Note: Shaker is programmed to change the rotation direction each time when a motion timer is started, i.e. if the Orbital motion time is set to 30 sec then the direction of orbital rotation will be changed every 30 sec (fig.3).



**Fig.3.**

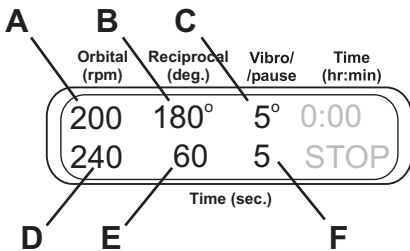


**Fig.4.**

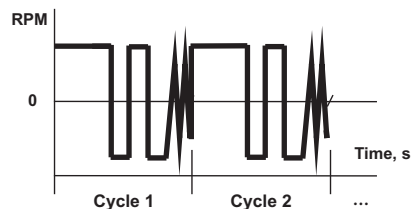
If Orbital motion time is set to "00" sec shaker will perform simple orbital rotation in one direction. In this mode Reciprocal and Vibrating motion cannot be added to the cycle (fig.4).

**5.8.2. Orbital + Reciprocal + Vibrating motion**

Set the speed (A) (20 - 250 RPM) and time (D) (1 - 250 sec) of Orbital motion. Set the angle (B) (0 - 360°) and time (E) (1 - 250 sec) for Reciprocal motion. (It is performed at the same speed as the Orbital motion.) Set the turning angle (0-5°) and time (1 - 5 sec) for Vibrating motion.



**Fig.5.**



**Fig.6.**

**Orbital, Reciprocal and Vibrating motions run one after another in cycles**

### 5.8.3. Orbital + Reciprocal + Pause

Set the speed (A) (20 - 250 RPM) and time (D) (1 - 250 sec) of Orbital motion. Set the turning angle (B) (0 - 360°) and time (E) (1 - 250 sec) for Reciprocal motion.

Set the angle (C) of Vibrating motion to zero. Set the time for Vibrating motion (F) (1 - 5 sec) - this is the time of pause duration.

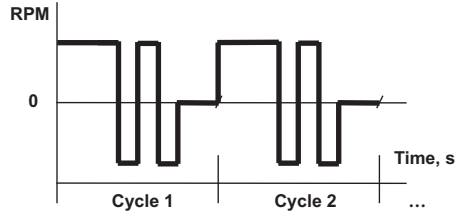
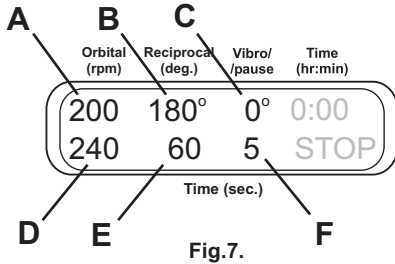


Fig. 8. Orbital and Reciprocal motions and pause run one after another in cycles.

### 5.8.4. Vibration + Pause

Set the speed (A) (20 - 250 RPM). Turn off Orbital motion by setting time of Orbital motion below zero (D) (OFF). Set the angle of Reciprocal motion (B) to zero. Set the time for Reciprocal motion (E) (1 - 250 sec) - this is the time of pause duration. Set the turning angle (C) (0 - 5°) and time (F) (1 - 5 sec) for Vibrating motion.

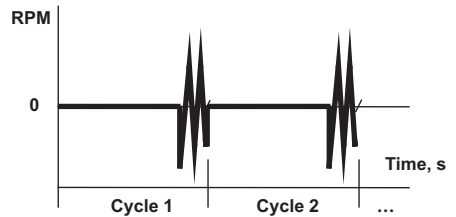
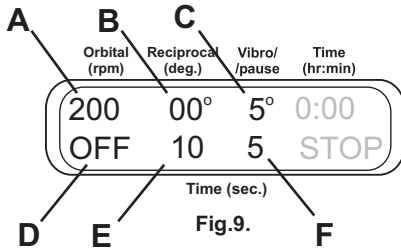


Fig. 10. Vibrating motion and pause run one after another in cycles.

# 6. Maintenance

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- 6.1. No routine maintenance is required except for cleaning. Do not attempt to repair: unit should be sent to our service department in the UK or, in other countries, to our distributor.
- 6.3. Cleaning liquids that do not contain concentrate organic solvents, alkali or acid can be used for device cleaning.
- 6.2. Standard ethanol (75%) can be used for disinfection.

# 7. Specifications

The Multi-Shaker is designed for operation at altitudes up to 2000 m, indoors in a laboratory with ambient temperature from +5°C to +40°C and maximum relative humidity 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C.

- **Orbital rotation mode**

Speed range.....20 - 250 rpm (increment 5 rpm)  
(max. speed depends on the shaking load and flask shape)  
Timer..... 0 - 250 sec

- **Reciprocal rotation mode**

Turning angle.....0° - 360°(increment 30°)  
Timer.....0 - 250 sec

- **Vibration mode**

Turning angle.....0° - 5° (increment 1°)  
Timer.....0 - 5 sec

- General timer of operation .....0 - 96 hrs/non-stop (increment 1 min)

- Orbit.....20 mm

- Maximal load .....8 kg

Do not operate this product above 200 rpm for loads between 5 - 6kg and not above 170 rpm for loads exceeding 6 kg.

- Power .....external power supply, DC 12 V, 4, 16 A

- Device dimensions (w/out platform).....410 x 410 x 130 mm

- Weight (w/out platform), not more ..... 14 kg

- Platform types:

- UP-330** universal platform for different types of flasks (345x430x105),

- P-30/100** with 30 clamps for 100 ml flasks (360x400mm),

- P-16/250** with 16 clamps for 250 ml flasks (360x400mm),

- P-9/500** with 9 clamps for 500 ml flasks (360x400mm),

- P-6/1000** with 6 clamps for 1000 ml flasks (360x400mm),

- PP-20** Flat platform with non slip rubber mat (480x380 mm),

- PP-20-2** Two-level flat platform (480x380x170 mm),

- PP-20-3** Three-level flat platform (480x380x340 mm),

- PP-20-4** Four-level flat platform (480x380x510 mm).

To improve the design manufacturer reserves the right to make changes in specification without prior notice.

# 8. Guarantee and Service

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## 8.1. **Guarantee**

When used in laboratory conditions and according to these working instructions, this product is guaranteed for TWO YEARS against faulty materials or workmanship.

## 8.2. **Service**

There are no user-serviceable parts inside the unit. For all maintenance and repairs (except as defined below) return to our service department in the UK or in other countries, our distributor.

# Declaration of Conformity

Manufacturer:	BIOSAN LTD. Ratsupites 7, build.2, Riga, LV-1067, Latvia
Equipment name/type number:	PSU-20i
Description of Equipment:	Orbital shaker
Directives:	EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC

Applied Standards	
Harmonized Standards:	<u>EN61326-1:2006</u> Electrical equipment for measurement, control and laboratory use <u>Part 1: General requirements</u>  <u>EN 61010:</u> Safety requirements for electrical equipment for measurement, control and laboratory use.  <u>EN 61010-2-051:2003</u> Particular requirements for laboratory equipment for mixing and stirring

I declare that this apparatus conforms to the requirements of the above Directive(s)

  
Svetlana Bankovska  
Executive Director  
Biosan Ltd.

Dated 07.09.2010.

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**BTD**  
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