

**Grant bio**

# Thermo-shaker

**PHMT**

*Operating instructions*



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# 1. Safety

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.



**Caution:** Surfaces can become hot during use!

## GENERAL SAFETY

- ☞ Use only as specified in the operating instructions provided. The unit should not be used if it has been dropped or damaged.
- ☞ The unit must be stored and transported in a horizontal position (see package label).
- ☞ After transport or storage allow the unit to reach room temperature (2-3 hrs) before connecting to the mains. Use only standard quality tubes.
- ☞ Before using any cleaning or decontamination method 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 the mains with a voltage corresponding to that on the serial number label. Use only the external power supply unit provided with this product.
- ☞ Ensure that the mains switch and external power supply are easily accessible during use.
- ☞ Do not plug the unit into the mains outlet without grounding, and do not use extension lead without grounding.
- ☞ Before moving the unit, disconnect it from the mains outlet.
- ☞ To turn off the unit, disconnect the external power supply from the mains outlet.
- ☞ If liquid is spilt inside the unit, disconnect it from the external power supply and have it checked by a qualified repair and maintenance technician.

## DURING OPERATION

- ☞ Do not leave the operating unit unattended.
- ☞ Do not impede the platform motion.
- ☞ Do not operate the unit in environments with aggressive or explosive chemical mixtures.
- ☞ Do not operate the unit if it is faulty or been incorrectly installed.
- ☞ For indoor use only.

- ☞ Intended for laboratory use only.
- ☞ Do not check the temperature by touch. Use a thermometer.

#### **BIOLOGICAL SAFETY**

- ☞ It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilt on or inside the equipment.

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## 2. General Information

Thermo-Shaker PHMT is an ideal instrument for intensive mixing of samples with heating. Heating (up to +100°C), and mixing modes can be used both simultaneously and independently i.e. the unit is three products in one: 1) a shaker, 2) a thermostat and 3) a thermo-shaker.

Features of the PHMT:

- Quick to reach the specified mixing speed and set temperature.
- Stability of maintaining the set temperature in a wide range throughout the Thermo-shaker's block surface;
- With the help of the temperature calibration function, the user can calibrate the unit approx.  $\pm 6\%$  of the selected temperature to compensate for differences in the thermal behavior of tubes from different manufacturers;
- LCD display indicates preset and current values of temperature, speed and time of operation;
- Quiet motor operation, compact size, prolonged service life.

PHMT is applicable in:

- DNA analysis for DNA extraction and further sample preparation;
- Biochemistry for studies of enzymatic reactions and processes;
- Metabolite extraction from cell materials.

There are five heating blocks available, including a block with a plastic lid for PCR-plates. All blocks are interchangeable and can be quickly and easily installed.

## 3. Getting started

### 3.1 Unpacking

Remove packing materials carefully, and retain 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.

**Attention!** Automatic balancing system in this product produces light metal-like noise when moving the unit which is likely to be heard during unpacking. It is normal occurrence and does not indicate a fault.

### 3.2 The Thermo-shaker PHMT set includes:

- Thermo-shaker PHMT .....1 piece
- Microtube block .....1 piece
- Spare rubber belt .....2 pieces
- External Power Supply.....1 piece
- Operating instructions; CE Certificate.....1 copy

### 3.3 Optional blocks

- PSC32 block.....for 20x0.2 ml microtubes + 12x1.5 ml microtubes
- PSC24N block .....for 24x1.5 ml microtubes
- PSC18 block .....for 20x0.5 ml + 12x1.5 ml microtubes
- PSC24 Block.....for 24x2.0 ml microtubes
- PSC96 Block.....for 96-well PCR microplate (semi-skirted, unskirted)

### 3.4 Set up:

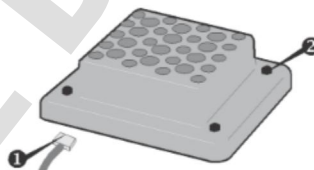
- Place the unit upon even horizontal non-flammable surface away from any flammable materials, remove protective film display.
- To provide optimum ventilation ensure clearance around the device - 20 cm on side faces.
- Plug the external power supply into the socket at the rear side of the unit and position the unit so that there is easy access to the power switch and external power supply.

### 3.5 Installing blocks (if block is not installed at the moment of delivery)! Disconnect from the mains!)

Connect the plug ❶ to the contact terminal on the underside of the block. Align the block so that the warning label is facing the front of the unit and secure with the four knurled screws ❷.

### 3.6 Changing blocks

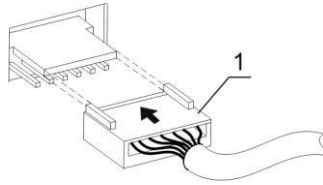
Disconnect the external power supply from the mains. Remove the four knurled screws ❷, disconnect the plug ❶. Select the new block. Connect the plug.





Align the block so that the warning label is facing the front of the unit and secure with the four knurled screws.

- 3.7 **Note!** When installing the **PSC96** block, drive one by one 4 screws for several turns and fix them with a hex-key (included in the PSC-96 thermo-block set).



**Fig.1 Thermo-block connection**

### 3.8 Changing Blocks

- Disconnect the external power supply unit from the device.
- Remove the four knurled screws (fig.2/1), disconnect the plug (fig.1/1).
- Select the new block and install it as point 3.5



**Fig.2 Thermo-block set up**

## 4. Operation of PHMT

### Recommendations during operation

- Please check that the tubes/microwell plates are thermo resistant. Don't heat the tubes/microwell plates over the melting point of the material they are made of (use thermo resistant polypropylene tubes). Remember that thin-walled tubes have a higher thermo conducting factor.
- Under high temperatures (> 85°C) tube caps can open, causing evaporation of the sample or a potential health risk when working with infected material. To prevent such occurrences it is recommended to use tubes with cap lock of Safe-Lock® type.
- For efficient mixing it is recommended to fill test tubes up to 75% of the tube specified volume.

- 4.1 Connect the external power supply to the grounded mains and switch ON the power switch located on the rear panel of the unit.
- 4.2 The display will turn on with the upper line (Set) showing time, RPM and temperature set earlier and the lower line (Actual) showing current readings of the same parameters (thermo block temperature °C, which automatically starts rising according to the temperature set in the upper line). The time to reach the set temperature will depend on the initial temperature.

### Setting the PHMT

Use the readings in the upper line of the display (Set), while setting the required parameters.

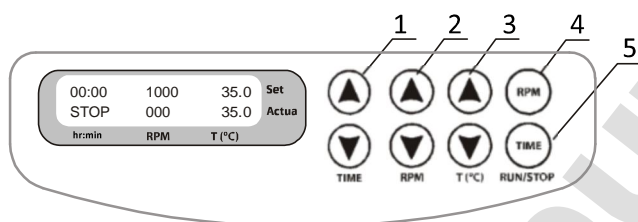


Fig.3 Control Panel

#### Time set (TIME)

- 4.3 With the help of "▲" and "▼" keys Fig. 3/1 set the required working time interval in hours and minutes (increment - 1 min). If the key is pressed for more than 3 seconds, the increment becomes bigger.

#### Speed set (RPM)

- 4.4 With the help of "▲" and "▼" keys Fig. 3/2 set the required speed (increment 10 RPM). If the key is pressed for more than 3 seconds, the increment becomes bigger.

#### Temperature set (T,°C)

- 4.5 With the help of "▲" and "▼" keys Fig. 3/3 set the necessary temperature (increment 0.1°C). If the button is pressed for more than 3 seconds, the increment becomes bigger.



The set parameters can also be changed during operation.



**Caution!** The timer ending does not stop the heating. Heating can only be turned off when it is set below 25°C (The display will show OFF – T, °C – set point)

#### Program execution

After the PHMT has reached a stable temperature (when the set and current temperature readings become the same):

- 4.6 Insert tubes into the block or place the microwell plate on the block and close the lid.
- 4.7 Press the RPM-RUN/STOP key Fig. 3/4 the block will start rotation and the timer indicator will start counting up the time interval (with 1 min precision).

**Note!** If the rotation speed is set to zero, pressing **RPM-RUN/STOP** key starts the timer but the block does not move.

**Attention!** Automatic balancing system in this product produces light metal-like noise when moving the unit which is likely to be heard during acceleration/deceleration. It is normal occurrence and does not indicate a fault.

- 4.8 At the end of the program (after the set time elapses) the block motion stops and the timer shows the flashing reading STOP accompanied by the repetitive sound signal until the **RPM-RUN/STOP** key is pressed.
- 4.9 If the working time is not set (or is re-set) and the timer indicator in the upper line shows 00:00, pressing the **RPM-RUN/STOP** button will start continuous operation of the device with the countdown timer in the lower line (Actual), until the **RPM-RUN/STOP** button is pressed again.
- 4.10 If required, it is possible to restart the timer when it is running. Press the **TIME-RUN/STOP** key once Fig. 3/5 to stop the timer. Press the **TIME-RUN/STOP** key again to restart the timer.
- 4.11 The block motion can be stopped at any time by pressing the **RPM-RUN/STOP** key. In this case the program and the thermo block motion stops and timer is set back to zero switching into the STOP mode. Press the **RPM-RUN/STOP** key to repeat the operation with the same time and speed.
- 4.12 At the end of operation turn OFF the unit with the power switch at the rear panel and disconnect the external power supply from the mains.

## 5. Calibration

- 5.1. The operating temperature of the device is pre-calibrated at the factory (the calibration coefficient is 1.00) which is measured by an external sensor installed in the heating block.
- 5.2. To enter the calibration coefficient, hold the **TIME-RUN/STOP** key (Fig. 3/5) for more than 8 sec to activate calibration mode. The calibration coefficient will be shown on the display (Fig. 5/1).
- 5.3. Set 1.000 value using the ▲ and ▼ keys (Fig. 3/3) as shown on Fig. 5/1 to restore the factory settings.
- 5.4. Press the **RPM-RUN/STOP** key once to exit the calibration mode.

### Calibration procedure

- 5.5. Install an independent temperature sensor (thermometer 0.5 C accuracy) into the tubes, placed into the block, or directly into the heating block special sensor socket.
- 5.6. Set the required temperature in operation mode (e.g. 40°C).
- 5.7. After the unit reaches the set temperature (when the set and actual temperature readings are equal) leave the unit for 30 min for thermal stabilization.
- 5.8. Let us assume that the reading of the independent temperature sensor is 39°C, but the display's actual temperature is 40 °C (Fig.4). Then it is necessary to add 1°C correction.



Fig.4 Control panel in operation mode

- 5.9. Hold down the **TIME-RUN/STOP** key (Fig. 3/5) for more than 8 sec. to activate calibration mode. The following parameters will be shown on the display (Fig. 5):

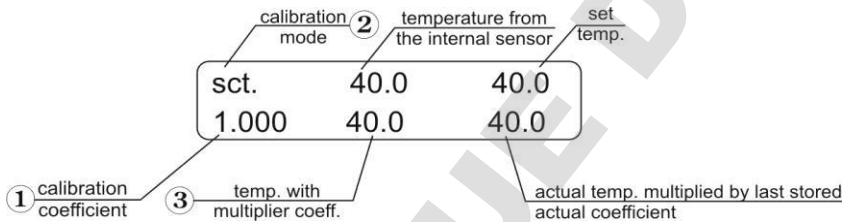
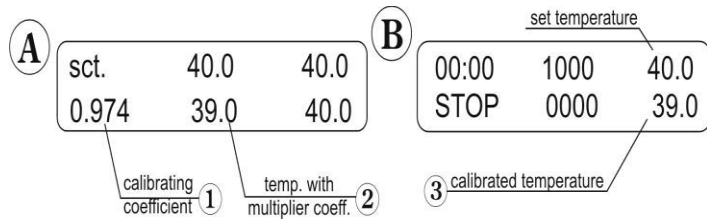


Fig.5 Control panel in calibration mode



**Fig.6 Control panel in calibration and operation mode**

- 5.10. Set the temperature with multiplier coefficient readings (Fig 6A/1) to change the actual temperature value of the device.

Using the **Temp. ▲** and **▼** keys (Fig.3/3), change the calibration coefficient (Fig.6A/1) so, that the new temperature value (Fig.6A/2) corresponds to the independent temperature sensor. In our example the calibration coefficient will be 0.974 (in range: 0.936 up to 1.063; increment 0.001).

**Caution!** This calibrating coefficient will correct the temperature through the whole operating range.

- 5.11. After finishing the calibration press the **RPM-RUN/STOP** key (Fig.3/4) once to save the changes and exit the calibration mode.
- 5.12. The display will show calibrated temperature as shown on fig.6B/3 and the unit will continue thermal stabilization according to the previously set temperature.

# 6. Specifications

## 6.1 Operating conditions

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

## 6.2 Temperature specifications

|                                                          |                              |
|----------------------------------------------------------|------------------------------|
| Temperature setting range .....                          | +25 to +100°C                |
| Temperature control range .....                          | +5 above RT to +100°C        |
| Temperature setting resolution .....                     | 0.1°C                        |
| Temperature stability.....                               | ±0.1°C                       |
| Temperature accuracy at +37°C .....                      | ±0.5°C                       |
| Temperature uniformity over the block at + 37°C.....     | ±0.1°C                       |
| Average heating speed on PSC24 from +25°C to +100°C..... | 2.5°C/min                    |
| Temperature calibration coefficient range.....           | from 0.936 to 1.063 (±0.063) |

## 6.3 General specifications

|                                                                         |                                           |
|-------------------------------------------------------------------------|-------------------------------------------|
| Speed range .....                                                       | 250 -1400 rpm                             |
| Speed setting resolution .....                                          | 10 rpm                                    |
| Maximal speed deviation                                                 |                                           |
| for 250 rpm.....                                                        | 2%                                        |
| for 1400 rpm .....                                                      | 0.7%                                      |
| Digital time setting.....                                               | 1 min - 96 hrs                            |
| Time setting resolution .....                                           | 1 min                                     |
| Maximum continuous operation time .....                                 | 96 hours                                  |
| (Recommended interval between operation sessions not less than 8 hours) |                                           |
| Orbit .....                                                             | 2 mm                                      |
| Display .....                                                           | 16x2 signs, LCD                           |
| Dimensions .....                                                        | 205x230x130 mm                            |
| Input current/power consumption .....                                   | 12V, 4.9 A / 60W                          |
| External power supply unit .....                                        | input AC 100-240 V 50/60Hz, output DC 12V |
| Weight with block and external power supply, not more .....             | 4 kg                                      |

| Optional accessories | Description                                                |
|----------------------|------------------------------------------------------------|
| PSC15                | block for 20x1.5 ml microtubes                             |
| PSC32                | block for 20x0.2 ml microtubes + 12x1.5 ml microtubes      |
| PSC20                | block for 20x2.0 ml microtubes                             |
| PSC18                | block for 20x0.5 ml + 12x1.5 ml microtubes                 |
| PSC24                | block for 24x2 ml microtubes                               |
| PSC96                | block for 96-well PCR microplate (semi-skirted, unskirted) |

PCMT blocks and PHMT blocks are not interchangeable, i.e. PCMT blocks cannot be used on the PHMT and vice versa.

| Replacement parts | Description  |
|-------------------|--------------|
| Rubber belt       | 117x5x0.6 mm |

Grant is committed to a continuous program of improvement, and reserves the right to alter the design and specification without notice.

## 7. Guarantee and Service

### 6.1 Guarantee

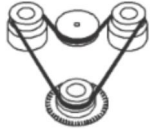
When used in laboratory conditions and according to these working Instructions, this product is guaranteed for TWO YEARS against faulty materials or workmanship.

### 6.2 Service

For service, return for repair to our Service Department in the UK or, in other countries, to our distributor.

### 6.3 Rubber belt replacement

1. Disconnect the external power supply from the mains.
2. Remove 4 fixation screws on the shaker bottom and remove the bottom plate.
3. Replace the rubber belt.
4. Re-assemble the unit.



# Declaration of Conformity

|                             |                                                               |
|-----------------------------|---------------------------------------------------------------|
| Manufacturer:               | BIOSAN LTD.<br>Ratsupites 7, build.2, Riga, LV-1067, Latvia   |
| Equipment name/type number: | PHMT                                                          |
| Description of Equipment:   | Thermo Shaker                                                 |
| Directives:                 | EMC Directive 2004/108/EC<br>Low Voltage Directive 2006/95/EC |

|                       |                                                                                                                                                                                                                                                                                                                                                                              |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applied Standards     |                                                                                                                                                                                                                                                                                                                                                                              |
| Harmonized Standards: | <u>EN 61326-1</u><br>Electrical equipment for measurement, control and laboratory use<br>General requirements<br><br><u>EN 61010-1:</u><br>Safety requirements for electrical equipment for measurement, control and laboratory use.<br>General requirements<br><br><u>EN 61010-2-010:</u><br>Particular requirements for laboratory equipment for the heating of materials. |

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

  
.....  
Svetlana Bankovska  
Executive Director  
Biosan Ltd.

Dated 06 09 2011 .....

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