Medical–Biological
Research & Technologies

PST-60HL / PST-60HL-4
Plate Shaker-Thermostat

Operating Manual
Certificate

for versions
PST-60HL – V.6AW
PST-60HL-4 – 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.

Caution! Surfaces can become hot during use.

GENERAL SAFETY

- Use only as specified in the Operating Manual provided.
- Save the unit from shocks or falling.
- Store and transport the unit in a horizontal position (see package label).
- After transportation or storage and before connecting to electric circuit, keep the unit under room temperature for 2-3 hrs.
- 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 the 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 switch and external power supply are easily accessible during use.
- Do not plug the unit into an ungrounded power 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 power 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 leave the operating unit unattended.
- Do not impede the platform motion.
- 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 fill in the microplates after they have been inserted in the unit.
- Do not use outside laboratory rooms.
- 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 spilled on or penetrates into the equipment.

2. General information

PST-60HL / PST-60HL-4 Plate Shaker-Thermostat is designed for shaking 1 to 4 standard 96-well plates in the thermal regulation mode.

Plate Shaker-Thermostat was designed using the multi-system principle, which allows using it as three independent devices:

1) incubator for lasting incubation of micro quantities (insect, plant cell cultures, etc.) in plates;
2) plate shaker for operation in the cold room or other conditions, which do not require temperature stabilization;
3) microplate thermo-Shaker for immunochemistry and molecular diagnostics, where the requirements to the result reproducibility and thus to the precise method regulation are particularly high.

A distinctive feature of Biosan plate thermoshakers is the patented two-side plate heating that allows to achieve full correspondence of the set and actual temperature in the plate wells.

PST-60HL/PST-60HL-4 Plate Shaker-Thermostat provides:

- soft or intensive sample shaking;
- rotation speed regulation, stabilization and indication;
- even shaking amplitude throughout Shaker-Thermostat platform;
- required operation time setting and indication;
- automatic stopping of the platform movement after the set time expires;
- current operation time indication;
- setting and indication of the required temperature;
- fault automatic diagnostics (temperature sensor, platform heating, lid heating and other errors).

The device can be used in:

cytochemistry	for in situ reactions;
immunochemistry	for immunofermentative reactions;
biochemistry	for enzyme and protein analysis;
molecular biology	for matrix analysis, DNA and RNA analyses.

The maximum guaranteed number of diagnostic cycles in the Plate Shaker-Thermostat mode, which require 15-30 min work in one cycle, is 7000-14000 times.

External 12V power supply is used to power the device. It makes it safe to work in the cold room, where condensation may cause leakage current from electric circuit.

3. Getting started

3.1. 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.

3.2. Complete set. Package contents:

- PST-60HL / PST-60HL-4 Plate Shaker-Thermostat ..... 1 pce
- spare rubber belt .....2 pcs
- external power supply..... 1 pce
- power cord..... 1 pce
- Operating manual, Certificate .....1 copy

3.3. Set up:

- place the unit upon even horizontal non-flammable surface away from any flammable materials (not less than 30 cm);
- remove protective film from the display;
- 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 the external power supply.

4. Operation

Recommendations during operation

- For proper mixing, it is not recommended to fill microplates for more than 75% of their nominal volume.
- Seal the microplates with an appropriate adhesive film to avoid spilling the sample.

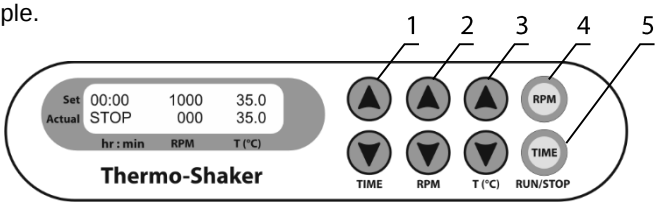


Fig.1 Control panel

4.1. Connect the external power supply to a grounded power socket and set the power switch located on the rear panel of the unit to position **I** (ON).

4.2. The display will turn on. Upper line (**Set**) shows time, speed and temperature set earlier. Lower line (**Actual**) shows current readings of the same parameters (thermoblock temperature °C, which automatically starts rising according to the temperature set in the upper line). The time of temperature stabilisation depends on the initial temperature.

4.3. Setting the parameters. Use the readings in the upper line of the display (**Set**), while setting the necessary parameters. Pressing the key for more than 3 s will increase the increment.

4.3.1. **Setting time (TIME)**. Using the ▲ and ▼ keys (Fig. 1/1) set the required working time interval in hours and minutes (increment 1 min).

4.3.2. **Setting speed (RPM).** Using the ▲ and ▼ keys (Fig. 1/2) set the required speed (increment 10 RPM).

4.3.3. **Setting temperature (T,ºC).** Using the ▲ and ▼ keys (Fig. 1/3) set the necessary temperature (increment 0.1ºC).

Caution! The platform heating can be turned off only by setting the required temperature below 25 °C (the display will show OFF - T,ºC - set point).It can be used in cold rooms as a mixing device without thermal regulation in this mode.

4.4. **Program execution**. After the thermal stabilisation of the unit (when the set and current temperature readings become the same):

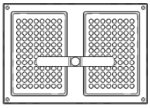
4.4.1. Microplate fixation:

PST-60HL: Place microplates on the platform and fix it with the special push-down clip by pressing it against the plate covers.

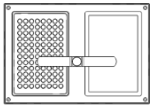
PST-60HL-4: Lightly pull the clip away from the center with your thumb and place microplate on the platform with the other hand.

Caution! For model PST-60HL: Load only pairs of microplates for best fixation.

Correct loading



Wrong loading



Caution! Do not fill in the microplates after they have been inserted in the unit.

4.4.2. Press the **RPM-RUN/STOP** key (Fig. 1/4). The platform will start rotating and the timer indicator will start counting up the time interval (with 1 min precision).

4.4.3. After finishing the program, the platform motion will stop and the timer will show the flashing reading STOP accompanied by the repetitive sound signal until the **RPM-RUN/STOP** key is pressed.

4.5. If the working time is not set (or is reset) and the timer indicator in the upper line shows 00:00, pressing the **RPM-RUN/STOP** key will start continuous operation of the Thermo-shaker (timer indicator will start counting up the time interval in the lower line (**Actual**)) until the **RPM-RUN/STOP** key is pressed again.

Please note! The platform temperature will be constantly maintained in accordance with the set temperature. This allows using the device again without pre-heating.

4.6. The timer can be reset during operation if required. Press the **TIME-RUN/STOP** key once (Fig. 1/5) to stop the timer. Press the **TIME-RUN/STOP** key again to restart the timer.

4.7. The platform motion can be stopped at any time by pressing the **RPM-RUN /STOP** key. In this case the program realisation will stop and the timer will switch into the STOP mode saving previously set time. Press the **RPM-RUN/STOP** key to repeat the operation with the same time and speed.

Caution! At the end of the set time period the platform movement is stopped automatically, but the heating can be stopped only by reducing the temperature using the ▼ T(ºC) key (Fig. 1/3, lower button) till the OFF sign appears in the upper part of the display.

4.8. After finishing the operation set the power switch, located on the rear panel of the unit, in position **O** (Off) and disconnect the external power supply from electric circuit.

5. Calibration

5.1. The device is pre-calibrated at the factory (calibrating coefficient is 1.000) for operation with temperatures, measured by a sensor, installed in the heating block.

5.2. To enter the calibration coefficient, hold the **TIME RUN/STOP** key (fig. 1/5) pressed for more than 8 s to activate calibration mode. The calibration coefficient will be shown on the display (fig. 2/1).

5.3. **Restoring factory settings.** Set 1.000 value using the ▲ and ▼ **T°C** keys (fig. 1/3) as shown on Fig. 2/1 to restore the factory settings. Press the **RPM RUN/STOP** key (fig. 1/4) once to save the changes and exit the calibration mode.

Note. Coefficient value changes are recommended after the unit has reached 30°C.

5.4. **Calibration procedure.**

5.4.1. Install independent sensor (0.5°C accuracy) into a microplate, placed into the block sockets.

5.4.2. Set the required temperature in operation mode (e.g. 40°C).

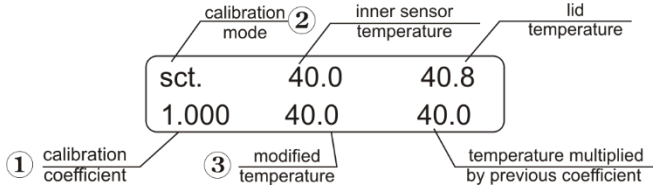


Fig.2 Control panel in calibration mode

5.4.3. After the unit reaches the set temperature (when the set and current temperature readings equal) leave the unit for 30 minutes for thermal stabilization.

5.4.4. Let us assume that the readings of independent sensor is 39°C, but the display's actual temperature is 40°C (fig. 1/4). Then it is necessary to add 1°C correction.

5.4.5. Hold **TIME RUN/STOP** key (fig. 1/5) pressed for more than 8 s to activate calibration mode. The following parameters will be shown on the display (fig. 2).

5.4.6. Using the ▲ and ▼ **T°C** keys (fig. 1/3), change the calibration coefficient (fig. 3/1) so that the new temperature value (fig. 3/2) corresponds to the independent sensor temperature. In our example, the calibration coefficient will be 0.974.

Note. Calibration coefficient can be changed in range from 0.968 up to 1.031 with increment 0.001. This calibrating coefficient will correct temperature through all the operation range.

Note. Coefficient value changes are recommended after the unit has reached 30°C.

5.4.7. After finishing the calibration press the **RPM RUN/STOP** key (fig. 1/4) once to save the changes and exit the calibration mode.

5.4.8. The display will show calibrated temperature as shown on fig. 4/1 and the unit will continue thermal stabilization according to the previously set temperature.

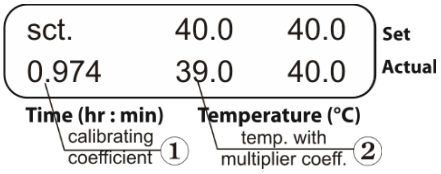


Fig. 3 Control panel in calibration and operation mode

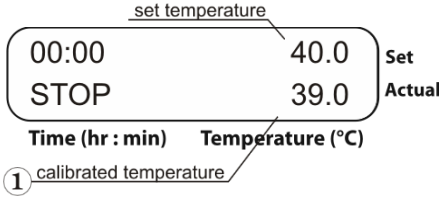


Fig. 4 Control panel in operation mode after calibration

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.

6.1. Temperature specifications

Setting range ..... +25°C ... +60°C
Control range ..... 5°C above room t° to +60°C
Setting resolution ..... 0,1°C
Stability ..... ±0.1°C
Accuracy ..... ±0.5°C
Uniformity at +37ºC ..... ±0.25°C
Time of block heating from +25°C to +37ºC ..... 12 min
Temperature calibration option
Calibration coefficient range ..... 0.936...1.063 (± 0.063)

6.2. General specifications

Speed setting range ..... 250 - 1200 rpm
Speed setting resolution ..... 10 rpm
Orbit ..... 2 mm
Display ..... 16x2 signs, LCD
Digital time setting range ..... 1 min - 96 hrs / non-stop
Max. continuous operation time ..... 96 hours
(recommended interval between operation sessions not less than 8 hours)
Time setting resolution ..... 1 min
Max. height of microtest plate ..... 18 mm
External power supply ..... input AC 100-240 V 50/60 Hz, output DC 12 V

	PST-60HL	PST-60HL-4
Current/power consumption	12 V DC, 3.3 A / 40 W	12 V DC, 4.15 A / 50 W
Number of microplates	2	4
Platform dimensions	250 x 150 mm	210 x 290 mm
Dimensions	270x260x125 mm	380x390x140 mm
Weight*	6.1 kg	8.8 kg

Replacement parts	Description	Catalogue number
Rubber belt	122x0.6x6 mm	BS-000000-S18

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

* Accurate within ±10%.

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.

7.4. Rubber belt replacement.

For maintenance of reliable operation of the device, the producer recommends to replace rubber belts after 1.5 years or 2000 hours of operation time. To replace the belt:

- Disconnect the external power supply from the device.
- Remove 4 fixation screws on the underside and remove the bottom plate.
- Replace the rubber belt (fig. 5).
- Reassemble the device.

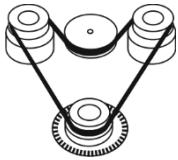


Fig. 5. Rubber belt replacement

7.5. Error codes in case of a defect.

Following error codes are shown in the lower right corner of the display (fig. 1), accompanied by a sound signal every 8 s. Press **RPM RUN/STOP** key to turn off the signal. Disconnect the unit from the electric circuit and contact Biosan or your local Biosan representative.

Error code	Description
ERR 1	Lower plate heat sensor error
ERR 2	Upper lid heat sensor error
ERR 3	PCB plate error
ERR 4	PCB plate error
ERR 5	Upper lid heating error
ERR 6	Upper lid overheating

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. The warranted service life of unit from date of delivery to the Customer is 24 months (excluding consumables such as rubber belts). Contact your local distributor to check availability of extended warranty.

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 address. Please visit www.biosan.lv, Technical support section to obtain the claim form.

8.5. 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	PST-60HL / PST-60HL-4 Plate Shaker-Thermostat
Serial number	
Date of sale	

9. Declaration of Conformity

Declaration of Conformity

Equipment name:	**PST-60HL / PST-60HL-4**
Type of equipment:	Plate Shaker-Thermostat
Directive:	EMC Directive 2014/30/EC Low Voltage Directive 2014/35/EC RoHS 2011/65/EC WEEE 2002/96/EC & 2012/19/EU
Manufacturer:	SIA BIOSAN Ratsupites 7, build.2, Riga, LV-1067, Latvia
Applied Standards:	**EN 61326-1:** Electrical equipment for measurement, control and laboratory use EMC requirements. General requirements. **EN 61010-1:** Safety requirements for electrical equipment for measurement, control and laboratory use. General requirements. **EN 61010-2-010:** Particular requirements for laboratory equipment for the heating of materials. **EN 61010-2-051:** Particular requirements for laboratory equipment for mixing and stirring.

We declare that this product conforms to the requirements of the above Directive(s)

Signature

Svetlana Bankovska
Managing director

28.01.2015
Date

Signature

Aleksandr Shevchik
Engineer of R&D

28.01.2015
Date

Edition 4.-6.01 – April 2016

How to Choose a Proper Shaker, Rocker, Vortex

ES-20/60
(with heating)

PSU-20i

Applications:
- Microbiology
- Extraction
- Cell growing

PSU-10i

ES-20
(with heating)

MR-12

Applications:
- Agglutination
- Extraction
- Gel staining/
destaining

Multi RS-60

Multi Bio RS-24

Applications:
- Microbiology
- Extraction
- Cell growing

Bio RS-24

V-1

NEW

RTS-1C

MSV-3500

MR-1

Applications:
- DNA–analysis
- Genome sequence

Multi Bio 3D

Applications:
- Agglutination
- Extraction
- Blot hybridisation
- Gel staining/destaining

PST-60HL-4
(with heating)

PST-100HL
(with heating)

NEW

TS-DW

PST-60HL
(with heating)

Applications:
- ELISA analysis
- Hybridization

PSU-2T

NEW

MPS-1

NEW

CVP-2

TS-100 (with heating)
TS-100C (with heating
and cooling)

V-32

Level of liquid

10^3 ... 10^2 ml	10^1 ml	10^0 ... 10^{-3} ml
Erlenmeyer flasks and Cultivation flasks	*Petri dishes, vacutainers and tubes up to 50 ml*	*PCR plates, microtest plates and Eppendorf type tubes*

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