

PST-60HL, PST-60HL-4 & PST-100HL Thermo-Shakers



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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 thermo-shakers:

- **PST-60HL** version V.7AW
- **PST-60HL-4** version V.5AW
- **PST-100HL** version V.2AW

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.



Caution!

Hot surface! Platform surface becomes very hot during use. Always use protective cotton gloves to install or remove samples when the temperature is set higher than 60°C.

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 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.
- 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 leave the operating unit unattended.
- Do not impede the platform motion.
- Do not check the temperature by touch. Use a thermometer.

BIOLOGICAL SAFETY

- The user is responsible to carry out appropriate decontamination if hazardous material spills on or penetrates into the equipment.

3. General information

PST-60HL, PST-60HL-4 and **PST-100HL** Thermo-shakers are designed for shaking standard 96-well microtiter plates in the thermal regulation mode. Models **PST-60HL** and **PST-100HL** hold 2 plates, model **PST-60HL-4** holds 4 plates.

Thermo-shaker was designed using the multi-system principle, which allows using it as three independent devices:

- Incubator for lasting incubation of micro quantities (insect, plant cell cultures, etc.) in plates.
- Plate shaker for operation in the cold room or other conditions, which do not require temperature stabilization.
- 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 achieving full correspondence of the set and actual temperature in the plate wells.

Thermo-shaker 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;
- (**PST-60HL & PST-60HL-4**) fault automatic diagnostics (temperature sensor, platform heating, lid heating and other errors);
- (**PST-60HL & PST-60HL-4**) temperature calibration, to compensate differences in the microtest plates from different manufacturers.

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 Thermo-shaker 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.

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:
- PST-60HL / PST-60HL-4 / PST-100HL, thermo-shaker 1 pce
 - External power supply 1 pce.
 - Power cable 1 pce.
 - Replacement rubber belt 2 pcs.
 - Operating manual, declaration of conformity 1 copy
- 4.3. **Setup.**
- Place the unit upon even horizontal stable non-flammable surface 30 cm away from any flammable materials, and clear 20 cm around the device on all sides for ventilation.
 - Remove the protective film from the display.
 - Connect the power cable to the external power supply.
 - Connect the power cable to the socket on the rear side of the unit, and position it with easy access to the power switch and plug.

5. Operation

Recommendations during operation

- Please check the microplates before using, be sure that the microplates are heat-resistant. Do not heat the microplates over the melting point of the material they are made of.
- It is recommended to fill plate wells up to 75% of the rated volume for efficient mixing.



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- 5.1. Connect 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).
- 5.2. The display will turn on with the upper line (**Set**) showing time, speed and temperature set earlier and the lower line (**Actual**) showing current readings of the same parameters (platform temperature in °C that automatically starts rising according to the temperature set in the upper line). The time of temperature stabilization depends on the initial temperature.
- 5.3. **Setting the parameters.** Use the readings in the upper line of the display (Set), while setting the required parameters. Pressing the key for more than 3 s will increase the increment rate. Speed and temperature can be changed during operation.
 - 5.3.1. **Setting time (TIME).** Using the ▲ and ▼ **TIME** keys (fig. 1/1) set the required working time interval in hours and minutes (increment 1 min).
 - 5.3.2. **Setting speed (RPM).** Using the ▲ and ▼ **RPM** keys (fig. 1/2) set the required speed (increment 10 rpm).
 - 5.3.3. **Setting temperature (T, °C).** Using the ▲ and ▼ **T, °C** keys (fig. 1/3) set the necessary temperature (increment 0.1°C).



Caution! Heating/temperature maintenance process does not stop when the timer is finished. Platform thermal regulation can be turned off only by setting the required temperature below 25 °C (the display will show OFF - T, °C - **Set**). In this mode, thermo-shaker can be used in the cold rooms as a mixing device without thermoregulation. Settings can be changed during operation.

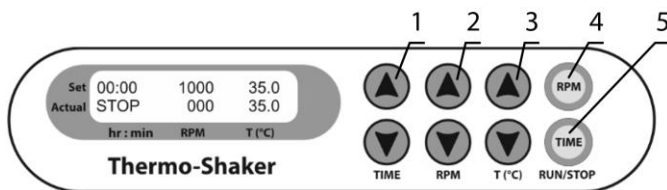


Figure 1. Control panel

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

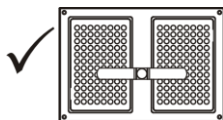
5.4.1. Place microplates on the platform:

PST-60HL and PST-100HL:	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 of the platform with your thumb and place microplate on the platform with the other hand.

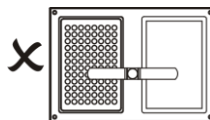


Note.

(For **PST-60HL** and **PST-100HL**) Load only pairs of microplates for best fixation.



Correct loading



Wrong loading



Caution!

Do not fill microplates directly inside the unit.

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



Note!

If the rotation speed is set to zero, pressing **RPM RUN/STOP** key will start the timer but the platform will not move.

5.5. After finishing the program (after the set time elapses) 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.

5.6. 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 device with countdown timer in the lower line (**Actual**) until the **RPM RUN/STOP** key is pressed again.

5.7. If required, there is possibility to restart the timer when it is running. 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.

5.8. The platform motion can be stopped at any time by pressing the **RPM RUN/STOP** key. The program stops and the timer switches 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 manually by reducing the temperature using the **▼ T, °C** key (fig. 1/3 - lower key) till the OFF sign appears in the upper line (Set) of the display



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5.9. 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.

6. Calibration



Note. Current section is applicable only for **PST-60HL** and **PST-60HL-4**

- 6.1. The device is precalibrated at the factory (calibrating coefficient is 1.000) for operation with temperatures measured by a sensor in the heating block.
- 6.2. To change the calibration coefficient, hold the **TIME RUN/STOP** key pressed for more than 8 s to activate calibration mode. The calibration coefficient appears on the display (fig. 2).

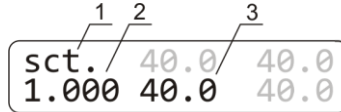


Figure 2. Display in calibration mode: 1. Calibration mode indicator; 2. Calibration coefficient; 3. Temperature with current coefficient



Note. Values marked in grey on figures 2 and 3 are not used in calibration and are meant for service engineers.

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



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

- 6.4. **Calibration procedure.** To calibrate the unit, use an independent sensor with 0.5°C accuracy, which can fit in the cell of a microplate on the platform.
 - 6.4.1. Install the sensor into a cell of the microplate.
 - 6.4.2. Set the required temperature in operation mode (e.g. 40°C).
 - 6.4.3. After the unit reaches the set temperature (when the set and current temperature readings equal), leave the unit for 30 min for thermal stabilization.
 - 6.4.4. Let us assume that the readings of independent sensor is 39°C, but the display's actual temperature is 40°C. Then, it is necessary to add 1°C correction.
 - 6.4.5. Hold the **TIME RUN/STOP** key pressed for more than 8 s to activate calibration mode (fig. 2).

6.4.6. Using the ▲ and ▼ T, °C keys, 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 0.936 to 1.063 (± 0.063), with increment of 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 temperature.

6.4.7. Press the **RPM RUN/STOP** key once to save the changes and exit the calibration.

6.5. 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.

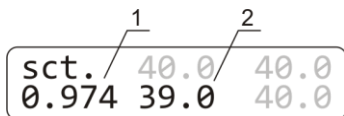


Figure 3. Changing the coefficient:

1. Calibration coefficient; 2. Temperature with current coefficient

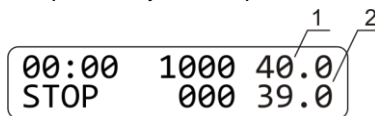


Figure 4. Display after calibration:

1. Set temperature; 2. Current calibrated temperature

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.

Model	PST-60HL	PST-60HL-4	PST-100HL
Temperature setting range	25°C ... 60°C		25°C ... 100°C
Temperature control range	5°C above RT ¹ ... 60°C		5°C above RT ¹ ... 100°C
Temperature setting resolution	0.1°C		
Temperature stability	±0.1°C		
Temperature uniformity at 37°C	±0.25°C		±0.2°C
Temperature calibration option	Yes		No
Two-side heating of the microplate	Yes		
Heat up time	12 min, from 25°C to 37°C; 35 min, from 37°C to 60°C		60 min, from 25°C to 100°C
Orbit	2 mm		
Speed setting range	250 - 1200 rpm (increment 10 rpm)		
Digital time setting range	1 min - 96 hrs / non-stop		
Maximum continuous operation ²	168 hrs		
Display	16x2 characters, LCD		
Maximum height of plates	18 mm		
Platform dimensions (WxD)	250x150 mm	290x210 mm	250x150 mm
Number of microplates	2	4	2
Dimensions	270x260x125 mm	380x390x140 mm	270x260x125 mm
Weight ³	6.1 kg	8.8 kg	5.9 kg
Working current	DC 12 V, 3.3 A	DC 12 V, 4.15 A	DC 12 V, 5 A
Power consumption	40 W	50 W	60 W
External power supply	input AC 100-240 V 50/60 Hz, output DC 12 V		

¹ Room temperature.

² Recommended interval between operation sessions is not less than 1 hour

³ Accurate within ±10%

8. Ordering information

8.1. Models and versions available:

Model	Version	Catalogue number
PST-60HL	V.7AW	BS-010119-AAI
PST-60HL-4	V.5AW	BS-010128-AAI
PST-100HL	V.2AW	BS-010142-AAI

8.2. To inquire about or order the replacement parts, contact Biosan or your local Biosan representative.

8.3. Replacement parts for all models:

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

9. Care and maintenance

9.1. If the unit requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

9.2. All maintenance and repair operations must be performed only by qualified and specially trained personnel.

9.3. Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and decontamination of the unit.

9.4. **Rubber belt replacement.** For maintenance of reliable operation of the device, the manufacturer 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 device bottom and remove the bottom plate.
- Replace the rubber belt (fig. 5).
- Reassemble the device.

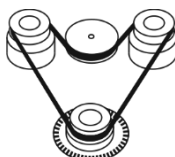


Figure 5. Rubber belt replacement

9.5. **Error codes in case of a defect (PST-60HL & PST-60HL-4).** Some malfunctions trigger an error code to appear on display, accompanied by a sound signal every 8 s. Press **RPM RUN/STOP** key to turn off the signal. Error code format is letters ER and a number from 1 to 4.

Disconnect the unit from the electric circuit and report the error code to Biosan or your local Biosan representative.

10. Warranty

- 10.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage and transportation instructions.
- 10.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months. For extended warranty, see **10.5**.
- 10.3. Warranty covers only the units transported in the original package.
- 10.4. 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.
- 10.5. Extended warranty. For **PST-60HL, PST-60HL-4 & PST-100HL**, 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.
- 10.6. 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

- 10.7. 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	PST-60HL, PST-60HL-4 or PST-100HL, thermo-shakers
Serial number	
Date of sale	

11. Notes

13. EU Declaration of conformity

EU Declaration of Conformity

Unit type	Thermo-shakers
Models	TS-100, TS-100C, TS-DW, PST-60HL, PST-60HL-4, PST-100HL
Serial number	14 digits styled XXXXXYYMMZZZ, where XXXXX 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 61010-2-010: 2015</u> Particular requirements for laboratory equipment for the heating of materials. <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

10.07.2016.

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
 $10^3 \dots 10^2$ ml

Erlenmeyer flask
and Cultivation flask



PSU-20i,
Orbital Shaker

ES-20/80,
Orbital Shaker-Incubator



Applications:

- Microbiology
- Extraction
- Cell cultivation



PSU-10i,
Orbital Shaker



ES-20,
Orbital
Shaker-Incubator

Applications:

- Agglutination
- Gel staining/destaining



MR-12,
Rocker-Shaker

Sample volume
 10^1 ml

Petri dishes, vacutainers
and tubes up to 50 ml



Multi RS-60,
Programmable rotator

BiO RS-24,
Mini-Rotator



RTS-1 and RTS-1C,
Personal bioreactor



MR-1,
Mini Rocker-Shaker



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

Sample volume
 $10^0 \dots 10^{-3}$ ml

PCR plates, microtest plates
and Eppendorf type tubes



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



CVP-2,
Centrifuge vortex for PCR plates

TS-100, TS-100C,
Thermo-Shakers



V-32,
Multi-Vortex

