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Medical–Biological
Research & Technologies

PST-60HL, PST-60HL-4, PST-100HL

Thermo-Shakers

User instructions

If you have any feedback on our products or services, we would like to hear from you. Please send all feedback to:

Manufacturer:

SIA Biosan
Ratsupites 7 k-2, Riga, LV-1067, Latvia

Phone: +371 674 261 37

https://biosan.lv

Marketing: marketing@biosan.lv
Support: support@biosan.lv

Contents

1. About this edition of user instructions

1.1. The current edition of the user instructions applies to the following models:

Model and name	**Version**
PST-60HL, thermo-shaker	V.7AW, V.8AW
PST-60HL-4, thermo-shaker	V.6AW, V.7AW
PST-100HL, thermo-shaker	V.3AW

1.2. Edition 3.-8.01 – May of 2025.

2. Safety precautions

2.1. Symbols used in these instructions:

Caution! Make sure you have fully read and understood the present instructions 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.

2.1. Icons used on the unit and packaging.

	CE marking, manufacturer affirms conformity with European health, safety, and environmental protection standards, see **12.1**
	WEEE directive marking, see **12.1**
	Polarity of the power connector
	Equipment uses direct current
	Caution! All parts inside the lid can become hot! (Only on **PST-100HL**)

2.2. 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 as described in section **Storage and transportation**.
- 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.

2.3. 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 section **Specifications**.

2.4. 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.

2.5. Biological safety

- The user is responsible to conduct 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 thermo-shakers 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.
- fault automatic diagnostics (temperature sensor, platform heating, lid heating and other errors).
- 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.
- User instructions, 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

5.1. **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.

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.

5.2. 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).

5.3. 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.

5.4. **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.

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

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

5.4.3. **Setting temperature (T, ºC).** Using the ▲ and ▼ **T, ºC** 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.

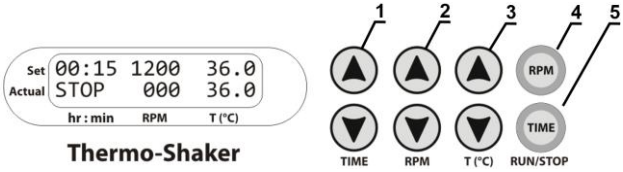


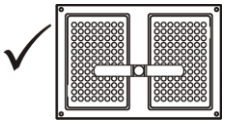
Figure 1. Control panel

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

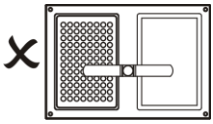
5.5.1. Place microplates on the platform:

PST-60HL and **PST-100HL**:	Place microplates on the platform and fix it with the special pushdown clip by pressing it against the plate covers.
PST-60HL-4:	Lightly pull the clip away from the centre 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.

5.5.2. 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.

5.6. 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.

5.7. 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.

5.8. 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.

5.9. 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

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.

5.10. 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

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).

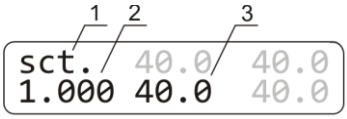


Figure 2. Display in calibration mode: 1. Calibration mode indicator; 2. Calibration coefficient; 3. Temperature with current coefficient

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 a microplate into the unit, and the sensor into a cell in 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 reading 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.

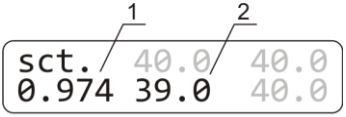


Figure 3. Changing the coefficient: 1. Calibration coefficient; 2. Temperature with current coefficient

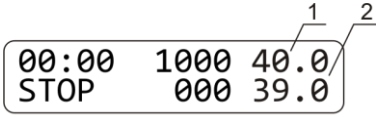


Figure 4. Display after calibration: 1. Set temperature; 2. Current calibrated temperature

7. Specifications

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

7.2. Temperature specifications

Model	**PST-60HL**	**PST-60HL-4**	**PST-100HL**
Setting range	25°C ... 60°C		25°C ... 100°C
Control range (RT = room temp.)	5°C above RT ... 60°C		5°C above RT ... 100°C
Setting resolution	0.1°C		
Stability	±0.1°C		
Uniformity at 37°C	±0.25°C		±0.2°C
Calibration option	Yes		No
Microplate heating	Yes, two-side		
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

7.3. Shaking specifications

Model	**PST-60HL**	**PST-60HL-4**	**PST-100HL**
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	168 hrs		

Note. Recommended interval between prolonged operation sessions must be 1 hour or more.

7.4. General specifications

Model	**PST-60HL**	**PST-60HL-4**	**PST-100HL**
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, accurate within ±10%	6.1 kg	8.8 kg	5.9 kg
Working current	12 V=, 3.3 A	12 V=, 4.15 A	12 V=, 5 A
Power consumption	40 W	50 W	60 W
External power supply	input 100–240 V~, 50–60 Hz, output 12 V=		

7.5. Workroom requirements

Workroom description	Cold rooms, incubators (except CO_2 incubators) and closed laboratory rooms
Temperature range	+4 °C … +40 °C
Humidity requirements	Maximum of 80% RH at 31 °C, decreasing linearly to 50% RH at 40 °C. Non-condensing atmosphere.
Operating height, maximum	2000 m ASL
Overvoltage category	I
Pollution degree	2

8. Ordering information

8.1. Models and versions available:

Model	Version	Catalogue number
PST-60HL, thermo-shaker	V.7AW, V.8AW	BS-010119-AAI
PST-60HL-4, thermo-shaker	V.6AW, V.7AW	BS-010128-AAI
PST-100HL, thermo-shaker	V.3AW	BS-010142-AAI

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

8.2.1. Replacement parts for all models:

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

9. Care and maintenance

9.1. **Service**.

9.1.1. If the unit is disabled (e.g., no platform shaking or heating, no reaction to knob turning, etc) or requires maintenance, disconnect the unit from the mains and contact Biosan or your local Biosan representative.

9.1.2. All maintenance and repair operations (except listed below) must be performed only by qualified and specially trained personnel.

9.1.3. Operating integrity check. If the unit follows the procedure described in sections **Operation** and **Calibration**, then no additional checks are required.

9.2. **Cleaning and disinfection**.

9.2.1. Use mild soap and water with a soft cloth or sponge for cleaning the exterior. Rinse remaining washing solution with distilled water. Wipe dry the excess water with clean, soft cloth or sponge.

9.2.2. To disinfect the plastic parts, use 75% ethanol or DNA/RNA removing solution (e.g., Biosan PDS-250). After disinfecting it is necessary to wipe the surfaces dry.

9.2.3. The unit and its accessories are not autoclavable.

9.3. **Rubber belt replacement**. For maintenance of reliable operation of the device, the manufacturer recommends replacing 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.

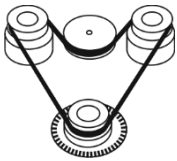


Figure 5. Rubber belt replacement

9.4. **Error codes in case of a defect**. 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.

9.5. **Disposal**. Disposal of the appliance requires special precautions and must be conducted at an appropriate disposal site, separate from normal household waste. To prevent pollution of the environment, all waste resulting from the disposal of the product must be collected and disposed of in the country of use, in accordance with the applicable requirements for the handling of electronic waste.

10. Storage and transportation

10.1. 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%.

10.2. After transportation or storage and before connecting it to the electric circuit, keep the unit under room temperature for 2-3 hrs.

10.3. For extended storage, the unit does not require special procedures.

11. Warranty

11.1. The Manufacturer guarantees the compliance of the unit with the requirements of Specifications, provided the Customer follows the operation, storage, and transportation instructions.

11.2. The warranted service life of the unit from the date of its delivery to the Customer is 24 months. For extended warranty, see **11.5**.

11.3. Warranty covers only the units transported in the original package.

11.4. If any manufacturing defects are discovered by the Customer, an unsatisfactory equipment report shall be compiled, certified, and sent to the local distributor. To obtain the claim form, visit section **Technical support** on our website at link below.

11.5. 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.

11.6. Description of the classes of our products is available in the **Product class description** section on our website at the link below.

Technical support	**Registration**	**Product class description**
biosan.lv/en/support	**biosan.lv/register-en**	**biosan.lv/classes-en**

11.7. 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	Serial number	Date of sale
PST-60HL, PST-60HL-4 or **PST-100HL**, Thermo-Shakers		

11.8. **Production date**. Production date is placed in the serial number, on the label of the unit. Serial number consists of 14 digits styled XXXXXXYYMMZZZZ, where XXXXXX is model code, YY and MM – year and month of production, ZZZZ – unit number.

12. EU Declaration of conformity

12.1. Thermo-Shakers **PST-60HL, PST-60HL-4** and **PST-100HL** are in conformity with the following relevant Union legislations:

LVD 2014/35/EU	**LVS EN 61010-1:2011 + A1:2019** Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. **LVS EN 61010-2-010:2020** Particular requirements for laboratory equipment for the heating of materials. **LVS EN 61010-2-051:2021 + A11:2021** Particular requirements for laboratory equipment for mixing and stirring.
EMC 2014/30/EU	**LVS EN 61326-1:2021** Electrical equipment for measurement, control, and laboratory use. EMC requirements. General requirements.
RoHS3 2015/863/EU	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
WEEE 2012/19/EU	Directive on waste electrical and electronic equipment.

12.2. Declaration of Conformity is available for download on the page for the relevant model on our website by links below, in the **Downloads** section:

PST-60HL **PST-60HL-4** **PST-100HL**

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how to choose
A PROPER SHAKER, ROCKER, VORTEX

biosan
Medical–Biological Research & Technologies

Sample volume 10^3 ... 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 Bio RS-24, Programmable rotator

Multi RS-60, Programmable rotator

Bio RS-24, Mini-Rotator

Applications:
- *Microbiology*
- *Extraction*
- *Cell cultivation*
- *Hematology*

V-1 plus, Vortex

RTS-1 and RTS-1C, Personal bioreactor

MSV-3500, Multi Speed Vortex

MR-1, Mini Rocker-Shaker

Multi Bio 3D, Mini Shaker

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

Sample volume 10^0 ... 10^{-3} ml
PCR plates, microtest plates and Eppendorf type tubes

PST-100HL, Thermo-Shaker

PST-60HL-4, Thermo-Shaker

TS-DW, Thermo-Shaker for deep well plates

PST-60HL, Thermo-Shaker

Applications:
- *ELISA Analysis*
- *Genomic Analysis*
- *Hybridization*
- *Immunology*

Applications:
- *Nucleic acid Analysis*
- *Molecular Analysis*
- *Protein Analysis*
- *Genomic Analysis*

MPS-1, Multi Plate Shaker

PSU-2T, Mini-Shaker

CVP-2, Centrifuge vortex for PCR plates

TS-100 Plus, TS-100C Plus, TS-100C Smart Thermo-Shakers

V-32, Multi-Vortex

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