Grant bio

Thermo shaker
PHMP & PHMP-4

Operating instructions

For versions
V.6GW (PHMP)
V.4GW (PHMP-4)

Contents

1. Safety

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.
- The unit should not be used if dropped or damaged.
- The unit must be stored and transported in a horizontal position (see package label) at ambient temperatures between -20°C and +60°C and maximum relative humidity of 80%.
- After transportation or storage keep the unit at room temperature for 2–3 hrs before connecting it to the electric circuit.
- Use only cleaning and decontamination methods recommended by the manufacturer.
- Do not make modifications to the design of the unit.

ELECTRICAL SAFETY

- Connect only to the external power supply unit with voltage corresponding to that on the serial number label.
- Use only the external power supply unit provided with this product.
- Ensure that the switch and external power supply unit 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 the electric circuit before moving.
- Disconnect the external power supply unit from power socket to turn off the unit.
- If liquid penetrates into the unit, disconnect it from the external power supply unit 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 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 spilt on or penetrates into the equipment.

2. General Information

The **Thermo shaker PHMP & PHMP-4** is designed for shaking 1 to 4 standard 96-well plates in the thermal regulation mode.

The 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.

The **Thermo shaker PHMP & PHMP-4** 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.

The device can be used in:

cytochemistry	for in situ reactions;
immunochemistry	for immunofermentative reactions;
biochemistry	for enzyme and protein analysis; molecular biologyfor 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 unit 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 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.

3.2. Thermo-Shaker set includes:

- Thermo Shaker PHMP/PHMP-4 .....1 piece
- Spare rubber drive belt. .....2 pieces
- External power supply unit.....1 piece
- Operating instructions; Declaration of Conformity .....1 copy

3.3. Setup

- Place the unit onto an 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 unit into the socket at the rear side of the PHMP and position the unit so that there is easy access to the power switch and the external power supply unit.

4. Operation

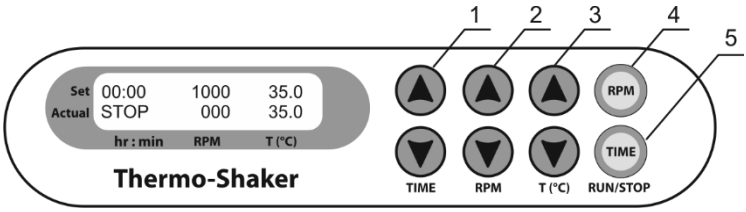

Figure 1. Control panel

4.1. Connect the external power supply unit 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 with the upper line (Set) showing time, speed and temperature set earlier and the lower line (Actual) showing 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. *Setting time (TIME)*

4.3.1. Using the ▲ and ▼ **TIME** keys (Fig. 1/❶) set the required working time interval in hours and minutes (increment - 1 min). Pressing the key for more than 3 s will increase the increment. *Setting speed (RPM)*

4.3.2. Using the ▲ and ▼ **RPM** keys (Fig. 1/❷) set the required speed (increment 10 RPM). Pressing the key for more than 3 s will increase the increment. *Setting temperature (T,ºC)*

4.3.3. Using the ▲ and ▼ **T (°C)** keys (Fig. 1/❸) set the necessary temperature (increment 0.1ºC). Pressing the key for more than 3 s will increase the increment.

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. While the platform is not shaking (STOP indication on the display), press **Time RUN/STOP** key and hold for 8s to enter lid temperature mode (LID indication on the display). Press **RPM RUN/STOP** key to exit the mode.

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

4.5.1. Microplate fixation:

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

PHMP-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 PHMP: Load only pairs of microplates for best fixing.

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

4.5.3. 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.

4.6. 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 Thermo-shaker (timer indicator will start counting up the time interval in the lower line (Actual)) until the **RPMRUN/STOP** key is pressed again.

Note! The platform temperature will be constantly maintained in accordance with the set temperature. This allows the devise to be used again without pre-heating.

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

4.8. The platform motion can be stopped at any time by pressing the **RPM-RUN /STOP** key. In this case the program realisation run and the platform motion 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. 1/❸ lower key) till the OFF sign appears in the upper part of the display.

4.9. 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.

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 **Stop** key (fig. 1/8) 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. 1/6) as shown on Fig. 2/1 to restore the factory settings. Press the **Run** key (fig. 1/7) 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 spectrocells, placed into the block sockets.

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

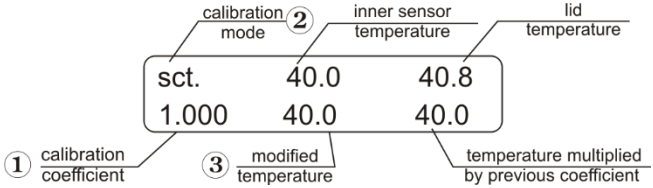

Figure 2. Control panel in calibration mode

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 **Stop** key (fig. 1/8) 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. 1/6), 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 **Run** key (fig. 1/7) 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.

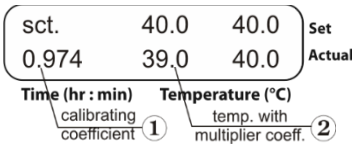

Figure 3. Control panel in calibration and operation mode

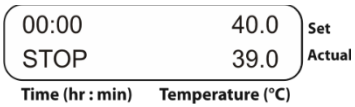

Figure 4. Control panel in operation mode after calibration

6. Specifications

The unit is designed for operation in cold rooms, incubators and closed laboratory rooms at ambient temperature from +4ºC to +40ºC 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.

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

6.1. Temperature specifications

Setting range ..... +25°C ... +60°C
Control range ..... 5°C above RT 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

	PHMP	**PHMP-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

* Accurate within ±10%.

7. Guarantee and Service

7.1. **Guarantee.** When used in laboratory conditions and according to these working instructions, this product is guaranteed for TWO YEARS against faulty materials or workmanship. For full Details of the Grant Bio Warranty policy please contact Grant Instruments.

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

7.2.1. **Replacing Drive belt.** For the maintenance of reliable operation of the device Grant recommends to replace the rubber belts after 1.5 years or 2000 hours of operation time. Disconnect the external power supply unit from the device. Remove 4 fixation screws on the device base and remove the bottom plate. Replace the rubber drive belt (fig. 5). Reassemble the device.

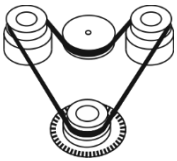

Fig. 5. Belt replacement

7.2.2. Spare parts:

Rubber drive belt	122x6x0.6 mm
External power supply unit (part no. 18020)	input AC 100–240 V, 50–60 Hz; output DC 12 V.

7.3. **Cleaning & disinfection.** Standard ethanol (75%) or other cleaning agents recommended for cleaning of laboratory equipment can be used for cleaning and disinfection of the unit.

7.4. **Error codes.** 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. Please contact our Service Department in the UK or, in other countries, our distributor.

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

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EU Declaration of Conformity

Unit type	Thermoshakers
Models	**PHMT, PCMT, TS-DW, PHMP, PHMP-4, PHMP-100**
Serial number	14 digits styled XXXXXXYYMMZZZZ, where XXXXXX 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	LVS EN 61326-1: 2013 Electrical equipment for measurement, control and laboratory use. EMC requirements. General requirements. LVS EN 61010-1: 2011 Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements. LVS EN 61010-2-010: 2015 Particular requirements for laboratory equipment for the heating of materials. LVS EN 61010-2-051: 2015 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

19.07.2016.
Date

Signature

Aleksandr Shevchik
Engineer of R&D

19.07.2016
Date

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