

# Thermo shaker PHMP/ PHMP - 4

*Operating instructions*





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# 1. Safety

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The following symbols mean:-



















Caution: Read these operating instructions fully before use and pay particular attention to any sections containing this symbol



Caution: Surfaces can become hot during use.

Always observe the following safety precautions:

-  Use only as per the operating instructions otherwise the intrinsic safety of this product may become impaired.
-  After transport or storage in humid conditions, dry out the unit before connecting to the supply voltage. During drying out the intrinsic protection may be impaired.
-  Connect only to the recommended power supply with a voltage corresponding to that on the serial number label, if in doubt please contact your supplier.
-  Ensure that the mains switch and isolating device (power supply connector) are easily accessible during use.
-  Connect only to a power supply which provides a safety earth (ground) terminal.
-  Before moving, disconnect at the power supply socket.
-  If liquid is spilled inside the unit, immediately disconnect it from the power supply and have it checked by a competent person or return it to your supplier detailing the potential hazard.
-  It is the user's responsibility to carry out appropriate decontamination if hazardous material is spilled on or inside the equipment.
-  The maximum guaranteed number of diagnostic cycles in the Thermo-Shaker mode, which require 15-30 minutes use in one cycle, is 7000-14000 times.
-  Do not use external power supply units other than that recommended by the manufacturer.
-  Before using any cleaning or decontamination method except those recommended by the manufacturer, user should check with the manufacturer that the proposed method will not damage the equipment.
-  Clean the unit only with a damp cloth, do not use chemical cleaning agents.
-  Do not operate the unit outside the laboratory premises.
-  Do not operate the unit in premises with aggressive or explosive chemical mixtures.
-  For model PHMP-4: Do not close the lid if the microplate fixation screws are not turned in to avoid damage.
-  The unit should be saved from shocks and falling.

## 2. General Information

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- 2.1** The Thermo-Shaker PHMP/PHMP-4 is designed for shaking a special platform for 1-4 standard 96-well microplates, and controlling the set temperature in the range of 25°C to 60°C (if the room temperature (RT) is less than 25°C).
- 2.2** **The main features of the Thermo-Shaker are**
- A** Additional heating source, in the lid of the device, which allows:
    - faster heat-up times;
    - Increase of temperature range.
  - B** Compact size.
  - C** Informative liquid crystal display, which allows instant control over both **set** and **current** temperatures of the aluminium block, as well as the shaking intensity and duration.
- 2.3** The Thermo-Shaker was designed using the multi-system principle, which allows use as three independent devices:
- A** Incubator - for lasting incubation without shaking of micro quantities (insect, plant cell cultures, etc.) In microplates;
  - B** Microplate Shaker - for operation in the cold room or other conditions, which do not require temperature stabilisation;
  - C** Thermo-Shaker - for immunochemistry and molecular diagnostics, where stringent requirements of reproducibility and precision are necessary.
- 2.4** An external 12V power supply unit is used to power the device. This makes it safe for use in the cold room, where condensation may cause leakage current from the mains. The device can be used in:
- cytochemistry - for in situ reactions;
  - immunochemistry - for immunofermentative reactions;
  - biochemistry - for enzyme and protein analysis;
  - molecular chemistry - for matrix analysis.
- 2.5** The time of the continuous work in the Shaker mode is restricted by the continuous work of the motor, guaranteed by the manufacturer (i.e. 3500 hrs of continuous work). 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.

# 3. Getting started

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## 3.1 Unpacking

Remove packing materials carefully and retain for future shipment or storage of the unit.

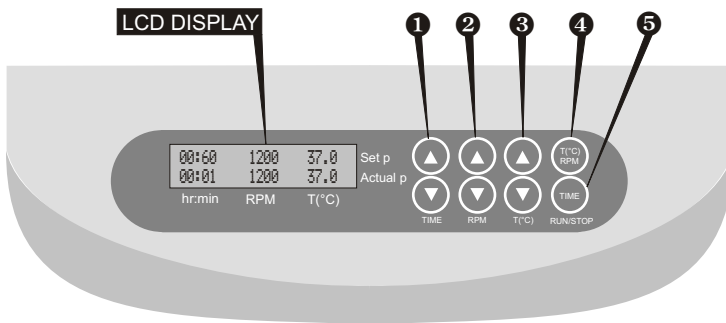
## 3.2 Thermo-Shaker set includes:

- Thermo-Shaker PHMP/PHMP-4.....1 piece
- Spare rubber drive belt .....1 piece
- External power supply unit .....1 piece
- Operating Manual; Certificate .....1 copy

3.3 Place thermo-shaker upon level, non-flammable surface away from any flammable materials.

3.4 Plug the external power supply unit into the 12 V socket at the rear side of the Thermo-Shaker.

## 4. Operation of PHMP



- 4.1** Connect power supply unit to the mains power. The display will illuminate with the upper line (set point) showing **time**, **RPM** and **temperature** set at the factory (15 min, 1200 RPM, 37.0 °C) and the lower line (actual point) showing current readings of the same parameters (STOP - time, 000 - RPM, thermoblock temperature °C, which automatically starts rising according to the temperature set in the upper line). The total time to achieve temperature stabilisation depends on the initial temperature, but does not exceed 15-20 minutes, if the set temperature is 37.0°C.

**4.2 How to set the necessary parameters.**

Use the readings in the upper line of the display (set point), while setting the necessary parameters.

*Reaction time (TIME)*

With the help of ▲ and ▼ keys (1) set the required working time interval.

*Shaking intensity (RPM)*

With the help of ▲ and ▼ keys (2) set the required shaking intensity in revolutions per minute.

Reaction temperature (T,C)

With the help of ▲ and ▼ keys (③) set the necessary temperature, for example 35°C.



*Attention: It is possible to turn off heating of the thermoblock only by setting the required temperature below 25°C (the display will show OFF - T,C - actual temperature). In this mode Thermo-Shaker can be used in the cold rooms as a mixing device without thermoregulation.*

### 4.3 Program execution

After the thermal stabilisation of the shaker (when the set and current temperature readings become the same):

- 4.3.1 PHMP: Place microplates on the platform and fix in position with the special holder by pressing it against the plate covers.  
PHMP-4: Unscrew the fixation screws. Place microplates on the platform and fix them by turning in the fixation screws.



Caution! The microplate fixation screws must always be turned in to avoid damage. Turn in the fixation screws completely when microplates are removed from or placed on the platform.

- 4.3.2 Press the **RPM-RUN/STOP** key (④). The platform will start to rotate and the timer indicator will start counting up the time interval (in 1 minute steps). If the **RPM-RUN/STOP** key is pressed again the program is halted and the platform movement stops and the timer is set back to [00:00], switching the unit into the **STOP** mode.
- 4.3.3 At the end of the program the platform rotation stops and the timer shows [STOP] which will flash, this will be accompanied by a repetitive sound signal until the **RPM-RUN/STOP** key is pressed.  
Please note, that the platform temperature will be constantly maintained in accordance with the set temperature that allows using the device again without pre-heating.
- 4.3.4 If the working time is not set (or deleted) and the timer indicator in the upper line shows 00:00, pressing the **RPM-RUN/STOP** key causes the unit to operate continuously until the **RPM-RUN/STOP** key is pressed again.
- 4.3.5 If required, there is possibility to restart the timer when it is running. Press the **TIME-RUN/STOP** key once (⑤) to stop the timer. Press the **TIME-RUN/STOP** key again to restart the timer.
- 4.3.6 The platform movement can be stopped at any time by pressing the **RPM-RUN/STOP** key once (④) to stop the timer. Press the **RPM-RUN/STOP** key again to restart the unit.



At the end of the set time period the platform movement stops automatically, but the heating will need to be stopped by reducing the temperature with the ▼ key (③) until the [OFF] sign appears in the upper part of the display.

- 4.4 At the end of operation disconnect the external power supply unit from the mains.

# 5. Specifications

## 5.1 Thermo-Shaker PHMP/PHMP-4 provides:

- gentle or vigorous rotational shaking of the samples;
- regulation, stabilisation and indication of rotation speed;
- even shaking amplitude throughout Thermo-Shaker platform;
- setting and indication of the required working time;
- automatic stop of the rotation after the set time expiration;
- indication of the current working time;
- setting and indication of the required temperature on the platform.

•Temperature regulation range .....	ambient +5°C to 60°C
•Stability .....	±0.1°C
•Temperature uniformity over the platform .....	±0.2°C
•Orbit .....	2 mm
•Speed variation .....	250-1200RPM
•Independent timer with sound signal .....	0 to 96 hrs
•Time setting unit .....	1 minute
•Rotation speed setting interval .....	10 rpm
•Time of thermoblock heating from "RT" to 37°C .....	15-20 min
•Display .....	16x2, LCD
•External power supply;	
input .....	AC 100-240 V, 1.8 A, 50-60 Hz
output .....	DC 12 V, 5.0 A

	PHMP	PHMP-4
•Platform loading capacity.....	2	4
•Platform dimensions .....	250 x 150 mm	210 x 290 mm
•Dimensions .....	270x260x125 mm	380x390x140 mm
•Weight, incl. power supply, not more than.....	7 kg	9 kg

•Thermo-Shaker is designed for operation indoors in a laboratory at altitudes up to 2000m, with ambient temperature from +5°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. Guarantee and Service

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## 6.1 Guarantee

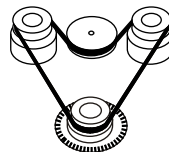
When used in laboratory conditions and according to these working instructions, this product is guaranteed for TWO YEARS against faulty materials or workmanship. For full Details of the Grant Bio Warranty policy please contact Grant Instruments.

## 6.2 Service

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

### 6.2.1 Replacing Drive belt

1. Remove the fixing screws on the bottom of the shaker.
2. Remove the bottom plate.
3. Replace the rubber drive belt and reassemble the unit.



### 6.2.2 Spare parts:

- Rubber drive belt (117x5x0.6 mm);
- External power supply unit (part no. 18020)  
input AC 100-240 V, 1.8 A, 50-60 Hz  
output DC 12 V, 5.0 A.

# Declaration of Conformity

Manufacturer:-	GRANT INSTRUMENTS (CAMBRIDGE) LTD, Shepreth, Cambridgeshire SG86GB
Equipment name/type number:-	PHMP/PHMP-4
Description of Equipment:-	Thermo Shaker
Directives:-	EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC

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

Applied Standards:-	<u>EN 61326:</u> Electrical equipment for measurement, control and laboratory use - EMC requirements
Harmonized Standards:-	<u>Part 1:</u> General requirements
	<u>EN 61010:</u> Safety requirements for electrical equipment for measurement, control and laboratory use.
	<u>Part 1:</u> General requirements
	<u>Part 2-10:</u> Particular requirements for laboratory equipment for the heating of materials.

# Grant-bio

**Grant Instruments  
(Cambridge) Ltd**  
Shepreth,  
Cambridgeshire  
SG8 6GB

Tel: +44 (0)1763 260811  
[www.grant.co.uk](http://www.grant.co.uk)  
[sales@grant.co.uk](mailto:sales@grant.co.uk)  
Fax: +44 (0)1763 262410