Heating Mantles

PE-4100, PE-4110, PE-4120, PE-4130, PE-4100-3

Data Sheet

Operating Manual

Version 1.3 dated 25.09.2015

Part number:

1.75.50.2050 1.75.50.2060 1.75.50.2070

1.75.50.2080 1.75.50.3000

Saint Petersburg

2015

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1. General

The present Manual contains the data required for operating the laboratory heating mantles of PE-41xx series, hereinafter referred as the “heating mantle” or “device”. The manufacturer reserves the right of making amendment to the design and circuitry of the device, which do not affect the technical parameters, without correction of the operating documentation.

2. Purpose

The heating mantle is intended for heating liquids in round-bottomed flasks made of heat-resistant glass with the volume of 250, 500, 1000 and 2000 ml within the temperature range from the ambient one to 400°C. Maximum temperature of the heating element: 450°C.

The following functions are implemented in the device:

- two-zone heating with the possibility of switching off the heating of the top zone;
- indication of the parameters on the liquid-crystal display;
- electronic (PID) temperature controller;
- automatic and manual tuning of the heating intensity;
- timer with visual and audible signalling of finishing of the heating;
- locking of the control to provide the protection against accidental change of the operation mode;
- possibility of connection of a remote sensor (option);
- determination and indication of the possible faults and malfunctions.

Remarks:

1. The maximum heating temperature is reached when both heating zones are switched on.
2. Due to presence of heat losses, the liquid temperature in the vessel can never reach the maximum temperature of the heating element; therefore, the settable temperature is limited by a value of 400°C.

3. Operating conditions

Ambient air temperature, ^{o}C .....+10 to +35

Relative air humidity, %.....up to 75

Supply voltage, V..... 220±10%

Power supply frequency, Hz ..... 50±2

Allowable time of continuous work, not more than, hours 8

4. Technical Specification

Model	Flask volume, ml	Maximum heater temperature, °C	Power, W	Dimensions, W x D x H, mm	Weight/kg
PE-4100	500	450	230	220x310x120	3.4
PE-4110	1,000		330	220x330x130	3.7
PE-4120	250		150	220x310x120	3.3
PE-4130	2,000		470	220x330x130	3.8
PE-4100-3	500x3		230x3	610x310x120	8.4

5. Scope of delivery

Heating mantle ..... 1 pc
Mains cable ..... 1 pc
Data Sheet and Operating Manual ..... 1 pc
Complete set of supports (for PE-4100-3) ..... 1 pc

6. Safety requirements

1. As regards the method of protection of a human against electric shock, the heating mantle corresponds to class I of GOST 12.2.007.0 standard. When operating the heating mantle, the “Rules for Operation of Customers' Electrical Installations” and “Safety Rules for Operation of Customers' Electrical Installations” approved by the State Power Supply Inspectorate (Gosenergonadzor) shall be observed and the requirements of GOST 12.2.007.0 standard shall be met.
2. The persons allowed to operate the instrument shall have necessary qualification and be trained in the safety regulation as well as shall have studied the present operating manual for the instrument operation.

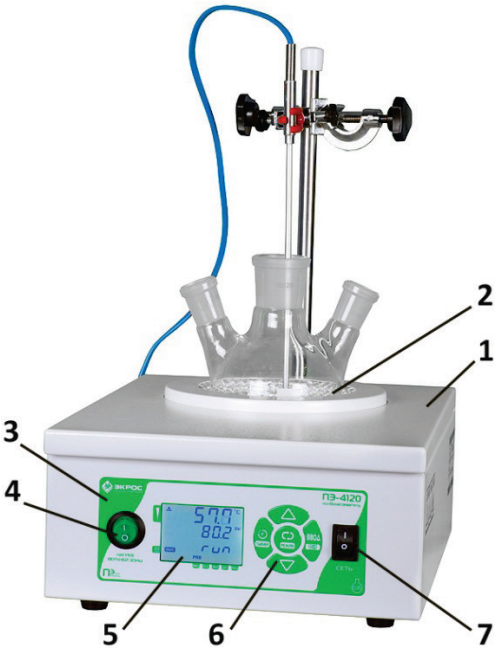


Figure 1

3. The device shall be connected to the earthing loop by means of a two-pole socket and plug with earthing contact. The electric resistance of the earthing loop shall not exceed 4 Ω. It is strictly prohibited to work with the unearthed instrument as well as use

the water/gas-supply or sewerage networks, earthing connectors of lightning dischargers, etc. as earthing system.

4. Prior to connecting the instrument to the power mains, make sure that the power cord is free of mechanical damages.
5. When operating the instrument, avoid any contact with its heated parts. It is strictly prohibited to touch the heating element fabric when the heating mantle is connected to the electrical mains.
6. Special care should be taken when handling flammable liquids. Getting a flammable liquid onto the heating element can cause inflammation.

7. Construction of the Instrument

The heating mantles (Figure 1) consists of the body 1, heating element 2 and electronic control unit ensuring the performance of all the necessary functions of the device.
The front panel of the heating mantle 3 comprises: switch of the top heating zone 4, liquid-crystal illuminated display 5, group of control buttons 6 and main switch 7.
The heating element is woven of safe non-toxic fiberglass with interwoven nichrome wire that excludes its residual deformation and ensures the firm adherence to the vessel walls to minimize the heat losses and increase the energy efficiency of the device.
The heating mantle cabinet is made of cold-rolled steel and coated with Karumel powder paint having adhesion stability, and resistance to scratching and corrosion.
The three-place heating mantle (Figure 2) unites the three independent heating units in a single cabinet. The construction and functionality of these units are identical completely to the heating units of single-place heating mantles.

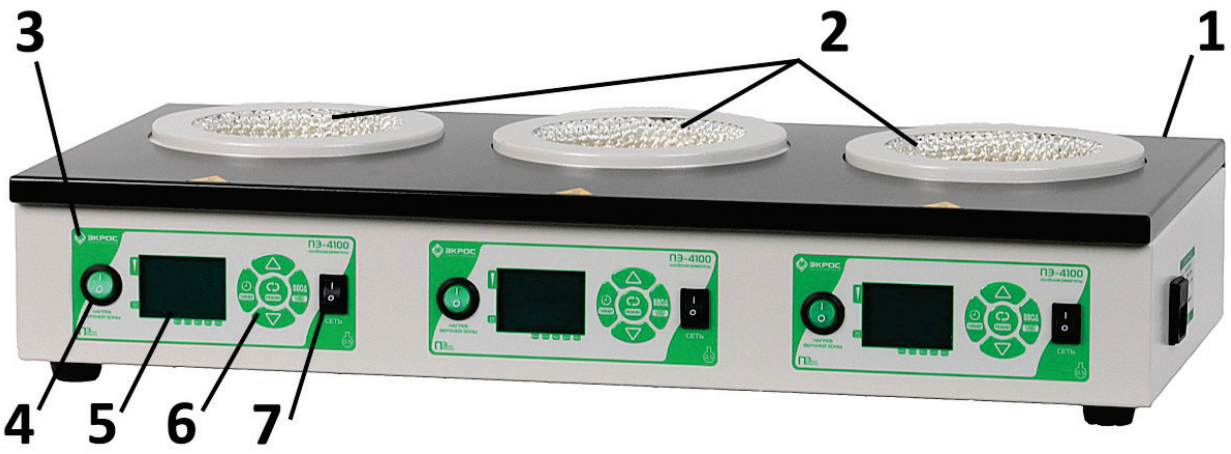


Figure 2

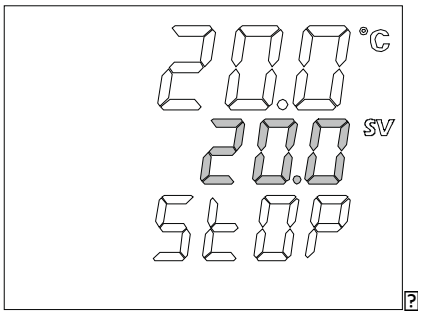
8. Working Procedure

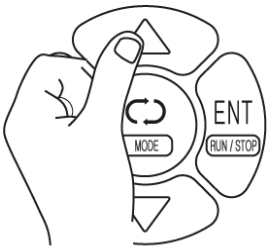
1. Prior to starting the work with the heating mantle, make sure that the main switch 7 is in the OFF position.
2. Connect the device to the electric mains.
3. Depending on the required operation mode, the top heating mode can be switched on or off by means of the switch 4.
4. Turn on of the heating mantle by the main switch 7.
5. Set the necessary operation mode by means of the control buttons.

Attention!

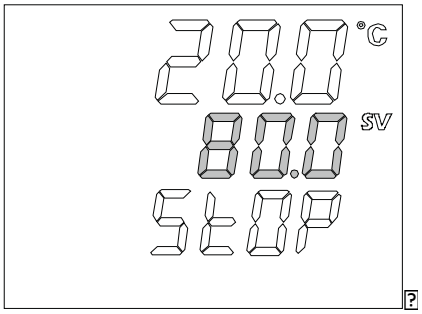
1. Any direct contact of the heating element fabric with liquids is strictly prohibited. It leads to heating mantle failure not covered by the warranty. If any liquid gets into the heating mantle, disconnect immediately the latter from the electric mains and wait for sufficient time until the heating mantle dries out in natural way.
2. Never apply mechanical efforts capable of deforming the heating element.
3. Never use the heating mantle at the maximum temperature for more than 8 hours.
4. Never disassemble the heating mantle and/or modify its construction in any way.

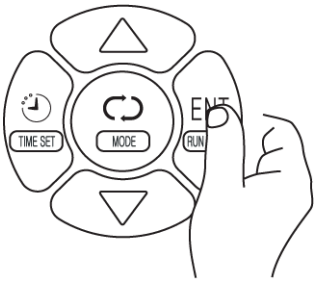
Setting the temperature, switching the heating on and off



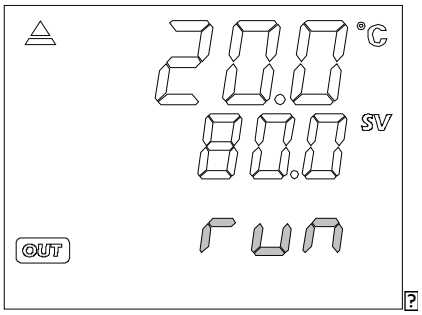


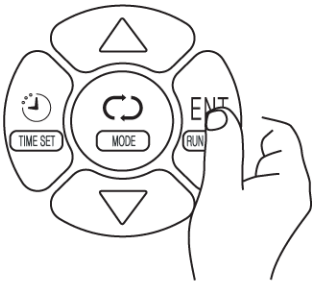
Set the necessary temperature value by means of the △ and ▽ buttons.



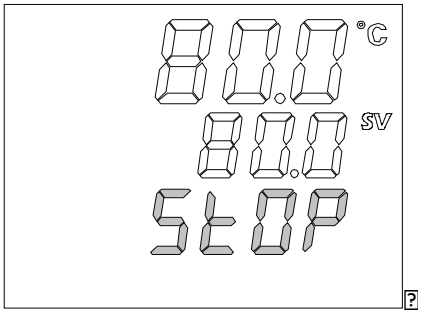


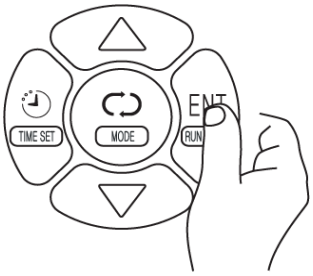
To finish the setting, press the ENT button.





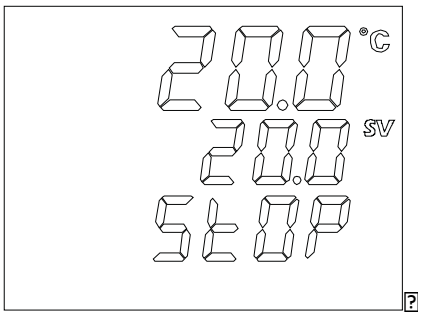
To switch on the heating press the ENT button and hold it down for 3 seconds.

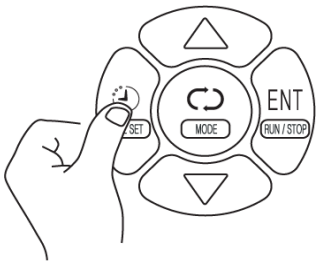




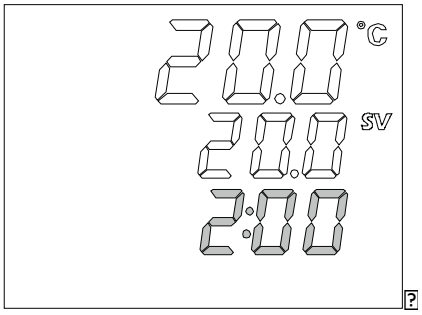
To switch off the heating, press the ENT button and hold it down for 3 seconds.

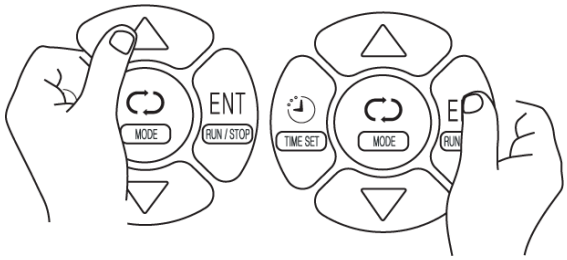
Setting the timer



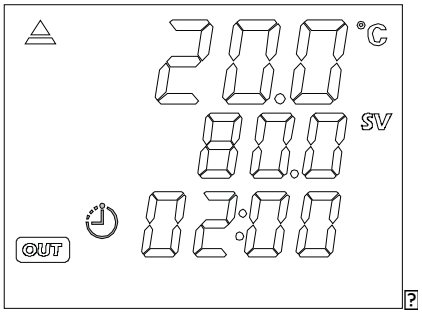


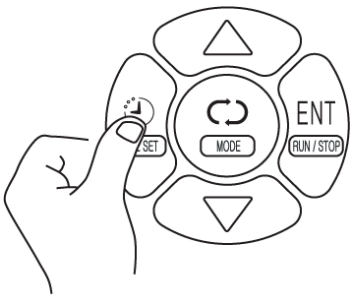
Press the TIME SET button when the heating is switched on or off.



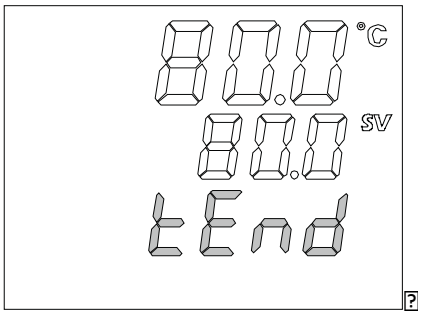


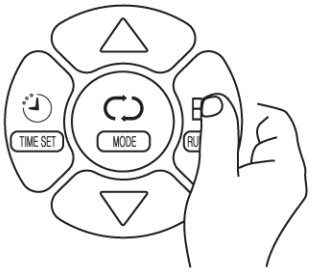
Set the required time by means of the △ and ▽ buttons and press the ENT buttons.



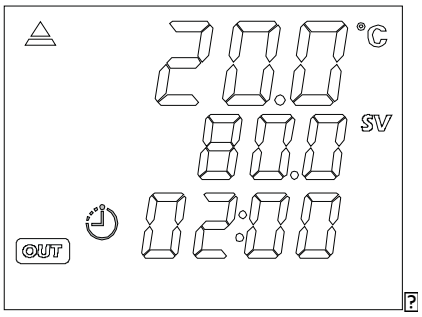


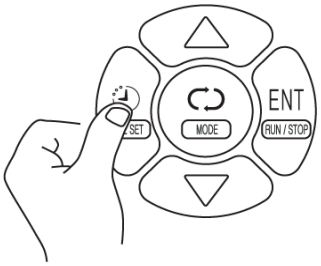
If the setting is performed with the heating switching ON, press the TIME SET button and hold it down within three seconds. The ⏲ symbol appears on the display and the count-down starts.



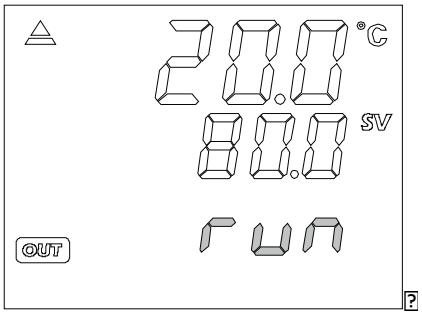


On expiration of the specified time, the heating stops, the tEnd lettering appears on the display and the signal is heard. Upon pressing the ENT button, the device is switched to the initial state.





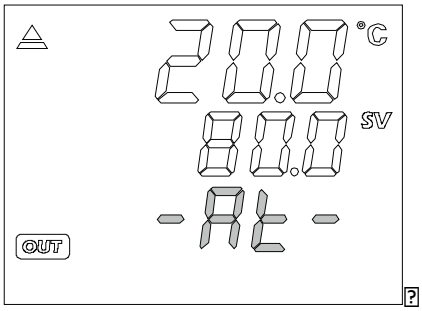
To switch off the down, press the TIME SET button and hold it down for 3 seconds.



The ⏲ symbol disappears from the display and the continuous heating mode is switched on.

Automatic Tuning of the Proportional-Integral-Derivative (PID) Controller

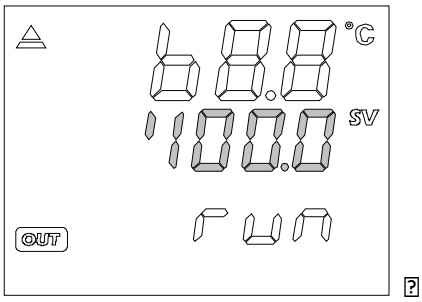
Use this function to improve the accuracy of maintaining of the temperature in a specific object; for another object, the obtained settings can be non-optimal.

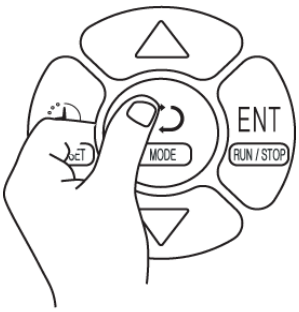


Set the required temperature and switch on the heating. Switch on the automatic tuning while holding down the △ and ENT buttons for 3 seconds. The operation can be interrupted by pressing this button combination once again.

The function is unavailable in the timer mode.

Viewing the Heating Rate Value

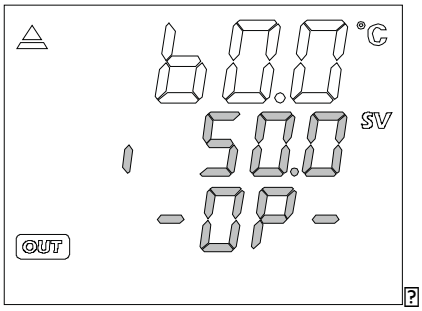


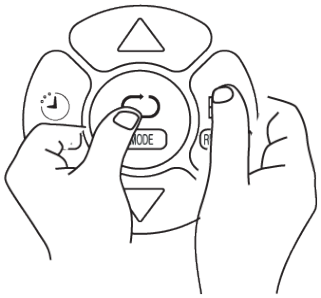


Upon pressing the MODE button, the specified value of the heating rate is displayed instead of the specified heating temperature value.
Pressing the MODE button returns the previous state of the indication.

Manual Setting of the Heating Rate

Reducing the heating rate helps in preventing the temperature over control and can be useful when handling the expensive and overheating-sensitive reagents.

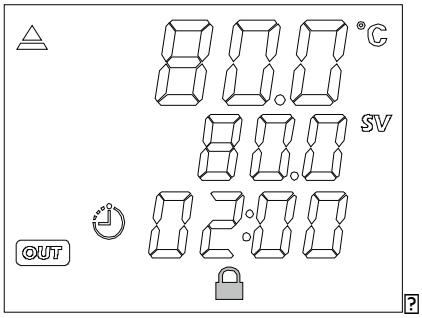


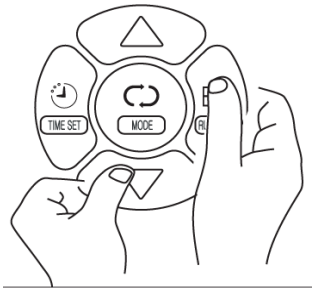


Press the MODE and END buttons simultaneously and hold them down for 3 seconds. The heating rate setting mode is switched on. Set the required value by means of the △ and ▽ buttons and press the ENT buttons. Use the same button combination to return to the initial mode.

Locking the Control Buttons

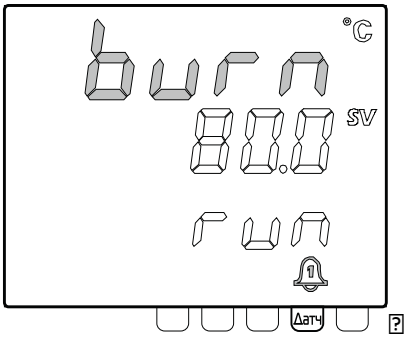
Use this function to prevent an accidental change of the heating parameters when performing an important experiment.



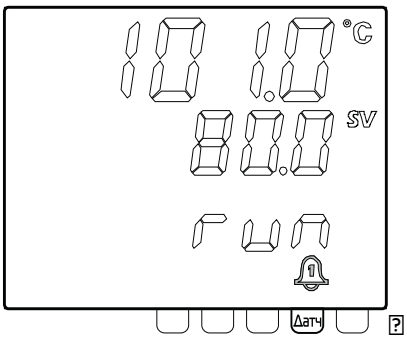


To lock or unlock the keyboard, press the ▽ and ENT buttons simultaneously and hold them down for 3 seconds.

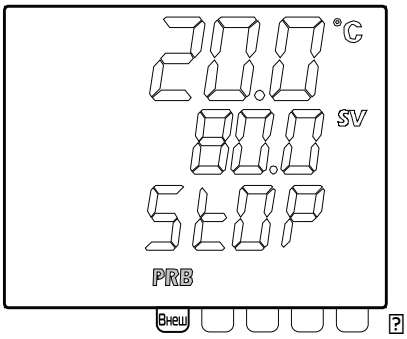
Messages on the Faults and Errors of Functioning



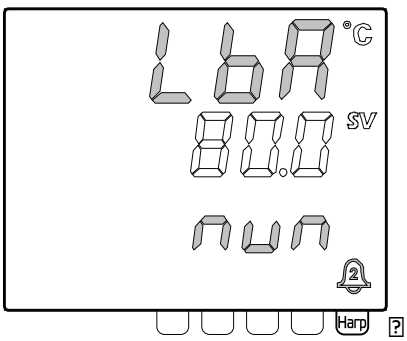
In case of failure of the temperature sensor, the burn lettering and symbol appear on the display and the audible signal is heard.



If the current value differs from the specified one by more than 20°C, the symbol appears on the display and the audible signal is heard.



The PRB lettering appears on the display when connecting the external temperature sensor. When connecting the external temperature sensor, the lettering disappears and the device is switched to the built in sensor. The sensors should be switched over then the heating is switched off.



Appearance of the LbA lettering and symbol signalises the heating error. This means that one of the following situations has appeared:

1. The heating element has failed.
2. The connected external temperature sensor has fallen from the object being heated.
3. The heating element power is insufficient for heating this object to the specified temperature.

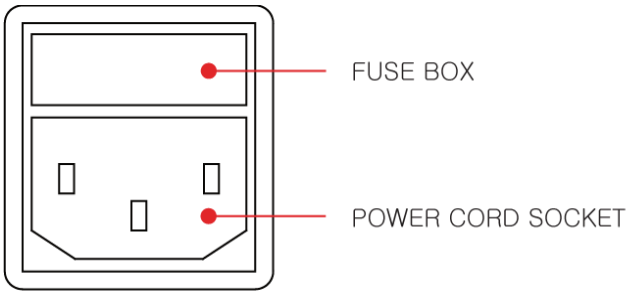
Remarks:

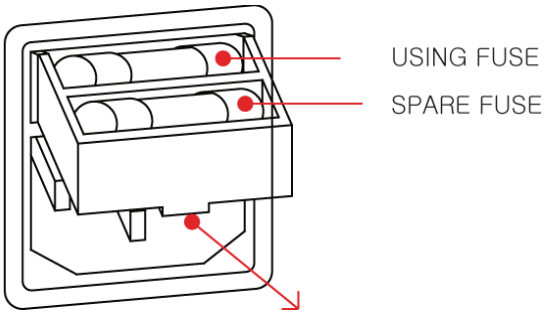
1. After operation of the heating mantle, the internal surface becomes spotty or its colour charges slightly. It is caused by burning of the heating element and does not affect the device operation.
2. Within the first 30 minutes of operation the heating mantle, smoke can appear that is caused by evaporation of silicone from the protective coating of the heating element and does not affect the instrument quality is any way.
3. A round-bottomed flask and the heating mantle shall fit together as to volume, otherwise the heating takes more time and power consumption increases. Choose the heating mantle model correctly.

9. Troubleshooting

Should the message on a fault or other malfunctions of the device appear, the power shall be immediately switched off. If an external temperature sensor is used, make sure that it is in the object being heated.

If the device cannot be switched on, check the presence of the main voltage, integrity of the main cable and intactness of the fuse.





In any other case, contact the Service Department of the equipment supplier. Never disassemble the heating mantle or try to eliminate the fault by yourself.

10. Disposal

After expiration of its service life, the heating mantle causes no hazard for human life or health or for the environment and requires no special methods of disposal.

The disposal procedure shall be determined by the organisation operating the heating mantle.

11. Storage and Transportation Rules

Within the guaranteed storage life, the heating mantle shall be stored in the manufacturer's package at a temperature of +5 and +40◦C and relative humidity of 80%.

The unpacked heating mantle should be stored at ambient air temperature of +10 to +35◦C and relative humidity of 80%.

The instrument may be transported by any transportation mode in roofed vehicles within the temperature range of -40 to +50◦C and relative humidity of not more than 95%.

12. Warranty

The manufacturer guarantees the compliance of the product with the characteristics stipulated in items 2 and 4 hereof provided the consumer adheres to the operation, transportation and storage conditions.

The guaranteed service life is 12 months from the date of shipment to the consumer as determined in the bill of lading or, in the absence of the latter, from the date of manufacture of the product.
The warranty maintenance shall be only performed by the manufacturer's authorised service centres.

13. Claims Information

In case of revealing any faults within the guaranteed service life or incompleteness when unpacking the product, the consumer shall send the claim report to the manufacturer's address:

Ecohim Co. Ltd.
22 17th Line, building I, Suite 406, Vasilyevsky Island, Saint Petersburg 199178.
Phone/fax: (812) 322-9600, 448-7610, 448-7600
E-mail: info@ecohim.ru, URL: www.ecohim.ru

The claim shall not be submitted:

- on expiration of the warranty period;
- if the consumer has broken the operation, storage and transportation rules provided in the operating documentation;
- in case of damage of the seals on the instrument cabinet.

14. Certificate of Acceptance

The heating mantle of PE-41xx series, serial number _____ has been verified in accordance with the statutory requirements of national standards and current technical documentation, and recognised to be ready for service.

Date of manufacture _____

Stamp of the Technical Control Department

Inspector _____

Appendix 1 – Information on the Repairs Performed

Data of failure	Nature and causes of the failure	Note of the organisation having performed the repair	Remarks