PE-4820 Muffle Furnace

Data Sheet
Operating Manual

Version 1.0EN dated 24.09.2015

Part number: 1.21.40.25

Saint Petersburg
2015

1. General

The present data sheet combined with the technical description and operating manual is intended for familiarising the user with the construction and rules of operation of PE-4820 muffle furnace.
Due to continuous improvement of the devices, minor modifications not worsening the technical specification of the product can be made to the design.

2. Purpose

2.1. The muffle furnace is intended for using in laboratories, industrial and mining enterprises as well as research and development institutes to perform the element analysis as well as to quench, anneal and temper ordinary- and small-size steel parts and to perform other heat-treatment operations.

2.2. The following functions are implemented in the device:
- maintenance of the specified temperature with the required accuracy;
- digital indication of the specified temperature and current temperature of the working chamber;
- setting the timer to stop the heating;
- overheating protection with the operation alarm.

3. Operating conditions

3.1. Ambient air temperature, °C ..... +5 to +40
3.2. Relative air humidity, % ..... up to 85
3.3. Supply voltage, V ..... 220±22
3.4. Power supply frequency, Hz ..... 50±1

Attention! This equipment is not intended for handling flammable, explosive, poisonous and corrosive substances as well as in the atmosphere of them.

4. Technical Specification

Working temperature range, °C ..... 50 ÷1000
Temperature non-uniformity throughout the volume, °C ..... ±5
Temperature setting discreteness, °C ..... ±1
Timer setting range, s ..... 1÷9,999
Chamber dimensions, mm ..... 300×200×120
Chamber volume, l 7.2
Power consumption, W 2,500
Overall dimensions (W x D x H), mm ..... 560×705×600
Weight, kg 61
Average service life, years 7

5. Scope of Delivery

The scope of delivery of the standard equipment includes:

- muffle furnace 1
- data sheet and operating manual 1

6. Construction and Principle of Operation

The muffle furnace is designed in a single cabinet. The facing is welded of steel plates and their surface is painted by electrostatic spraying. The furnace chamber is a monolithic structure made of ceramic fibre and consisting of the chamber itself and door. The electric heating wires are laid Inside the chamber. Between the cabinet and the working chamber of the furnace, there is an air heat insulation, due to which the furnace cabinet surface preserves a low temperature (when maintaining the temperature of 1000°C in the working chamber for more than 1 hour, the facing surface continues to preserve a low temperature).

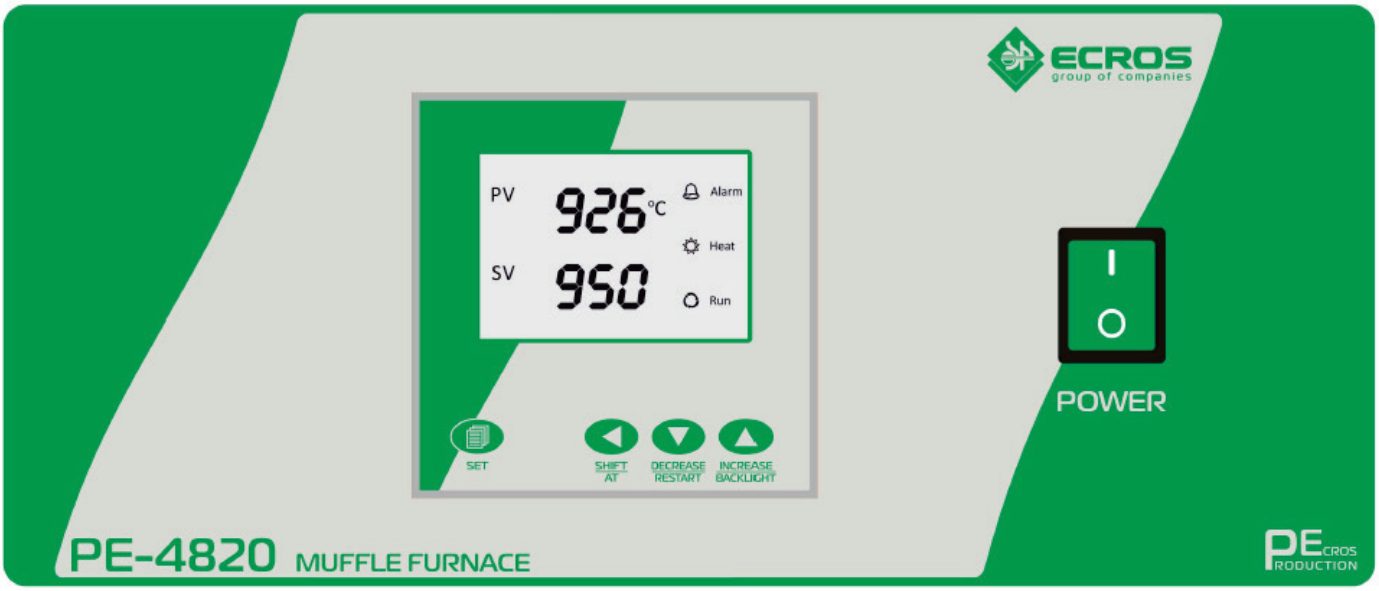

Figure 1

In the front part of the furnace, there is a control panel (Figure 1) comprising the main switch and temperature controller.

The temperature controller is a multifunction device performing the main temperature-regulating functions as well as a number of auxiliary functions. This product is equipped with a temperature controller implementing the Fuzzy PID control that provides the following advantages in comparison with the classic PID controller:

- less overcontrol, less stabilisation time with high accuracy of maintaining the temperature;
- it is unnecessary to gather up all the parameters of the controller for different objects; it is sufficient to modify the proportional component only;
- one-time performance of the automatic tuning for this object ensures that the controller parameters optimum for the whole range are found;

- it is unnecessary to install the door-opening sensor, because the controller determines the door opening by changing the parameters and compensates for its effect as soon as possible.

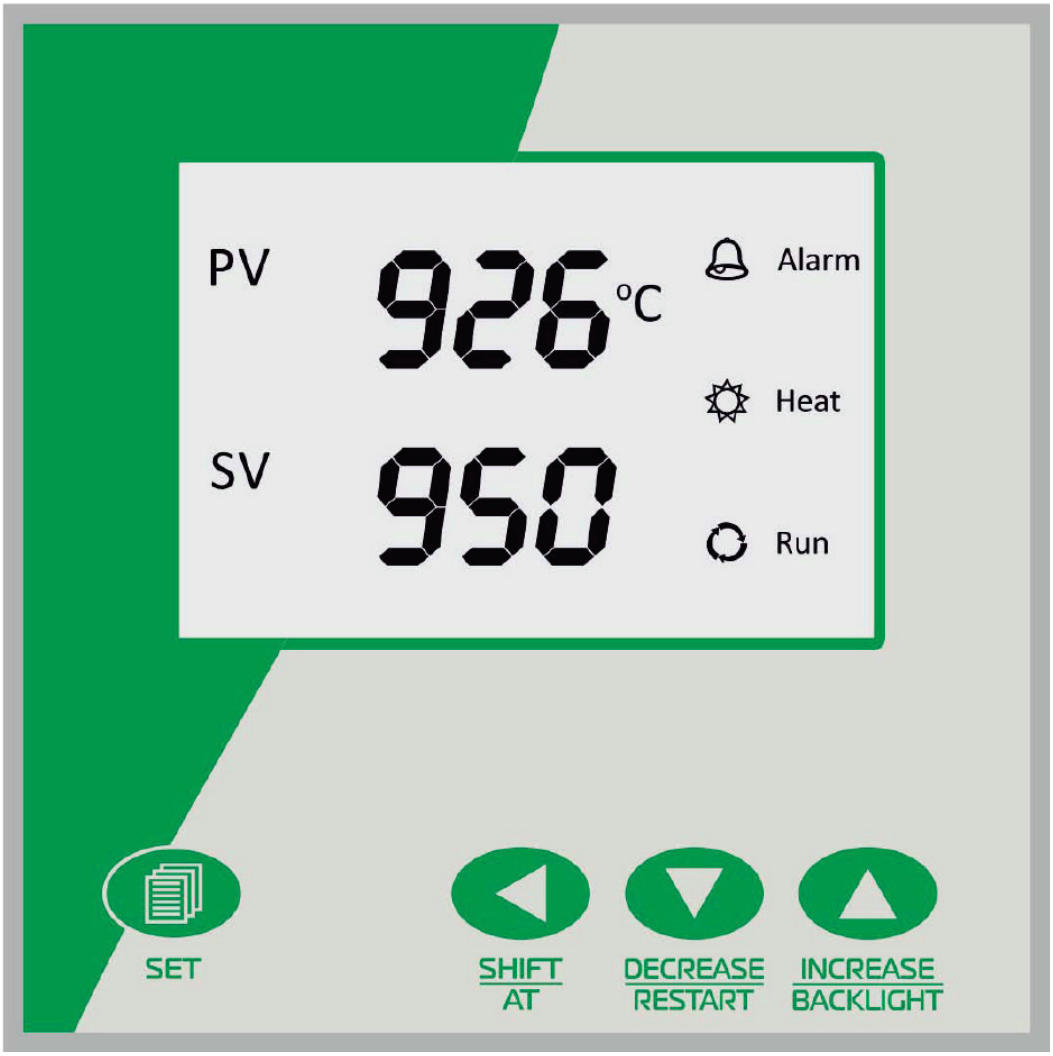

Figure 2

7. Pre-Operation

The furnace shall be prepared for operation as follows:

- Take out the furnace from the transportation package;
- Remove the transportation catch from the furnace door;
- Install the furnace in a well-ventilated room or fume hood at a distance of minimum 10 cm from the nearest objects;
- Set the POWER switch to the OFF position;
- Connect the power cord to the AC mains with the voltage of 220 V.

Prior to the first use or after long-term downtime, the furnace shall be burned to dry out completely the insulation materials and form an oxide film on the heating coil.
Burn the empty furnace at a temperature of 200°C for 4 hours, increase the temperature to 600°C and burn 4 hours more. Then the furnace can be operated.

8. Working Procedure

The work with the furnace shall be performed as follows:

1. Open the chamber, place the work piece to be treated into it and close the furnace door;
2. Switch the furnace on by means of the POWER switch;
3. Set the required temperature and furnace operating time by means of the temperature controller and switch on the heating;
4. On completion of the heat treatment of the work piece, switch off the furnace by means of the POWER switch;
5. Open the furnace door and take out the work piece to be treated.

Attention! The works in the chamber may be only performed when the main switch is set to the OFF position.

9. Setting the Working Modes

9.1. Control Elements

Figure 2 presents the control panel of the temperature controller.

Purpose of the buttons:

Setting and viewing the values of the temperature and other parameters.

In the parameter setting mode, it serves for moving the cursor. In other modes, holding down this button for 6 seconds causes the start or interruption of the procedure of the automatic tuning of the controller.

In the parameter setting mode, it serves for decreasing the current value. Holding down the button causes the continuous decrease. Holding down the button on completion of the program causes the program to restart.

In the parameter setting mode, it serves for increasing the current value. Holding down the button causes the continuous increase. In other modes, it switches the LCD backlight on/off.

9.2. Setting the Working Temperature and Time

- When switching on the controller, top line of the display shows the type of the connected sensor and the bottom one – the maximum value of the working temperature. After 3 seconds, the controller returns to the initial state.
- The working temperature and time shall be set as follows:

  Press the SET button to switch the controller to the temperature setting mode. After that, the top line of the display shows the “SP” lettering, and the bottom ones – the cur-

rent value of the set temperature. To alter it, use the SHIFT button for selecting the digit and the INCREASE or DECREASE buttons for altering its value.

Press the SET button again to switch the controller to the temperature setting mode. After that, the top line of the display shows the “St” lettering, and the bottom ones – the current value of the working time at the set temperature. To alter it, use the SHIFT button for selecting the digit and the INCREASE or DECREASE buttons for altering its value.

Press the SET button once again and the entered values of the temperature and time will be saved automatically.

Should the zero value of time be set, the timer function will be disabled and the furnace will run continuously. In this case, the bottom line of the display will show the set temperature instead of the countdown.

In case of timer-controlled operation, the heating is switched off, the display shows the “End” lettering and the audible signal is heard.

To restart the heating cycle, hold down the DECREASE/RESTART button for 3 seconds.

- In case of operation of the overtemperature alarm, the “Alarm” symbol lights up on the display and the audible alarm is heard. Should the overtemperature be caused by altering the set temperature, no audible signal is heard.
- To switch off the audible signal, press any button.
- Should no button be pressed within one minute in the parameter setting mode, the controller returns automatically to the return state.

9.3. Automatic Tuning of the Controller

Should the temperature maintenance accuracy be insufficient, it is recommended to perform the procedure of automatic tuning of the regulator.

Attention! In the course of performance of this procedure, considerable overtemperatures will occur.

To start the procedure, press the SHIFT/AT button and hold it down for 6 seconds.
During performance of this procedure, the AT lettering blinks of the display. On completion, the lettering stops blinking and new settings will be accepted.
To interrupt the procedure before its completion, press the SHIFT/AT button and hold it down for 6 seconds once again.
Should the set temperature be exceeded during the automatic tuning, the overtemperature alarm will not be switched on, but the independent temperature protection can operate.
In this mode, the bottom line of the display shows the set temperature value irrespectively of the timer setting.

10. Troubleshooting

Trouble	Possible causes	Remedy
The furnace cannot be switched on	The alimentation plug is poorly connected or not connected to the receptacle	Connect the plug to the receptacle
	The fuse has blown out	Replace the fuse
The temperature in the chamber fails to increase	Incorrect temperature setting	Set the required temperature
	The electric heater is faulty	Replace the electric heater
	The temperature controller is faulty	Replace the temperature controller
The temperature in the chamber fails to increase; the display shows dashes instead of the temperature value	The temperature sensor is faulty	Replace the temperature sensor

11. Safety Requirements

1. As regards the method of protection of a human against electric shock, the device corresponds to class I of GOST 12.2.007.0 standard. When operating the device, 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 device shall have necessary qualification and be trained in the safety regulation as well as shall have studied the present document.
3. Prior to connecting the device to the power mains, make sure that the power cord is free of mechanical damages.
4. The furnace 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 device.
5. The muffle furnace shall be installed in a well-ventilated room or in a fume hood, and no combustible or explosive substances shall be located near it.
6. The muffle furnace is not provided with an explosion prevention device; therefore no place flammable or explosive substances shall be placed into it.
7. The furnace shall be kept clean both outside and inside. Should the muffle furnace be out of operation for long time, it shall be covered with thin plastic film and left in a dry room.

12. Storage and Transportation Rules

1. The muffle furnace shall be stored indoors in the packing box at the air temperature of +5 to +40°C and relative air humidity of not more than 80%.
2. The unpacked device should be stored at ambient air temperature of +10 to +35°C and relative humidity of 80%.
3. The device 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%.

13. Warranty

Ecohim Co. Ltd. guarantees the compliance of the product with the specification stipulated in item 4 hereof provided the consumer adheres to the operation, transportation and storage conditions.
The guaranteed service life of the muffle furnace is 12 months from the date of shipment to the consumer as determined from the bill of lading.
The warranty maintenance shall be only performed by the service centres authorised be the manufacturer.
Within the warranty period, the free repair or replacement of the product is provided for. The guaranteed service life of the product shall be extended for the time, for which it was not used due to the defects detected.

14. Claims Information

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

Ecohim Co. Ltd.
22 17th Line, building I, Suite 406, Vasilyevsky Island, Saint Petersburg 199178
Phone (812) 322-96-00, fax (812) 448-76-00
E-mail: info@ecohim.ru URL: www.ecohim.ru

No claims may be submitted:

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

15. Certificate of Acceptance

PE-4820 muffle furnace No. **4K82P**_____ has been verified in accordance with the current technical documentation, statutory requirements of national standards and recognised to be ready for service.

Date of manufacture _____

Stamp of the Technical
Control Department

Inspector _____

16. Information on the Repairs Performed

Date	Description of the fault	The repair has been performed by	Remarks