PE-4610 Drying Oven

Data Sheet
Operating Manual

Version 1.0EN dated 24.09.2015

Part number: 1.75.55.0220

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-4610 drying oven.
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 drying oven is to be used for drying, firing, melting, curing and sterilisation of various articles, treatment of tools and samples as well as performance of laboratory investigations of every sort and kind in the laboratories of industrial enterprises, research establishments and medical institutions, colleges, universities, etc.

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;
- overheating protection with the operation alarm.
- setting the timer to stopping the heating;
- control of the rotational speed of the fan.

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 ..... from ambient +5 to +300
Temperature non-uniformity throughout the volume, °C ..... ±1
Temperature setting discreteness, °C ..... ±0.1
Internal dimensions, mm ..... 400×360×450
External dimensions, mm ..... 550×550×840
Chamber volume, l 65
Standard/maximum number of shelves, pcs 2/5
Power consumption, W 1,600
Weight, kg 61
Average service life, years 7

5. Scope of delivery

The scope of delivery of the standard equipment includes:

- Drying oven 1
- Shelf made of stainless steel..... 2
- Mains cable 1
- Data Sheet and Operating Manual..... 1

The additional accessories are delivered to separate order.

6. Construction and Principle of Operation

The drying oven consists of the outside case, working chamber with the ventilation passage and air duct and electronics module.

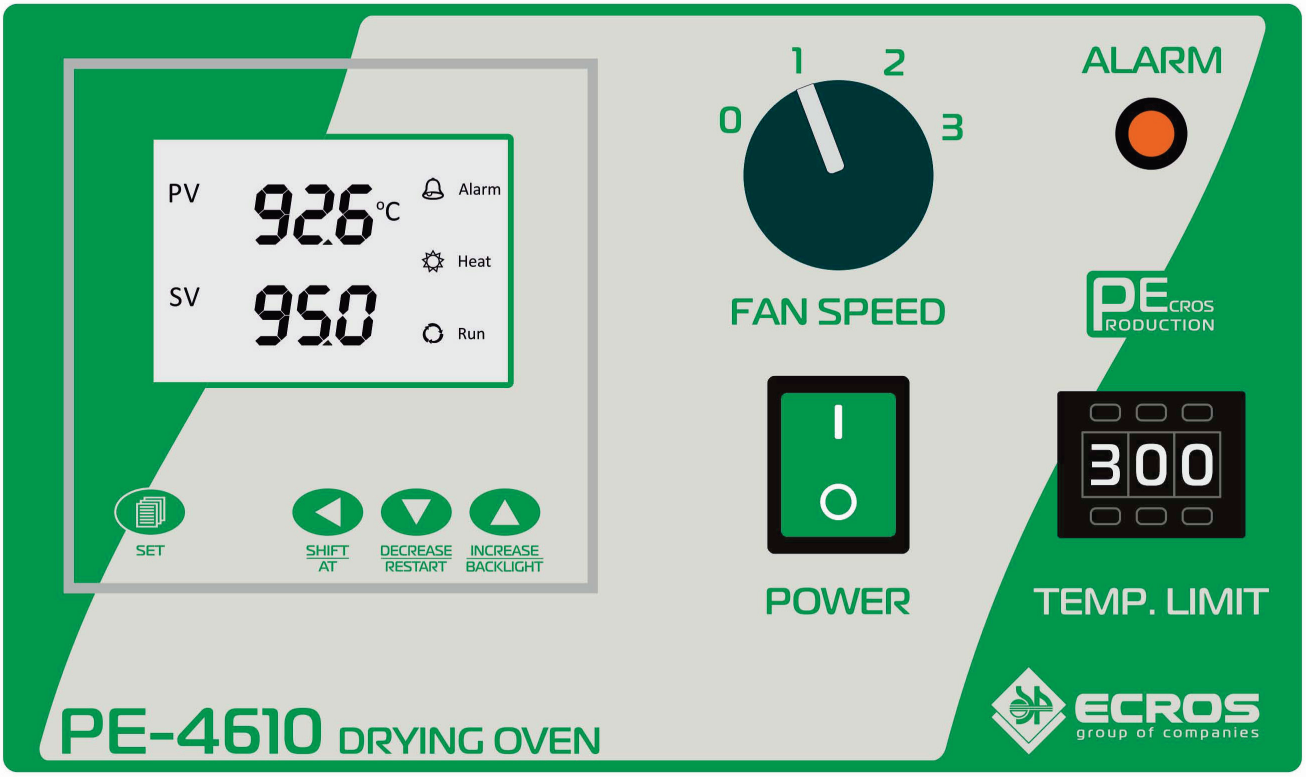

Figure 1

The outside case is made of high-quality cold-rolled steel and coated with powder paint resistant to mechanical and chemical attacks. The space between the case and the working chamber is filled with highly efficient heat insulator. The ventilation passage damper is located on the roof of the case.

The working chamber is a structure made of stainless steel, the side walls of which are provided with five pairs of holes for the guides for setting the shelves at the required height.

The oven door is multilayer; the surface of the contact between the door and the working chamber walls is provided with a seal made of heat-resistant silicon rubber. The adjustable door catch ensures the reliable sealing.

The control unit is located in a separate compartment in the bottom part of the oven.

The front panel (Figure 1) comprises the main switch, control panel of the temperature controller, rotational speed controller of the fan, overtemperature protection facility and indicator lamp of the protection operation.

The system for maintaining the constant temperature of the oven consists of the motor with axial fan, electric heater, system of air ducts and temperature controller. When this system is switched on, the motor rotates the fan, which provides for ascent of heated air from the electric heater located at the bottom of the oven through the air duct into the working chamber, where the samples being dried are located. Having passed through the working chamber, the air is sucked by the fan again. Such circulation continues until the specified temperature is reached.

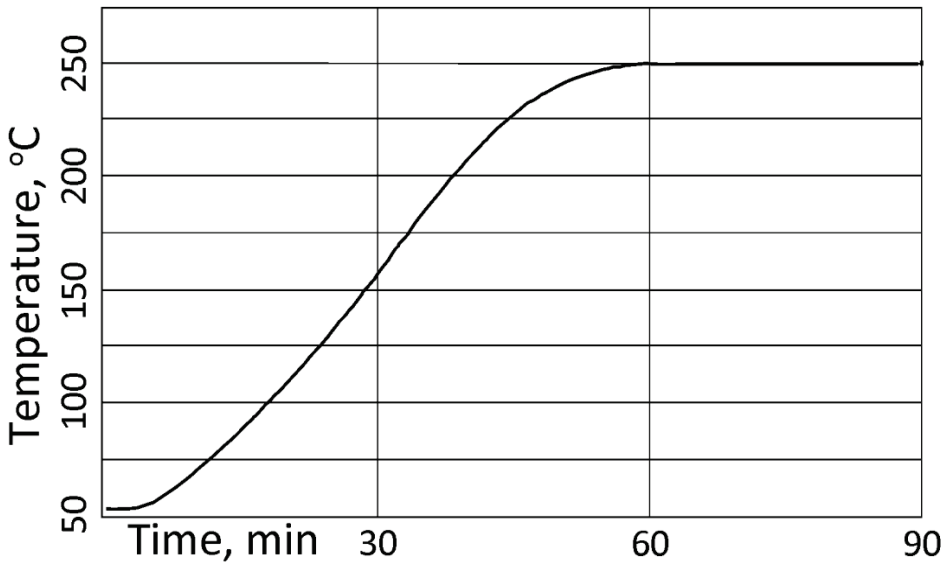

Figure 2

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.

The example of a typical temperature profile is shown in the figure above.

7. Working Procedure

1. Place the objects to be dried into the drying oven and close the door tightly. Power on the instrument by means of the power switch and switch on the fan.

   Attention! Do not place anything onto the drying oven chamber bottom. To ensure the free air inflow between the objects being dried in the chamber, the shelves should be arranged in well-balanced manner and loaded to not more than 2/3 of their capacity.

2. Set the necessary working mode of the drying oven (in accordance with the description of the work with the temperature controller). The heating to the set temperature will be started; on completion of the heating, the heating indicator will go out. The temperature will be stabilised completely within extra 30 minutes.

   Attention! Never switch off the fan when the temperature is rising, otherwise the service life of the heating element will be shortened.

3. The drying mode shall be chosen depending on the moisture content in the object to be dried. If the working samples are too moist, open completely the vent damper at the top of the oven.

4. If the dried objects are not to be removed from the oven right after completion of the drying process, close the vent damper. Otherwise switch off the power, open the chamber door and remove immediately the samples. Be careful to avoid burns.

8. 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 oven 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 drying oven shall be installed in a well-ventilated room, and no combustible or explosive substances shall be located near it.

6. The drying oven is not provided with an explosion prevention device; therefore never place flammable or explosive substances into it.

7. Too many objects in the drying chamber are not allowed. The object shall be arranged at small distance from one another to ensure good circulation of hot air in the chamber.
8. The drying oven shall be kept clean both outside and inside. Should the drying oven be out of operation for long time, it shall be covered with thin plastic film and left in a dry room.

9. Operating Mode

9.1. Control Elements

Figure 3 presents the control panel of the temperature controller.

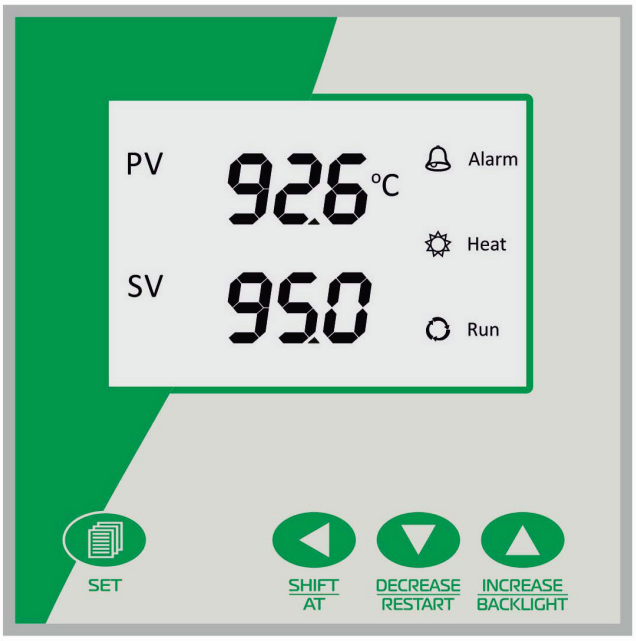

Figure 3

Purpose of the buttons:

Setting and viewing the values of the temperature, time 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. Temperature and Time

- When the controller is switched on, the type of the temperature sensor connected is indicated in the top line of the display: “Pt” and the maximum working temperature value – in the bottom line. 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 current 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 oven 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 “RUN/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

Fault	Possible causes	Remedy
The instrument cannot be switched on	The alimentation plug is poorly connected or not connected to the receptacle, or the power cord is disconnected	Connect the power cord to the oven receptacle and insert the plug into the AC socket
	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 sensor is faulty.	Replace the temperature sensor.
	The fan is not running	Replace the fan
The set temperature cannot be reached	The vent damper is fully opened	Close the damper to some extent
	The working chamber is overfilled; there is no place for movement of air	Unload the chamber partially to ensure the free circulation of air
The fan is not running	The fan motor is faulty	Stop working and check the motor and capacitor
The display indicates dashes instead of the temperature value	The temperature sensor is faulty	Replace the temperature sensor
The “STOP” lettering is displayed	Stop by the timer	To restart, hold down the DECREASE/RESTART button for 3 seconds

11. Storage and Transportation Rules

1. The drying oven 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%.

12. 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 drying oven 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 supplier's authorised service centres.
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.

13. 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.

14. Certificate of Acceptance

PE-4610 muffle furnace No. **4K61P**_____ 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 _____