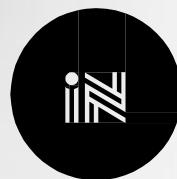


# COAST



**INSTALLATION AND OPERATING  
INSTRUCTIONS**



INDUSTRY

POLAR series furnaces are economical and highly efficient heaters designed for heating residential and industrial premises, maintenance centres, workshops and garages, greenhouses, sheds, etc. In addition, furnaces are well suited for the permanent heating of spaces and for spaces that are used temporarily and intermittently.

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# 1 INTRODUCTION

This installation and operating manual concerns five sizes of heaters intended for heating industrial and residential premises. The heating furnace (POLAR series) is an economical and highly efficient heating appliance that uses solid fuel. Its main operating mode is glow combustion (wood gas generator principle). The operating mode is set by the consumer and depends on the size of the room to be heated and the speed at which the desired temperature is reached. The heated air heats the room evenly and the air ducts allow the following options heat several adjacent rooms. Furnace climatic performance type - UHL category 4.2 according to GOST 15150.

**WARNING!!!** Before installing and using the stove, read these installation and maintenance instructions carefully.

The manufacturer will not be held responsible for failure to follow the installation and maintenance instructions.

# 2 TECHNICAL DATA

The furnaces are produced in series for heating five standard sized spaces from 200 to 1300 m<sup>3</sup> with a maximum thermal output of 11 to 45 kW respectively. All the models produced share a common purpose, operating principle, construction and fuel. The models have different overall dimensions, weight, combustion chamber volume, diameter and number of convection tubes, total heating surface area, flue diameter and height. The main technical specifications of the furnaces are given in the following table. Table 1.

# 3 THE DEVICE AND HOW IT WORKS

The heat gun (Figure 1) is a simple, highly efficient and reliable use of a dedicated welded structure of the thermal type made of structural steel.

Figure 1. Furnace Construction

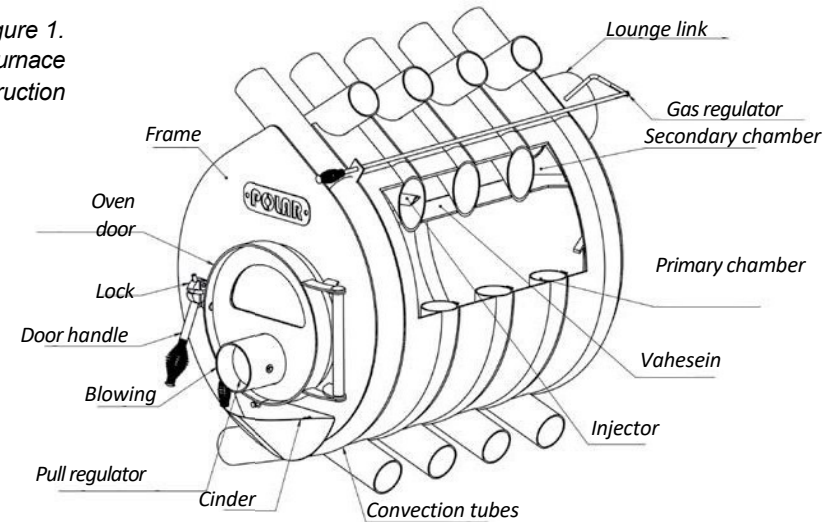


Table 1.

Heating capacity		Heated rooms, m <sup>3</sup>	Dimensions (height * width * length), mm	Weight, kg	Number of convection pipes	Oven capacity, dm <sup>3</sup>	Chute diameter, mm	Pit height (minimum), m	Length of stalks, mm	Working time per kilogram of fuel, in hours	Model
Rated power, kW	Maks. Power, kW										
7	11	200	891*	86,30	7	100	120	6	450	6-8	Polar 01 Standard
			560*	85,78							Polar 01 Glass
12	18	400	968*	117,60	9	142	150	7	600	6-8	Polar 02 Standard
			603*								Polar 02 Glass
18	26	600	847	116,71	11	194	150	7	750	6-8	Polar 03 Standard
			1120*	149,99							Polar 03 Glass
23	35	1 000	890	148,88	14	336	180	7	900	6-8	Polar 04 Standard
			1349*	209,40							Polar 04 Glass
30	45	1 300	720*	211,33	16	434	180	7	1 100	6-8	Polar 05 Standard
			970	241,28							Polar 05 Standard

\* The area of the space to be heated is given as an illustrative 2u3l e7e'6s6 and depends on many factors, such as: heat loss

Such a furnace has a two-chambered combustor in which the glow combustion method (based on the "wood gas generator" principle) involves two stages: combustion of the fuel and afterburning of the flue gases.

The combustion gases, which are produced by the glowing of wood in the lower (primary) chamber, enter the upper (secondary) chamber, where they are combusted by heated air (oxygen), which is introduced from the heated room through special injectors.

Since wood does not burn but glows, one bag of stove fuel is sufficient for 6 to 8 hours of continuous operation (depending on fuel density and moisture content).

The furnace is equipped with heat exchanger tubes to ensure efficient heat exchange. Cold air from the space to be heated enters the lower openings of these tubes and is returned through the upper openings to the space after heating to a temperature of 60 - 80°C.

This ensures that the air is heated and mixed evenly throughout the room. The tubes are in full contact with the stove, quickly absorbing the heat generated and transferring it to the room to be heated.

Efficient removal of heat from the walls of the column due to the powerful convection current generated ensures efficient heat removal from the side surfaces of the column.

Separating the primary and secondary chambers also helps to achieve optimum temperatures at the upper ends of the heat exchanger tubes. The fuel is fed into the oven through an oven door that is large enough to allow the addition of large stacks. The eccentric lock on the door handle ensures that it closes firmly and tightly.

The furnace door is equipped with a blower regulator (draft regulator), which can be used to control the intensity of fuel combustion.

The post-combustion mode of the CO released from the fuel shall be set by means of a flue gas regulator (gas regulator) in each case on a case-by-case experimental basis, depending on the design of the flue.

The chimney damper has a cut-out equal to a quarter of the cross-sectional area to prevent the ingress of flue gas into the space to be heated. The ash tray prevents hot fuel particles from falling to the floor of the room. All the external surfaces of the heater are painted with a heat-resistant silicone enamel paint which retains its properties at high temperatures.

*\* The manufacturer reserves the right to modify the design of the oven without affecting its performance.*

## 4

### SAFETY REQUIREMENTS

**NOTE!** To ensure the safe installation and use of the appliance, the requirements and recommendations given in this manual and the following documents must be followed:

-NAPBA.01.001 - 2004 Ukrainian fire safety regulations;

-SNiP 2.04.05 - 91 Heating, ventilation and air conditioning. In addition, the local fire inspector should always be consulted with any questions.

## 5

### FURNACE INSTALLATION

Before installing the stove, make sure that there is a supply of fresh air for normal operation in the room where it is to be installed.

In order to ensure an adequate air supply for stoves of 35 kW or less, the room in which such a stove is installed shall have at least an external door or an opening window. In the case of stoves with a capacity of more than 35 kW, the room shall be provided with extract ducts with a cross-section of at least 150 cm<sup>2</sup> leading to the surface.

In any case, the size of the installation space shall be 4 m<sup>2</sup> for each 1 kW of heat output.

The installation location of the stove must be chosen in such a way as to ensure not only the most efficient heating of the space to be heated, but also free access for inspection and cleaning of the stove. The surface underneath the heater must be made of non-combustible materials.

In addition, the stove must be installed on a metal base with a height of at least 0,2 m or on a brick base as shown in Figure 2. The underside of the oven door, which is made up of combustible and flammable materials, shall be protected by a metal sheet 700 x 500 mm, placed with its long side along the length of the oven.

The distance from the oven door to the opposite wall must be at least 1,25 m.

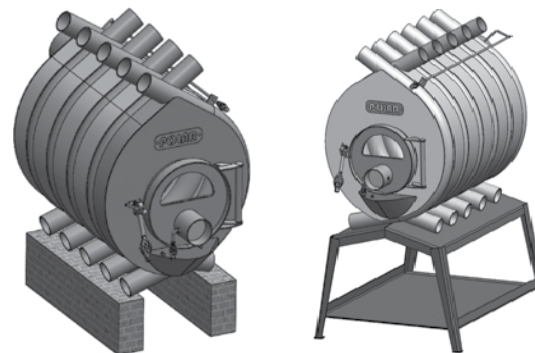


Figure 2. Oven installation options

The metallic forge shall be installed at least 1 m from structures made of materials of flammability classes G3, G4 and at least 0,7 m from structures made of materials of flammability classes G1, G2 (Figure 3).

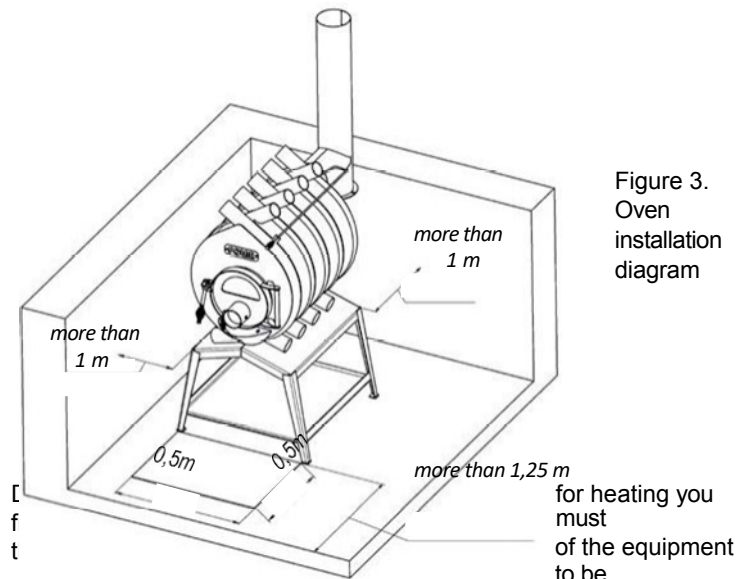


Figure 3.  
Oven  
installation  
diagram

at least 0,7 m and at least 1,25 m from the oven door. When installing the oven, the back of the oven must be raised 1-5° from the horizontal line to create a draft.

## 6 BELLOWS INSTALLATION

Due to the fact that the stove has an optimised fuel combustion process (in order to prolong the operating time and increase efficiency), the rules for the use of the stove impose strict requirements on the stove materials and their installation conditions.

The following is a brief description of the basic requirements for modern chimneys.

- 1 As the gases move through the stack, they cool naturally due to heat transfer to the stack walls. Therefore, the more massive the flue, the faster the heat loss of the flue gases and the more energy is required to reheat them. As the temperature of the exhaust flue gases is not high in modern high-efficiency furnaces, the flue gas temperature may not be as high as it is today.

be sufficient to heat a thick brick structure over the entire height of the chimney. A reduction in the temperature of the flue gases will result in a significant attenuation of their outflow. As a result, draught is reduced, the stove starts to smoke, etc. For this reason, rapid heating, low heat output and low weight are essential for modern chimneys.

- 2 As you know, the gases in the atmosphere rise upwards because of their heat (energy), in other words their temperature. If the flue is cold (both the material and the air inside the flue) and the temperature of the outgoing flue gases is not high, the situation arises where the energy of the smoke is not sufficient to "break through" the air cap in the cold part of the flue. The insulation of the flue allows to avoid cooling. Therefore, parts of the chimney that may be affected by cold temperatures (attic, street), i.e. pipes outside the room to be heated, should be insulated with 30 - 50 mm thick basalt wool.

- 3 As noted, the exhaust gases cool naturally as they pass through the stack. Often, the temperature of the flue gas drops below the dew point, resulting in abundant condensation, which is chemically very strong, and a layer of soot on the inside walls of the stack. If the chimney is made of a material that cannot withstand the highly acidic environment of condensate, the chimney will become such a trap quickly becomes unusable.

This is why corrosion resistance is important for the bellows. A suitable material is acid-resistant stainless steel, which ensures the durability of the bellows.

- 4 In addition, the surface of the chute walls has a significant effect on the drag; the smoother the surface, the lower the drag coefficient and the stronger the drag. In addition, the roughness of the walls promotes soot build-up, which results in a reduction in the cross-sectional area of the chute and hence in the drag. The smooth surfaces of stainless steel gullies have a minimum coefficient of drag, and stainless steel prevents soot from sticking to them.

So the heater's flue must provide good draught and be strong and durable. It must be able to withstand the high temperature of the flue gases (during firing of the stove), provide a stable flue gas outlet (in economy mode) at low flue gas temperatures, withstand the effects of condensate and strong acids, be fire-resistant and easy to install.

This is why we recommend a bellows made of heat and acid resistant stainless steel DIN 1.4571 / 1.4404.

Such a baffle has a small thickness, heats up very quickly, has a surface for the mirror to which nothing sticks, and is not damaged by exposure to strong acidic condensate. The use of such a chimney ensures its high efficiency, reliability and durability and, as a result, the correct and efficient operation of the oven in the modes and with the characteristics for which it is intended.

A separate flue pipe or separate flue duct in a brick pipe must be used for each stove (with mandatory lining in stainless steel).

The diameter of the chute shall not be less than the diameter defined in Table 1 over the entire height of the chute.

The height of the chimney from the outlet to the end of the stove shall not be less than that specified in Table 1 and shall always be above the roof ridge.

**NOTE!** When assembling non-insulated (stainless) metal chimney flues, the upper pipe is inserted into the lower pipe (Figure 5).

When assembling insulated pipes, the inner upper pipe is inserted into the lower pipe, while the outer upper pipe is installed on the lower one.

Asbestos-cement pipes must not be used for chimneys.

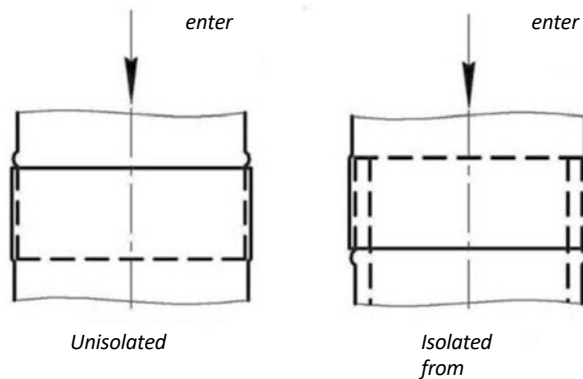


Figure 4. Connecting the flue pipes

When installing the chimney (Figures 6, 7, 8), the requirements below must be followed.

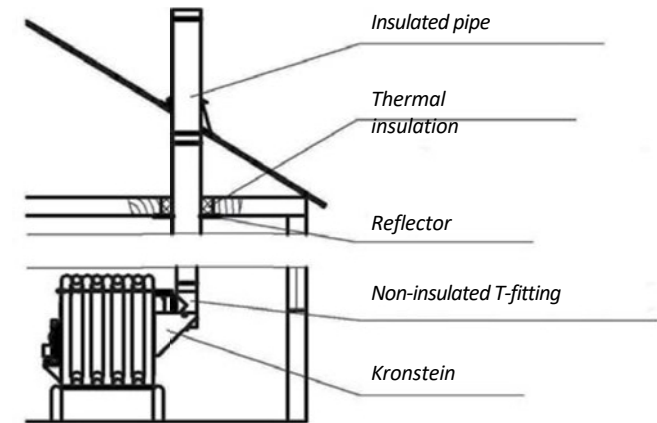


Figure 5. Installing the chimney through the ceiling

Metallic pipes installed under the ceiling or parallel to walls and partitions, made of materials of fire hazard class G3, G4, shall be spaced at the following distances: not less than 0,7 m for pipes without insulation; not less than 0,25 m for pipes with insulation that does not allow the external surface temperature to exceed 90 °C.

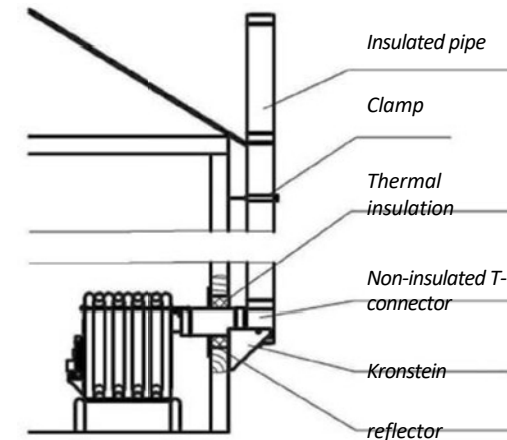
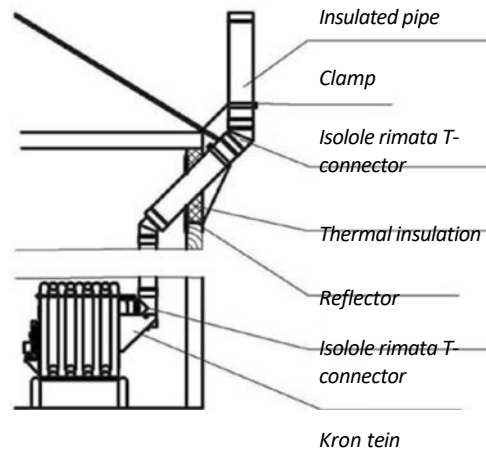


Figure 6. Installing the chimney through the wall

A metal bellows may be led through a ceiling of combustible material if the finish is made of non-combustible materials not less than 0,51 m in size.



Figure 7.  
Installing a chimney through the wall with a knee

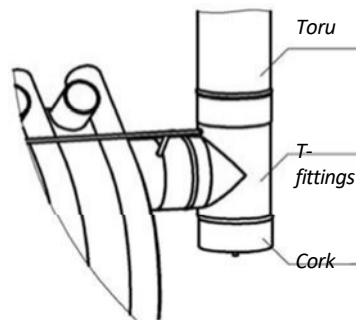


If the flue is routed through a window, a steel sheet at least three times the diameter of the flue must be installed.

The end of the pipe shall extend at least 0,7 m beyond the wall of the building and terminate at least 0,5 m above the ground. The pipe shall extend 1 m above the eaves of the upper floor window. It is recommended to install a rainwater run-off shelter on top of the pipe. Gullies shall be of vertical construction. The permissible vertical inclination of the pipes is up to 30°, with an offset of not more than 1m.

Chimney flues in buildings with roofs of combustible materials shall be fitted with metal mesh spark arresters with openings not exceeding 5 x 5 mm. It is not recommended to use horizontal cuts when installing the flue. By way of exception, one horizontal cut not exceeding 1 m in length directly from the stove is allowed.

To prevent the chimney from becoming clogged with soot and condensate and to make chimney cleaning more convenient, a T-shaped fitting (Figure 9) with a removable cap (funnel) should be installed immediately after the chimney outlet.



installation Figure 8.  
corked (with funnel)

The space between the flues and roof structures made of combustible or flammable materials shall be covered with non-combustible roofing materials.

If the chimney passes through the roof, a corresponding notch must be made in accordance with SNiP 2.04.05.

- 91 requirements. The opening and the chamfer are then covered with metal (at the roof penetrations), which is guided under the slab on one side and placed on top of the slab on the other side.

A cover (umbrella) must be installed over the chute, sealed with silicone sealant and secured with screws (Figure 9).

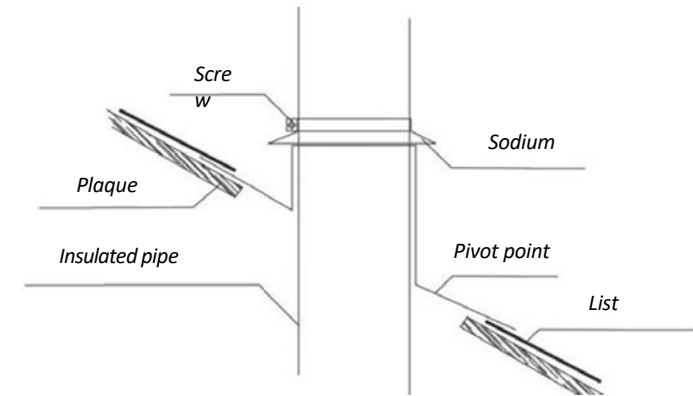


Figure 9. Chimney installation through the roof

This will provide rain protection for the roof and attic.

The height of the flue above the roof shall be as follows:

- at least 500 mm - for flat roofs;
- at least 500 mm - above the roof ridge or batten, if the pipe is not more than 1,5 m from the ridge or batten;
- not lower than the ridge or batten - if the chimney is between 1,5 m and 3,0 m from the ridge or batten;
- not lower than a line drawn from the ridge downwards at an angle of 10° to the horizon if the chimney is more than 3,0 m from the ridge.

(Figure 10).

Chimneys must be located above the roof of taller buildings connected to the building.

# 7

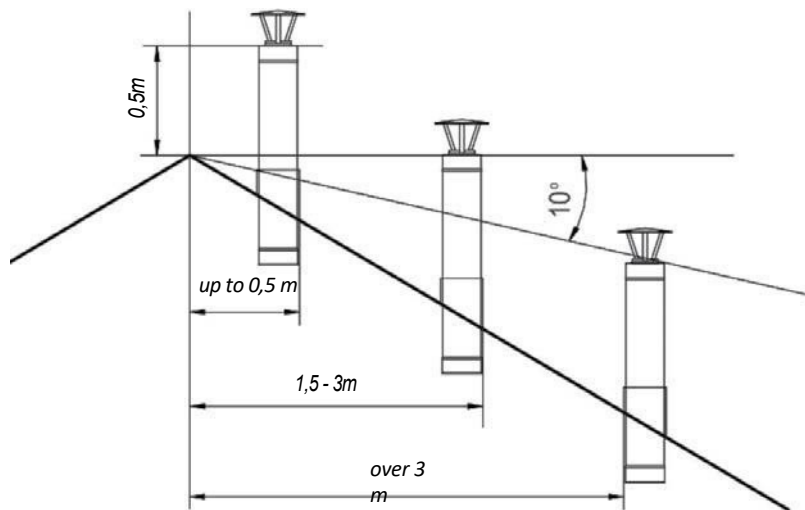


Figure 10. Location of the chimney above the roof top

Any type of solid fuel can be used in the stove: wood, wood waste, wood and peat briquettes, pellets, paper, cardboard, etc. The standard fuel choice is split firewood that has dried naturally in the shade for 1-2 years, with a moisture content of no more than 20%. It is also possible to use large round logs of the same length as the stove without splitting.

If sawdust is used, it should be used in combination with logs and/or firewood. Never use liquids or gases of any kind, coal, coke, etc. as fuel. Do not burn any type of plastic, rubber, etc. in the stove, as this will release toxic gases and pollute the environment.

The fuel must be stored in specially adapted rooms or in a designated place, taking into account the requirements of the regulations. It is strictly forbidden to use unauthorised types of fuel in the stove and to make any changes to the stove's construction.

# 8

## USE

**NOTE!** The stove is painted with a heat-resistant silicone enamel paint which only fully polymerises during the first heating of the stove and gives off a specific smell which disappears afterwards.

For this reason, the stove should be heated for the first time in a properly ventilated room with fully open doors and windows or outdoors. Before using the stove, make sure that all the elements of the stove and the chimney are working properly. The stove and the flue must be checked and cleaned at least every two months.

In addition, it must be systematically cleaned of dust and other foreign matter and fresh air must be allowed to enter the room. Before lighting the oven, set the gas regulator and the draft regulator to the fully open position (Figure 11).

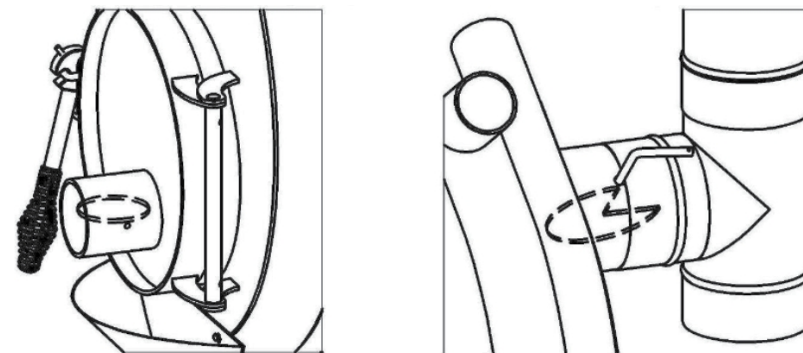


Figure 11: Position of the sliding bars when lighting or adding firewood (intensive mode)

Use paper and wood shavings for ignition, and add fuel to the stove as it burns until it is completely full.

Within 2 to 3 minutes after the fuel has ignited properly, close the oven door and cover it with the damper and only then close the damper. This is how you reconfigure the oven for gas mode (Figure 12).



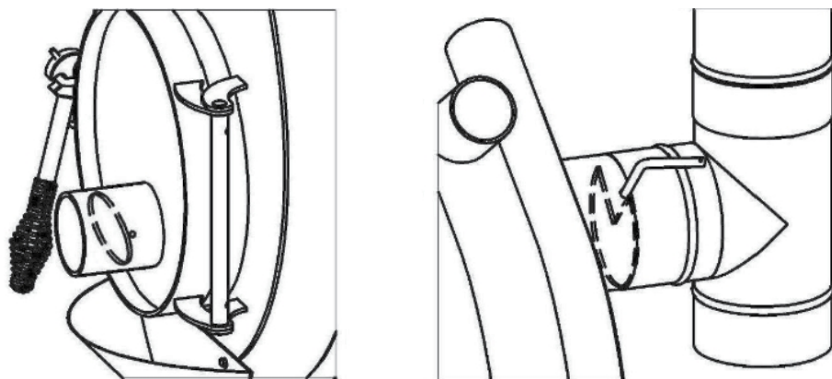


Figure 12. Position of the sliders in main (economy) mode

With the draft and gas regulators fully closed, the furnace has the highest efficiency and the longest operating time.

Change the position of both controls to adjust the desired burn intensity. Their position is freely adjustable and depends on the quality of the firewood (density, moisture content), the construction of the firebox (height, number of knees), weather conditions (air pressure, wind), etc.

**NOTE!** Intense combustion mode is not the main mode of operation of the oven and it is not recommended to use it continuously as it will significantly reduce the lifetime of the product and the safety of the heat-resistant coating is not guaranteed.

Before adding fuel, switch the oven to the intensive combustion mode; first open the gas valve fully (i.e. open the flue gas outlet), then, after 2-3 minutes, smoothly open the damper (i.e. increase the combustion air supply) and only then open the oven door. Add fuel, close the door and set the regulators to the previous position.

Allow the fuel to burn out completely and wait until it has cooled before removing the ash. Do not remove the ash completely. Always leave a layer of ash up to 50 mm high (approximately to the bottom edge of the door).

The ash layer is necessary to protect the lower pipes from combustion and also provides thermal insulation to the lower pipes to create convection currents.

Do not use the stove while:

- leave the stove unattended or under the supervision of children;
- place fuel and other combustible substances and materials directly in front of the oven door opening;
- store unquenched charcoal and ash in metal containers placed on a wooden floor or a base of combustible material;
- drying and storing clothes, firewood, other combustible objects and materials in the stove;
- use firewood longer than the size of the hearth;
- keep the oven hood open when heating the oven;
- use ventilation and gas ducts as flues;
- place the heater flue on a burning surface;
- attach antennas for televisions, radios, etc. to the baffles;
- keep a fuel reserve in the room that exceeds the daily requirement.

## 9

### TRANSPORT AND STORAGE

The oven may be transported by any type of means of transport in accordance with the rules applicable to the type of transport.

The transport conditions of the furnace, depending on climatic factors, correspond to class 8 of storage conditions according to GOST 15150 - 69, and to class C of mechanical factors according to GOST 23170 - 78.

The oven must be stored in a warehouse.

The warehouse must be stocked with primary fire-fighting equipment in accordance with the requirements of the "Fire Safety Regulations".

The storage conditions of the furnace, depending on the influence of climatic factors in the environment, comply with class 4 according to GOST 15150 - 69.

<b>ERRORS</b> External manifestations	<b>Reasons</b>	<b>Method of elimination</b>
Stove does not heat, smoke, no draft	<p>Insufficient height of the chimney.</p> <p>Lack of thermal insulation on the outer parts of the chimney.</p> <p>The chimney becomes clogged with soot and ash. Vertical deflection of pipes up to 300 , more than 1 m.</p> <p>Use of asbestos pipes for chimneys.</p> <p>Connecting the chimney to the masonry.</p>	<p>Install the e chimney according to Table 1, point 3.</p> <p>Isolate bellows compartments outside the room.</p> <p>Clean the bell.</p> <p>Fire a fire around the construct.</p> <p>See point 6.</p> <p>See point 6.</p>
Weak heating capacity, smoke	<p>Insufficient combustion air, tightly closed windows and doors.</p> <p>The chimney becomes clogged with soot and ash.</p>	<p>Open a window. Ventilate the room, see point 8.</p> <p>Clean the bell.</p>
Pink spots appear on the fins	<p>Condensation due to the temperature of the refrigerant gases:</p> <ul style="list-style-type: none"> <li>• cold air intake;</li> <li>• the use of wet or damp firewood;</li> <li>• a non-isolated chimney.</li> </ul>	<p>Eliminate air intake through the purge vent and seal the purge vents.</p> <p>Isolate bellows compartments outside the room.</p> <p>Use only dry wood shavings.</p>
Insufficient temperature during use	<p>Use of wet firewood.</p>	<p>Use only dry wood shavings.</p>
Smoke from heat exchanger tubes	<p>Absence of a pit.</p> <p>Insufficient height of the chimney.</p> <p>Lack of thermal insulation in the bellows on the outer parts. Vertical deflection of pipes up to 300 , more than 1 m.</p> <p>Use of asbestos pipes for chimneys.</p> <p>Connecting the chimney to the masonry.</p> <p>The chimney is clogged with soot.</p>	<p>Install the e chimney according to Table 1, point 3.</p> <p>Isolate bellows compartments outside the room. The chimney needs to be designed around.</p> <p>See point 6.</p> <p>See point 6.</p> <p>Clean the bell.</p>
Smoke when opening the oven door	<p>The oven did not empty. Lack of draught.</p>	<p>See point 8. Clean the ejector.</p>
Smoke exit from the regulator	<p>Lack of canister insulation.</p> <p>Insufficient combustion air, tightly closed windows and doors.</p>	<p>Isolate bellows compartments outside the room.</p> <p>Open the window, air the room.</p>