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**BURNiT**  
by **SUNSYSTEM**

**PyroBurn Wood-Gasifying Boiler  
Lambda series**

**TECHNICAL PASSPORT  
INSTALLATION and OPERATION MANUAL**



*Version i0.1.7*







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## 1. EXPLANATION OF SYMBOLS AND SAFETY INSTRUCTIONS

### 1.1. Explanation of symbols

 **CAUTION!** - Important recommendation or warning concerning safety conditions during installation and operation of the heating boiler

 **DANGER!** - fault or improper use may cause injury or be hazardous to the life of humans or animals.

 **FIRE HAZARD!** - fault or improper installation and operation may cause fire.

 **INFORMATION** - Important information on the proper operation of the product.

### 1.2. Requirements to boiler installation room

This manual contains important information for the safe and correct installation, start-up and trouble-free service and maintenance of the heating boiler.

The heating boiler can be used for heating rooms only in the manner described in this manual.

Take note of the boiler type information indicated on the factory sticker and the technical data provided in chapter 12 in order to ensure proper operation of the product.


#### 1.2.1. Instructions to boiler installer


During installation and operation, the country-specific requirements and regulations must be observed:

- local building regulations on the installation, air supply and exhaust gas extraction as well as chimney connection.
- regulations and norms concerning the fitting of the heating installation with

safety devices.

 **Use only original BURNiT parts**


 **DANGER of intoxication, suffocation.**  
*Inadequate inflow of fresh air in the boiler room may result in dangerous leak of exhaust gases during boiler operation.*  
 - Make sure the air inlets and exhaust gas outlets are not clogged or closed.  
 - If faults are not remedied immediately, the boiler must not be operated, and the user must be provided with written instructions on the fault and the hazard it entails.


 **DANGER of fire when burning flammable materials or liquids.**  
 - Flammable materials/liquids must not be left in immediate proximity of the heating boiler.  
 - Indicate to the installation user the allowed minimum clearances from surrounding objects.

**Customer must undergo boiler operation/maintenance training by authorized installer/service shop.**

 **It is mandatory to assure a backup power generator of corresponding rated power! (see 12.3)**

#### 1.2.2. Instructions to installation user

 **Customer must undergo boiler operation/maintenance training by authorized installer/service shop.**

 **It is mandatory to assure a backup power generator of corresponding rated power! (see 12.3)**

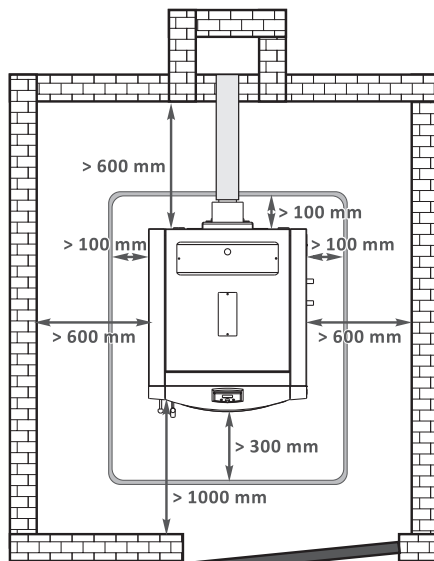
**DANGER of intoxication or explosion**  
*Toxic gases may be discharged when burning waste, plastics, liquids.*

- Use only the fuels indicated in this manual.
- In case of danger of explosion, ignition or discharge of exhaust gases in the room, stop the heating boiler from operation.

**CAUTION! Danger of injury / damage of installation due to incompetent operation.**

- The heating boiler must be serviced only by persons familiar with the operation manual.
- As a user, you are only allowed to start the boiler up, adjust the temperature of the boiler, shut the boiler down and clean it.
- Unattended children must not be allowed to access a room housing a running boiler.

The minimum distance from the heating boiler or exhaust gas pipe to objects or walls must be at least 200 mm.



**Diagram 1**  
**Recommended clearances between the boiler and walls.**

**Safety rules for user operation:**

- Operate the heating boiler at a maximum temperature of **85°C**, and to that end you must regularly inspect the boiler room.
- Do not use flammable liquids to ignite the fire or increase boiler's output .
- Collect the ash in a fire-proof container with a lid.
- Clean the heating boiler surface using non-flammable agents only.
- Do not place flammable objects onto the heating boiler or in its proximity. (see diagram 1 for the minimum clearances)
- Do not store flammable materials in the boiler room.

**1.2.3. Minimum clearances for installation and combustibility of building materials**

The applicable minimum clearances in your country may differ from the ones specified bellow. Please, consult your installer.

For general safety considerations, we recommend that the boiler be placed on a foundation with height of 100 mm made of class A material, see table 1.

**Table 1**  
**Combustibility of building materials**

<b>Class A</b> – non-combustible	Stone, bricks, ceramic tiles, baked clay, solutions, plaster free of organic additives.
<b>Class B</b> – hard combustible	Gypsum board panels, basalt fiber needled felt, fiberglass board, AKUMIN, Izomin, Rajolit, Lignos, Velox, Heraklit.
<b>Class C1/C2</b> Medium combustible	Wood beech, oak Wood softwood, layered wood
<b>Class C3</b> – easy combustible	Asphalt, cardboard, cellulose, tar, fiberboard, cork, polyurethane, polyethylene.

## 2. PRODUCT DESCRIPTION

PyroBurn Lambda boilers are designed to burn solid fuel – wood or wood briquettes class B on the principle of wood gas generation using a fan. The body of the boiler is manufactured as welded sheet-steel structure. It comprises a loading chamber which in its lower part is equipped with ceramic nozzle with longitudinal slot through which passes the wood gas produced. Below it is the combustion chamber where the wood gas burns, lined with ceramic refractory pieces. On the front, in the upper part of the boiler is located the upper door for loading the upper chamber with wood, and in the lower part is the combustion chamber door. Open door sensor detects when boiler door is open and activates fume extractor fan on full speed (100%). Fume extractor fan draws smoke from the chamber to the chimney via back-side upper chamber opening. Open door sensor function is to prevent boiler room from fume pollution when reloading. The boiler body is heat-insulated on the outside with mineral wool inserted under the housing. Smart MCU controller is build-up in boiler upper part.

- **Design.** Boiler body is made of high-quality boiler steel sheets with thickness of 6 mm for the combustion chamber and 4 mm for the water jacket. The built-in refractory ceramic pieces help ensure the uniform transfer of the heat produced to the water jacket and protect the steel walls from the high temperatures (up to 1200 °C).

- **Pyrolytic combustion.** Wood in the loading chamber burns (above 580°C) and releases wood gas rich in carbon compounds. When combined with the primary air it forms a burnable mixture and is then routed to the nozzle in the

combustion chamber. In the nozzle the mixture is enriched with secondary air and is self-ignited in order to reach the combustion chamber at 1200°C. Before leaving the boiler body, flue gases pass through flue pipes where they lose their heat and cool down to 150°C. Pyrolytic combustion helps achieve efficient wood burning with minimum production of ash.

- **Effective.** Thanks to the pyrolytic principle of wood burning, the boiler achieves efficiency of more than **92%**. The water jacket envelops the entirety of the combustion chamber in order to utilize maximum amount of the heat produced. On the outside, the boiler body is insulated by means of 50 mm layer of mineral wool thermal insulation.

- **Intelligent microprocessor control unit**  
The PyroBurn Lambda boiler is equipped with a hi-tech reliable controller capable of managing complex heating installations. The controller manages the combustion process via permanent monitoring of oxygen levels in exhaust gases, their temperature as well as the boiler temperature. Depending on those values the controller adjusts air intake into the primary and secondary combustion chamber. The control unit is capable of managing various heating circuits whereas it has 3 types of heating installations embedded in its logic. Thanks to the integrated lambda sensor the combustion process is optimized to such an extent that boiler efficiency exceeds 92%, and exhaust gas emissions conform to strictest EU standards.

The microprocessor control is able to control one heating circuit and one DHW circuit through the built-in terminals for connecting circulation pumps and DHW sensor.

- Lambda sensor for accurate combustion process management
- Fuel loading door
- Cleaning door (combustion chamber)
- Actuator-driven air flaps for air intake management
- STB – emergency thermostat
- Flue gas sensor
- Safety heat exchanger.
- Open door sensor and fume extraction opening
- Safety devices of the boiler

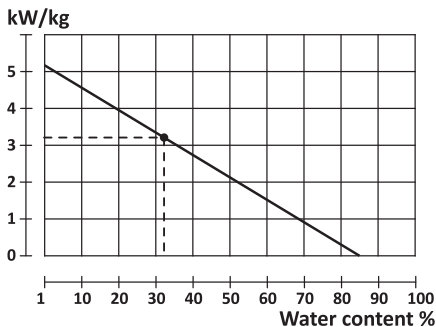
The boiler is equipped with 4 independent overheating protections.

1. Upon reaching 90°C the controller turns the fan off and activates the pumps for domestic hot water and heating system.
2. An independent STB thermostat shuts down the fan upon reaching 95°C.
3. Emergency cooling coil integrated in the top section of the water jacket allows the connection of thermostatic valve.
4. Safety valve 3 bar

### 3. FUELS

The heating boiler can utilize only natural and untreated wood. Log length should be up to 500 mm. Pressed fuels and briquettes containing only wood may also be used. Fuel moisture content must not exceed 15-20%.

For maximum utilization of the wood heating value we recommend to use wood which has dried over a period of 1.5-2 years. High moisture content of the wood decreases its heating value which in turn reduces boiler output.



**Diagram 2**  
*Relation between wood heating value and water content.*

**Table 2**  
*Heating value of the most common wood species*


Wood species	Energy contained in 1 kg		
	kcal	kJoule	kWh
<b>Spruce</b>	3900	16250	4,5
<b>Pine</b>	3800	15800	4,4
<b>Birch</b>	3750	15500	4,3
<b>Oak</b>	3600	15100	4,2
<b>Beech</b>	3450	14400	4,0

### 4. TRANSPORTATION OF THE BOILER

We recommend to transport the heating boiler to the installation site in its packaging placed on the pallet. During transport and installation, depending on the weight, suitable safety devices should be used in accordance with Directive 2006/42/EC.

When transporting items weighing more than 30 kg, the use of pallet jack, fork truck or other hoisting devices is a must.

The boiler is safely secured by means of anchor fittings to a wooden pallet of sizes A, B, C. It has then been stretch-wrapped to protect the housing from scratching and dust buildup. The last element of the packing is a height D cardboard box. The cardboard box protects the boiler from ambient conditions during transport.

 **Important: When installing the boiler, the wooden pallet onto which the boiler is placed must be removed by unscrewing the bolted connections using flat ring wrench S13.**

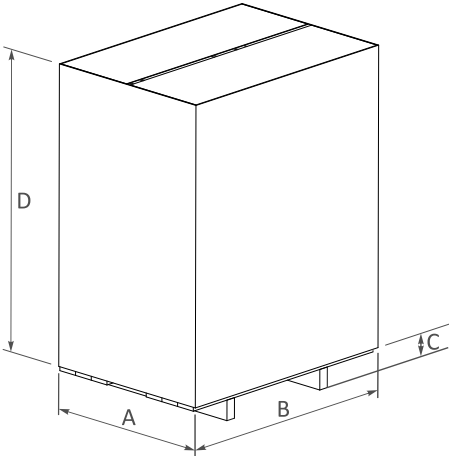


Diagram 3


Model	A	B	C	D	kg
PB 25 Lambda	850	1200	120	1360	509
PB 30 Lambda	850	1260	120	1470	627

### 5. DELIVERY OF THE BOILER

- Inspect the integrity of the packaging upon delivery.
  - Check whether all components have been delivered to you. Boiler scope of delivery includes:
    - 1) Boiler body with boiler doors
    - 2) Safety valve 3 bar.
    - 3) Ash pan
    - 4) Cleaning brush for flue pipes
    - 5) Installation and operation manual
    - 6) Service booklet and Warranty card
- If any of the above items are missing, contact your supplier.

- You must remove the polystyrene blocks placed in the combustion chamber prior to putting the boiler into operation.

### 6. ASSEMBLY OF THE HEATING BOILER

 **The assembly, installation and set-up of the boiler must be performed by a technician authorized for such operations. Installer must indicate to the user of the installation the minimum clearances from flammable materials and liquids.**

#### 6.1. Requirements:

- Boiler room must be frost-proof;
- Boiler room must allow for continuous access of air necessary to maintain combustion;
- Boilers must not be placed in inhabitable rooms;
- All boiler rooms must have correctly calculated vent depending on the boiler output. The vent must be protected by means of a net or grate.

The size of the vent is calculated according to the formula:

$$A = 6,02 * Q$$

- where:

**A** – area of the vent in cm<sup>2</sup>,

**Q** – boiler output in kW

- Remove the packaging without polluting the environment;
- Observe building supervision instructions, in particular the existing Ordinance on combustion devices and storage of combustion materials, on building requirements applicable to installation sites and on ventilation;
- The boiler must be placed on a foundation whose surface area is larger than the base of the heating boiler according to diagram 1;
- The boiler must be placed in a position



which allows for the easiest possible cleaning and servicing;

- Installation must be carried out according to installation diagram 1 which shows the boiler housing;
- No objects made of flammable materials or liquids may be placed on/near the boiler;

## 7. INSTALLATION OF THE HEATING BOILER

### 7.1. Connecting the boiler to a chimney

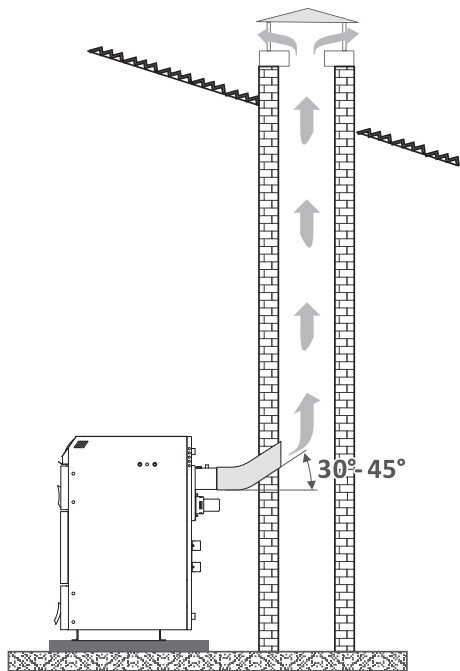


Diagram 4

Boiler-to-chimney connection must always comply with the existing standards and rules. The chimney must provide sufficient draught for evacuation of the smoke under any conditions.

The proper functioning of the chimney requires adequate sizing of the chimney

itself since the draught it produces affects combustion, boiler's output and life span. The draught created by the chimney is in functional relation to its cross-section, height and the roughness of its interior walls. No other appliance may be connected to the chimney serving the boiler. Chimney diameter must not be smaller than the flue outlet of the boiler. Flue outlet must be connected to the chimney opening. In terms of mechanical properties, the flue outlet must be sturdy and properly sealed (to avoid gas leak) and allow for easy access for cleaning on the inside. The inner section of the flue outlet must not be greater than the effective section of the chimney and must not narrow. Avoid using elbow joints.

Table 3  
Recommended minimum chimney heights

Boiler output	Chimney diameter	Recommended height
25-30 kW	Ø 160 mm	At least 9 m
	Ø 180 mm	At least 9 m
	Ø 200 mm	At least 8 m
	Ø 220 mm	At least 8 m



Data in the tables are for indicative purposes.

Draught depends on the diameter, height, uneven sections along the chimney surface and differences in temperature of combustion products and outside air. We recommend that you use chimney fitted with flue terminal. Heating specialist must calculate the precise sizing of the chimney.

### 7.2. Connecting the boiler to the mains power supply.



Such connection must be performed by a technician / service shop authorized for such operations.



### Caution! ELECTRIC SHOCK HAZARD!

- Before opening the unit: switch off the voltage and secure the unit against accidental restart.
- Observe installation instructions.

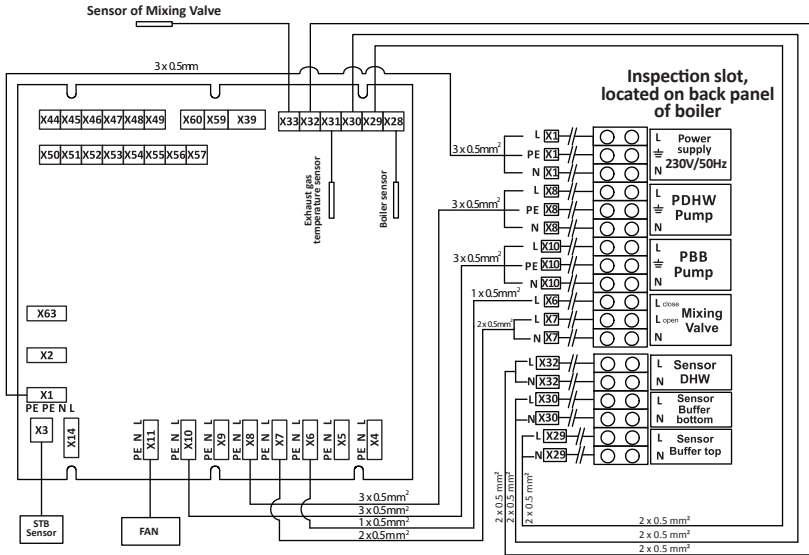
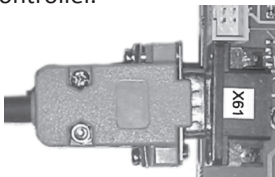


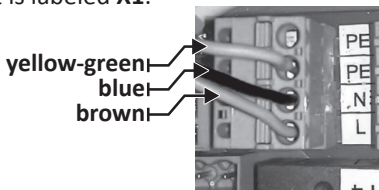
Diagram 5.

Connection of the controller with power supply and peripheral equipment.

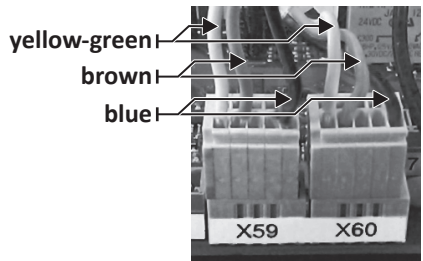
**Socket X61** - used to connect the display to the controller.



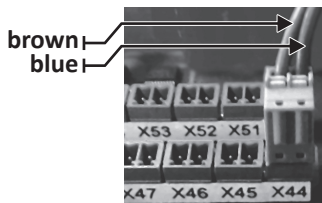
Next photo shows how to connect the mains power supply to the controller. Socket is labeled **X1**.



**Socket X59** is for the power supply cable of the primary air intake actuator. **Socket X60** is for the power supply cable of the secondary air intake actuator.

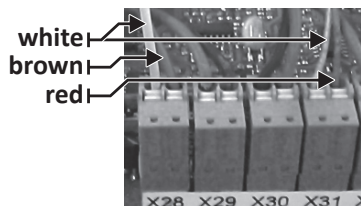


**Socket X44** serves to connect the open door sensor.

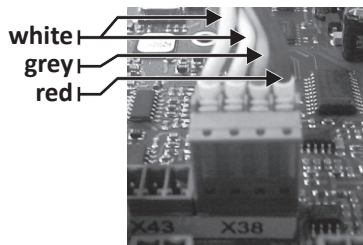


**Socket X28** serves to connect the temperature sensor inside the boiler water jacket.

**Socket X31** serves for the sensor reading the temperature of exhaust gases.



**Socket X38** serves to connect the wires of the lambda sensor.



The boiler must be connected to a 220V / 50Hz mains using a cable and a plug. The boiler must be placed in a position which allows for unobstructed access to the power supply plug. Dismount the inspection cover on the back side of housing.

Using a screw driver, connect the power supply and the external components (pump for the heating circuit and domestic hot water pump). Make sure you have connected the external components properly according to the enclosed wiring diagram.

Create solid connection with the electrical

mains which complies with the local regulations.



**It is mandatory to assure a backup power generator of corresponding rated power! (see 12)**

*Table 4*

Problem	Prevention
<b>Fire hazard!</b> Hot parts of the boiler may damage electrical conductors	Make sure all conductors are placed in the required cable guides and pass over the thermal insulation of the boiler.

### 7.3. Connecting the boiler to the heating installation.



**Such connection must be performed by a technician / service shop authorized for such operations.**

When the boiler is connected to a heating system, it is mandatory to install a 3 bar relief valve and expansion vessel.

No shut-off fittings may be installed between the relief valve, expansion vessel and boiler.



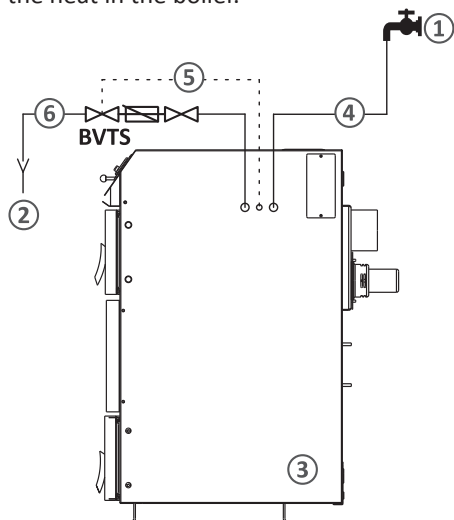
**It is mandatory to install a three-way valve (Laddomat or similar) or a four-way mixing valve which to ensure that the temperature of the heating medium fed into the boiler from the heating installation is at least 65°C.**

#### 7.4. Connecting the safety heat exchanger



Such connection must be performed by a technician / service shop authorized for such operations.

The heating boiler is equipped with safety heat exchanger (cooling circuit). It connects to the water system through a thermostatic valve. In case of overheating, the thermostatic valve feeds in cold water from the water mains which passes through the heat exchanger and absorbs the heat in the boiler.



1. Water supply network (pressure 6-10 bar)
2. Drainage (sewerage)
3. Boiler WBS Active
4. Safety heat exchanger inlet
5. BVTS valve sensor
6. Safety heat exchanger outlet

Diagram 6

The water is then discharged into the sewage system. This arrangement ensures safe evacuation of the excess heat without the need for additional energy. This guarantees that the water in the boiler will not exceed the maximum safe level of 95°C.

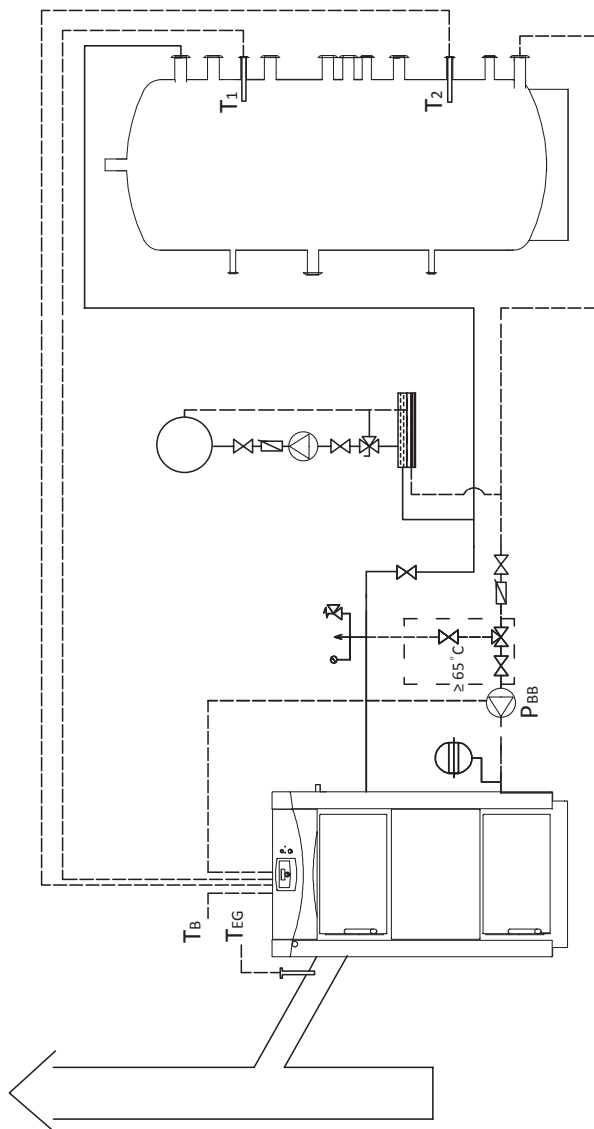
The minimum operating pressure of the cooling water in the safety heat exchanger must be within the range 2 - 10 bar.

A flow rate of at least 12 l/min is required. Connect the safety heat exchanger according to the hydraulic diagram using thermostatic valve. Install a filter on the inlet before the thermostatic valve.

#### 7.5. Connection diagrams



Such connections must be performed by a technician / service shop authorized for such operations.



**Diagram 7.**

**Connection of PyroBurn Lambda boiler to P type buffer tank and three-way valve.**

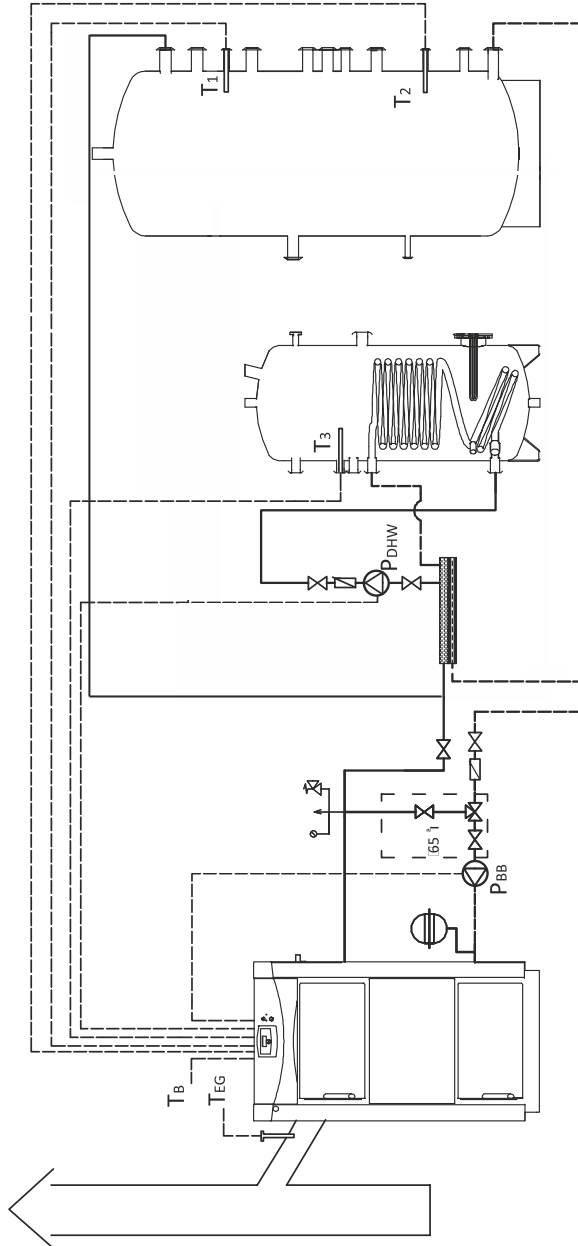
**Corresponds to BUFFER SCHEME 00 of the controller.**

**/\* An extra thermostat reads the temperature inside the buffer tank and upon reaching the set temperature switches on or off the central heating circuit pump./**

**IMPORTANT!** Instead of a three-way valve Ladomat referred to the scheme can be used electric three-way mixing valve that can be operated from the boiler controller.



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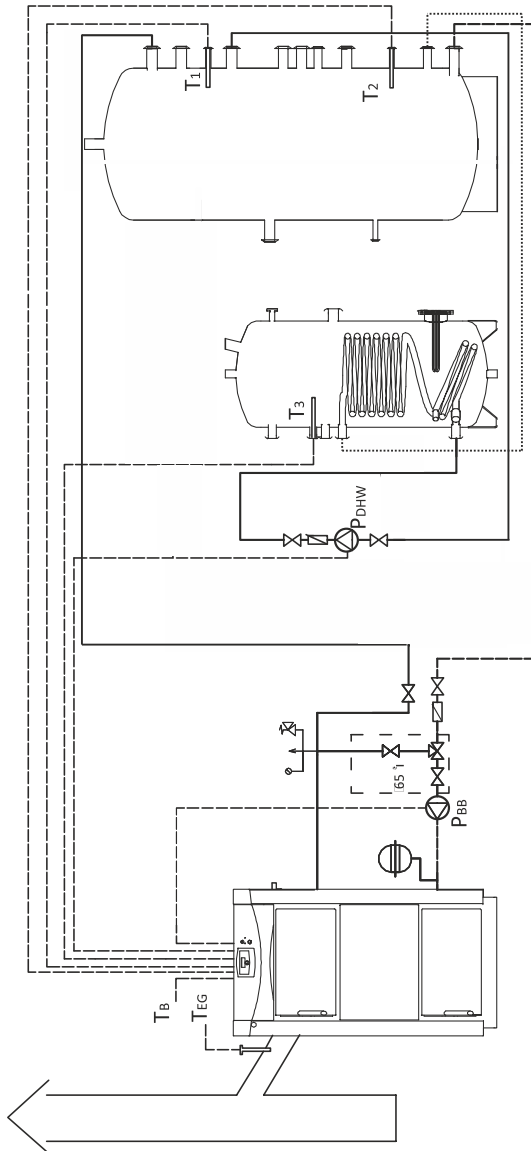


**Diagram 8.**

**Connection of PyroBurn Lambda boiler to solar tank SN, buffer tank P and three-way valve.**

**Corresponds to BUFFER SCHEME 01 of the controller.**

*/\* An extra thermostat reads the temperature inside the buffer tank and upon reaching the set temperature switches on or off the central heating circuit pump./*



**Diagram 9.**

**Connection of PyroBurn Lambda boiler to combi tank KSC2 and three-way valve.**

**Corresponds to BUFFER SCHEME 02 of the controller.**

*/\* An extra thermostat reads the temperature inside the buffer tank and upon reaching the set temperature switches on or off the central heating circuit pump./*

**IMPORTANT!** Instead of a three-way valve Ladomat referred to the scheme can be used electric three-way mixing valve that can be operated from the boiler controller.



### 8. FILLING THE HEATING INSTALLATION

Table 5

Problem	Prevention
Possible installation damage due to strains in the material caused by temperature differences.	Fill the heating installation only in cold conditions (inlet temperature must not exceed 40 °C).
Danger of installation damage due to accumulation of deposits Condensate formation and tar deposits may shorten boiler's operational life.	<ul style="list-style-type: none"> <li>- Do not operate the heating boiler for a long period of time in partial load mode</li> <li>- The temperature at the boiler inlet must not be less than 65°C, boiler water temperature must be between 75°C and 85°C.</li> <li>- Use the boiler for a short period to heat warm water in the summer.</li> </ul>

### 9. BOILER OPERATION

#### 9.1. Loading the boiler

When lighting the boiler for the first time, a condensate is formed which is later drained (this is not a fault in the boiler).

When burning moist wood, the boiler stops working effectively and fuel consumption increases significantly, desired output is not achieved and the operational life of the boiler body and the chimney is shortened.

Fuel is loaded in the upper combustion chamber and it is recommended is to load logs of length equal to the combustion chamber length and stack them tight inside with least possible air gaps.

#### Recommendations for fuel loading:

**1. Keep air openings (upper chamber) clean from ash /Diagram 10/.**

Clogging of air openings may affect boiler operation.

#### 2. Stacking firewood in boiler chamber.

Wood in the chamber must be neatly arranged and not thrown, as is illustrated. This is a top plan view of the boiler chamber /Diagram 11/

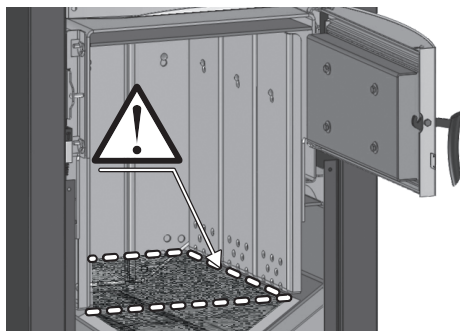


Diagram 10

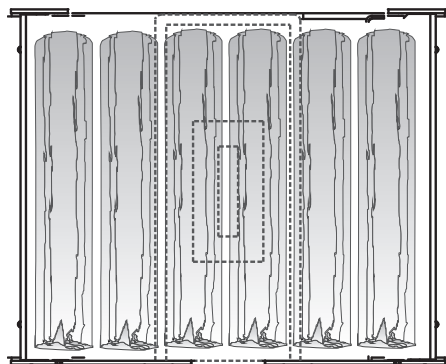


Diagram 11


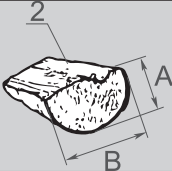
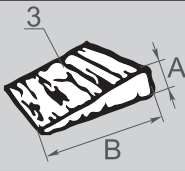
An important condition for the smooth running of the pyrolysis combustion is the upper chamber to be well tight with fuel, i.e. with minimal air gaps between the wood pieces.



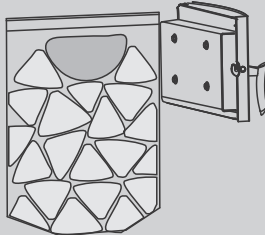
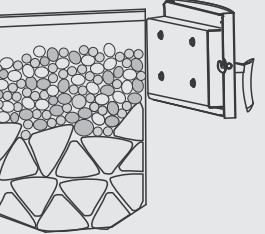
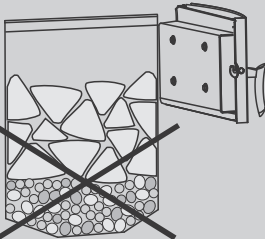
When stacking the wood in the firebox keep clear the opening between upper and lower chambers.

The entry of a large log in this opening can affect the pyrolytic combustion

**Recommended approximate dimensions of firewood:**

Type of firewood			
A, cm	8 - 10	7 - 9	5
B, cm	12 - 15	13 - 16	20

**3. Combustion of disproportionate firewood:**

<p><b>3.1. Loading of big and disproportionate firewood</b> Place disproportionate firewood upon an already stacked standard size firewood at upper part of boiler chamber</p>	
<p><b>3.2. Loading of small brushwood, pieces of wood and joiner waste.</b> We recommend first to arrange standard sized firewood /at least 3 lines/ and then stack all the little pieces of wood and disproportionately on them. Stack the firewood tight inside with least possible air gaps. <b>Remember the rule: Smallest and fine pieces of wood should be placed last!</b></p>	
<p><b>3.3. Never load small brushwood, pieces of wood and joiner waste in the lower part of chamber! Prohibited the burning of plastics and other paper packaging. This can affect to blockage of boiler.</b> Prohibited the burning of flammable substances or mixtures: diesel, gasoline, gunpowder, turpentine, paint and the like. Danger of explosion.</p>	

## 9.2 Combustion adjustment

Bottom chamber door as well as all inspection openings must be closed and sealed. Inside the boiler there should not be any fire or smoke. Press **F4** key to start calibration of lambda sensor. Over a period of 2-3 min. the lambda sensor is calibrated and can shift on to ignition of the boiler. This calibration is only necessary before igniting the boiler. Once the boiler has entered work mode no calibration is required between reloads.

To start ignition of the boiler press **F1** key and load the boiler with the initial dose of twigs and small wood, then kindle them. It is necessary to make a good glow bed in order that firewood loaded in the combustion chamber subsequently makes a good fire. During the glow-making period it is necessary to hold the upper door slightly open to allow exhaust gases be suctioned through the slit in its top part. Once you have the glow bed ready, top up with firewood to fill the entire volume of the combustion chamber.

The suction fan in the rear provides for the maintenance of combustion process in the boiler. The inflow of fresh air to the boiler is made possible by 2 flaps operated by motor actuators. An important condition is that flaps be well centered before the actuator is fastened to the respective flap. Sustainable combustion process depends on the proper adjustment of the flaps and the correct settings of the controller.

## 9.3. Requirements concerning cleaning and maintenance of the boiler.



### Caution! Hot surfaces.

*Before cleaning the boiler, make sure the fire in it has died out and the boiler has cooled down.*

### 9.3.1. Cleaning and maintenance by customer.

- Exploitation of the boiler and the type

of used fuel determine how often have to clean the boiler residues from the combustion process.

- We recommend cleaning the ashes from the upper chamber of the boiler to be done **every 3 - 4 days**. In the case where ashes has reached faster the level of primary air openings, then ashes must be cleaned immediately (see diagram 10). Do not let the ashes clog these holes.
- The ash accumulates in lower chamber as well. Clean ash when its level **reaches 1/3** of lower chamber volume (Diagram 13). Uncleaned ash affects boiler operation.

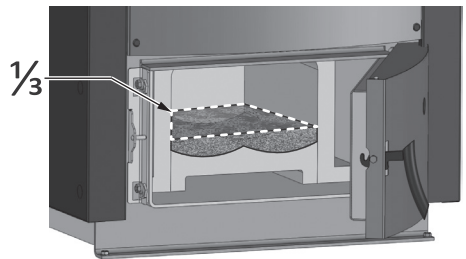


Diagram 12

### 9.3.2. Cleaning and maintenance by authorized installer / service

Boiler cleaning and maintenance must be performed by a technician / service shop authorized for such operations. Before the beginning of heating season must be done inspection and maintenance of following boiler parts:

#### 1. Adjustment of boiler doors again.

Make sure the doors seal well. If necessary, replace insulation rope at the door with a new one. Make sure that the new insulating rope is placed correctly, following exactly the geometry of channel. Pull the rope well to the door corners by using a screwdriver.

Tightly closing the doors is controlled by hexagonal plate (A) located under each hinge nut (B).

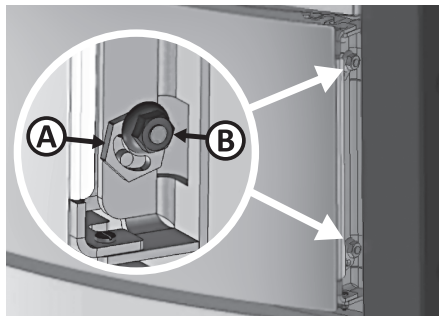


Diagram 13

### 2. Cleaning of the fan in back boiler part.

Use a switch S13 to remove the nuts (4 pieces) that secure fan plate. Disassemble the fan with plate. It is possible that the plate is stuck to the gasket. Thoroughly clean the fan turbine by using a brush. Remove the ash and soot accumulation in the place where the fan was mounted. Replace the plate gasket with new one. Assemble the fan back to the boiler.

### 3. Cleaning of boiler upper chamber.

Disassemble protective steel plates from the upper chamber and clean the area behind them.

Thoroughly clean the ash using a paddle brush and a vacuum cleaner (hoover). Assemble protective steel plates back to the upper chamber. Make sure they are properly seated.

#### Dismantling of the protective plates

1. The plate is rivet-mounted.
2. Slide the plate upwards so as to catch the rivet in the wide portion of the slot.
3. Pull the released plate away.

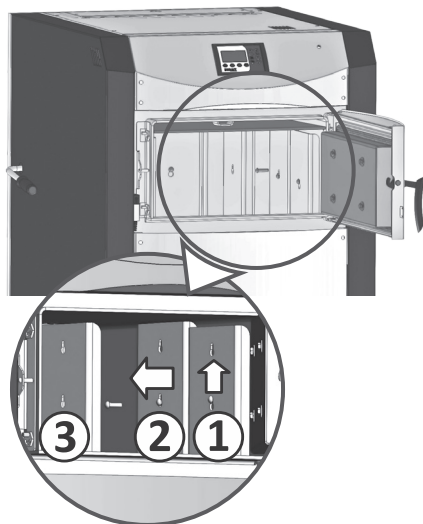


Diagram 14

### 4. Cleaning of boiler lower chamber / Diagram 15/.

Disassemble ceramic elements from lower chamber. Follow the sequence of diagram.

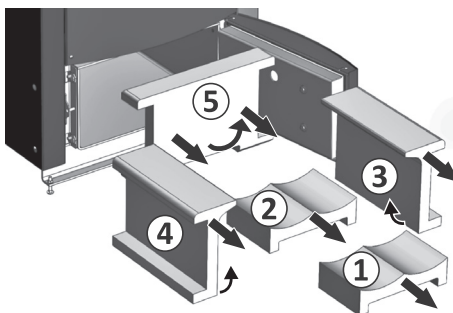


Diagram 15

- Disassemble the bottom ceramic part of combustion chamber (1 and 2).
- Disassemble both ceramic sides by smooth rotation of the detail (3 and 4).
- Disassemble back ceramic part: step one- pull the bottom part forward; step two -twist the detail and take it out (5).

- Thoroughly clean the lower chamber.
- Assemble the ceramic elements back into the lower chamber in reverse order – back (5), both sides (3 and 4) and bottom (2 and 1).

### 5. Cleaning of fume exhaust tubes of boiler.

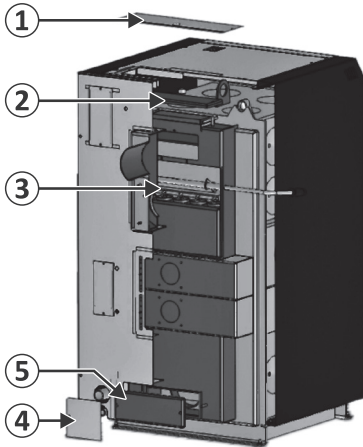


Diagram 16

- Upper cleaning opening is located on top of boiler. It is protected by two covers. Unscrew the two wing nuts. Disassemble the decorative lid of upper cleaning opening on boiler casing (1)
- Unscrew the two wing nuts. Disassemble the lid of upper cleaning opening on boiler body (2)

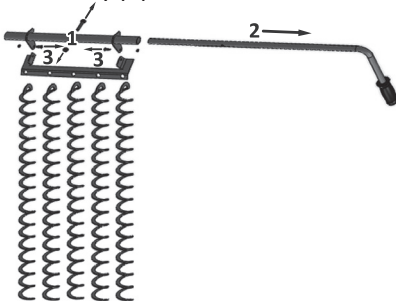


Diagram 17

- Remove the cleaning system (diagram 17) using a wrench S13 and S7. Thoroughly clean fume exhaust tubes (3) of soot deposits. Use the brush from equipment delivery.
- Lower cleaning opening is located behind the boiler, low down. It is protected by two covers. Unscrew the two wing nuts. Disassemble the decorative lid of lower cleaning opening on boiler casing (4)
- Lower cleaning opening. Unscrew the two wing nuts. Disassemble the decorative lid of lower cleaning opening on boiler casing (5).
- Remove soot accumulation after the cleaning of fume exhaust tubes
- Assemble the lid of upper cleaning opening on boiler body (2). Make sure the lid is placed correctly and tight.
- Assemble the decorative lid of upper cleaning opening on boiler casing (1).
- Assemble the lid of lower cleaning opening on boiler body (5). Make sure the lid is placed correctly and tight.
- Assemble the decorative lid of lower cleaning opening on boiler casing (4).

### 9.4. Important recommendations for long-lasting and correct operation of the boiler

- Please perform periodic maintenance of the boiler as described in instructions, section 9.2.
- The allowed moisture content of the fuel used must not exceed 15% ÷ 20%.
- Gas emission in the combustion chamber may result in the formation of tar and condensate (acids). Therefore, a mixing valve must be installed and it must be adjusted so that the minimum temperature of the water returning in the boiler is 65°C. This extends the life span of the boiler and its warranty. The operating temperature of the water in

the boiler must be within the 80 ÷ 85°C range.

- It is not recommended to operate the boiler for a long period of time at an output lower than 50%.
- When using circulation pump, boiler operation must be controlled via a separate thermostat in order to ensure the prescribed rated temperature of the return water.
- The eco-friendly operation of the boiler is realized at rated output.

- It is recommended to install a storage/ buffer tank and pump type group with thermostatic mixing valve to the boiler. The capacity of the storage tank is 55 L of water per 1 kW installed boiler power.
- Maintenance and operation training for the boiler is conducted by an authorized installer.



**Failure to observe the installation and operating requirements described in the manual and the service booklet voids the warranty.**

**Table 6. TROUBLE-SHOOTING TABLE**


<b>Installation damage</b>	
<b>Cause</b>	<b>Solution</b>
1. Due to unsealed connections	1. Install the connecting piping strain-free to the boiler connections. Connect the heating installation outlet to connection B. Connect the heating installation inlet to connection A. Mount the cock Y included in the set item. 12.3. at the drainage outlet
2. Due to accumulation of deposits. Condensate and tar formation may reduce the performance and life of the heating boiler. The temperature at the boiler inlet must not be less than 65°C, boiler water temperature at the outlet must be between 80 and 85°	2. It is mandatory to install a three-way thermostatic valve which will prevent the temperature dropping under 65°C at the inlet. - In order to increase the operational life of the boiler it is recommended to install a buffer vessel with capacity of 55 l per 1 kW of installed power
3. Due to freezing	3. If the heating installation, including the piping network, has not been built frost-proof, we recommend that you fill the heating installation with a liquid which has low freezing point and corrosion protection and antifreeze agent
<b>Output is too low</b>	
<b>Cause</b>	<b>Solution</b>
1. Insufficient draught	1. Check chimney condition and measure draught. (must be performed by an authorized service)
2. Heating value of the fuel is too low.	2. Make sure you use sufficiently dry fuel. When using fuel with high moisture content, after the reloading the boiler may burn for some time at significantly lower output level until the fuel in the combustion chamber has dried.


<p>3. Presence of soot deposits and/or tar in the flue pipes in water jacket in the back of the boiler</p>	<p>3. Clean the heat exchange surface of the flue pipes using the brush from the cleaning tools set. After the cleaning is completed, remove any soot through the inspection opening in the back of the boiler. Must be performed by an authorized service.</p>
<p><b>Boiler settings do not change. No pyrolytic combustion.</b></p>	
<p><b>Cause</b></p>	<p><b>Solution</b></p>
<p>1 Boiler doors don't close well.</p>	<p>1. Check sealing rope and replace if necessary. Boiler doors must be closed by applying light pressure in order to ensure proper sealing. Item 6.2.</p>
<p>2. Significant soot and tar deposits on the fan turbine hinder its normal operation.</p>	<p>2. Contact authorized service to carry out the cleaning the fan and its turbine. Check that the boiler does not operate for an extended period of time in reduced output mode or burn fuel with high moisture content.</p>
<p><b>Boiler water too hot, heating bodies too cold</b></p>	
<p>1. Hydraulic resistance is too high. 2. Air in the system 3. Inoperable circulation pump</p>	<p>Make sure the circulation pump has been properly selected and the heating installation is of the proper dimensions. (You must contact your installer.)</p>
<p><b>Fan is not working</b></p>	
<p>The boiler has reached the maximum set temperature.</p>	<p>Allow the boiler to cool off. After the temperature in the boiler has decreased, the draught fan restarts.</p>
<p>Significant soot and tar deposits on the fan turbine hinder its normal operation.</p>	<p>Contact authorized service for cleaning the fan and its turbine. Check that the boiler doesn't operate for an extended period of time in reduced output mode or burn fuel with high moisture content .</p>
<p>Fan is not working! The STB safety thermostat has been triggered.</p>	<p>Upon reaching a temperature of 95°C, the thermostatic safety protection device is triggered and the fan is turned off. To resume protection, remove the black cap on the front panel of the boiler and press the button on the STB-thermostat. Contact your installer to determine the cause of protection triggering.</p>
<p><b>High temperature of the boiler. Controller does not work.</b></p>	
<p>1. Fluctuating the mains. 2. Power failure.</p>	<p>It is imperative that secure the back power supply - generator, with the power! (see section 12.3)</p>


**10. CONTROLLER**


The PyroBurn Lambda boiler is equipped with a hi-tech reliable controller capable of managing complex heating installations. Combustion process is managed through permanent monitoring of oxygen levels in exhaust gases, their temperature as well as the boiler temperature. Depending on those values becomes adjusted the air intake into the primary and secondary combustion chamber. The control unit has embedded in its logic the capacity of managing three principal types of heating installations.

Thanks to the integrated lambda sensor the combustion process is optimized to such an extent that boiler efficiency exceeds 92%, and exhaust gas emissions conform to strictest EU standards.

 **ATTENTION! HIGH VOLTAGE!**  
*Make sure the regulator is disconnected from the mains before working on the power supply (cable connections, device installation, etc.)!*

 *All connection works must only be carried out by qualified electricians.*

 *Before activating the controller, measure the motor resetting efficiency, check the boiler and inspect wire insulation. During assembly, the device must be disconnected (make sure the power cord is unplugged)! Improper cable connections may damage the controller!*

 *The device may be damaged if struck by a lightning. Make sure it is unplugged during the storms.*

**10.1. Controller`s view. Explanation of buttons and indicators.**



**F1** - Ignition - (hold the button for 4 sec.).  
**F2** - Displays controller software version. Press the F2 button to display the software version



**F3** - On-Screen Menu. Pressing the F3 button displays an on-screen menu for testing the components of the boiler.



**EXHAUST FAN** - Fan of boiler  
**BUFFER PUMP** - Buffer Pump  
**DHW PUMP** - Pump for domestic hot water  
**PRI AIR FLAP** - Primary air valve  
**SEC AIR FLAP** - Secondary air valve  
**BACKW. MIXERF4** - Mixing valve for back water

**F4** - Calibration of the lambda sensor (hold the button for 2 sec.).

**Pg↑** - Go to previous page.

**Pg↓** - Go to next page.

**+ , -** - Used to adjust (increase/reduce the value of a parameter).

**Enter** - Confirm value of parameter.

**Esc** - Step back.

**↑** - Switch to a parameter up the page.

**↓** - Switch to a parameter down the page.

The menu display of the controller is composed of 2 main on-screen menus and 6 on-screen menus with parameters. In the top left corner of the display screen appears an icon symbol of the respective on-screen menu showing always in which menu you are.



**Important:** changing parameters in boiler settings is permitted to be performed only by an authorized installer. Entering wrong values for any of the parameters by the user may have negative impact on the boiler performance.

#### Parameters in main on-screen menus.

```
MAIN SCREEN: 1-3    BURNIT
ALARMNUMBER:      00
WORKING MODE:     OFF
BOILER TEMPERATURE: 015 °C
EXHAUST TEMPERATURE: 010 °C
O2 VALUE:         02.0 %
BOILERDOOR:      CLOSE ↓
```

**1. Alarm number** - Displays a possible error occurred during boiler operation. The error message goes off once the respective parameter that evoked the error message returns to its limits.

**2. Working Mode** - Indicates the actual

operation mode of the boiler.

#### 2.1 Modes of operation:

**2.1.1 OFF** - the boiler is in standby mode,.

**2.1.2 IGNITION** - The boiler is in firing-up mode. The controller follows the „**O2 VALUE ON IGNITION**“ parameter value and once it drops below the preset value, it shifts into „Burn On“ mode.

**2.1.3 Burn On** - The boiler is in ignition mode. The controller monitors the temperature and oxygen content of exhaust gases, and depending on the values entered shifts into normal working mode.

**2.1.4 Work** - The boiler is in normal operating mode. The controller monitors the temperature of coolant in boiler and the exhaust gases. It also monitors the oxygen level of exhaust gases and controls the primary and secondary air intake flaps.

**2.1.5 Burn Out** - The boiler has entered extinction mode. The boiler goes into this mode upon exhaustion of fuel and increase of oxygen level in the exhaust gases above the preset limit value.

**2.1.6 Glow** - This is the process of sustaining the glow bed inside the boiler. The controller switches to this mode when exhaust gas temperature decreases.

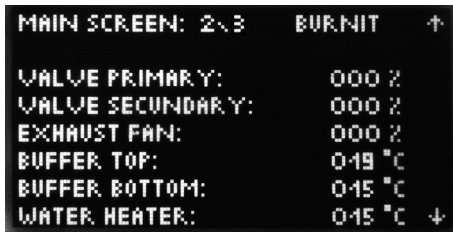
**3. BOILER TEMPERATURE** - Displays the temperature inside the boiler water jacket.

**4. EXHAUST TEMPERATURE** - Shows the temperature of exhaust gases inside the chimney.

**5. O2 VALUE** - Displays the actual value of oxygen content in exhaust gases.

**6. BOILERDOOR** - Indicates whether the boiler door is open or not (open / close).





**VALVE PRIMARY** - Shows in percentage how wide is open the primary air flap.

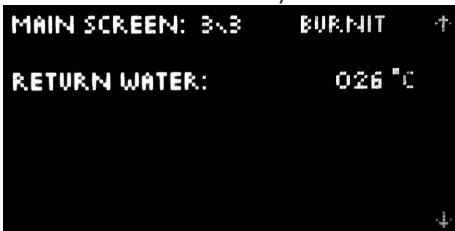
**VALVE SECUNDARY** - Shows in percentage how wide is open the secondary air flap.

**EXHAUST FAN** – Shows in percentage the performance rate of the suction fan.

**BUFFER TOP** - Displays the temperature at the top part of the buffer tank. (This parameter is active only when the selected system layout includes a buffer tank.)

**BUFFER BOTTOM** - Monitors and displays the temperature at the bottom of the buffer tank. (This parameter is active only when the selected system layout includes a buffer tank.)

**WATER HEATER** - Monitors and displays the temperature inside the domestic hot water tank. (This parameter is active when selected system layout includes domestic hot water tank.)



**RETURN WATER 026°C** – This screen displays the temperature measured by boiler return water temperature sensor.

	Depending on temperature of return water and temperature of water jacket is transmitted a signal to the external mixer. Opening and closing of the mixer is controlled by this signal. Signal type is displayed in the upper right corner of „MAIN SCREEN 1\3“. Symbol „C“ – signal for closing of the mixer. Symbol „O“ - signal for opening of the mixer.
--	---

**Explanation of on-screen parameter menus**

	<b>Caution!</b> These parameters can be set only by an authorized Professional Installer.
--	---



**BOILER SHOULD TEMP** - This parameter specifies the maximum working temperature.

**EXHAUST MAX TEMP** - This parameter specifies the maximum temperature of exhaust gases in operating mode (Work). The controller monitors the temperature and keeps the specified value via fan performance management.

**EXHAUST MIN TEMP** - This parameter sets the temperature of exhaust gas at which the controller shifts from firing up mode to operation mode.

	<b>Important:</b> In order to shift from firing up mode to operation mode it is necessary to be met the preset parameter values EXHAUST MIN TEMP and O2 GO TO REGULATION
--	--

**O2 MAX TEMPERATURE** - This parameter specifies the percentage of oxygen in the exhaust gases to be monitored and

sustained by controller in operation mode.

**02 MIN TEMPERATURE** - This parameter sets the percentage of oxygen to be monitored and sustained by controller in minimum power boiler operation mode.

**EXHAUST TEMP RISE** - This parameter sets the temperature at which the controller shifts from the loading to firing-up mode.

```
PARAMETERS: 2-6 BURNIT ↑
WAIT LAMBDA HEAT ON: → 02 MIN
02 VALUE IN IGNIT: 17.0 %
MAX IGNITION TIME: 30 MIN
02 GO TO REGULATION: 18.0 %
EXH GO TO REGULATION: 100 °C
MAX BURN ON TIME: 30 MIN ↓
```

**WAIT LAMBDA HEAT ON** - This parameter sets the calibration time of the lambda sensor. The minimum value is 2 min.

**02 VALUE IN IGNITION** - This parameter specifies the percentage of oxygen content in exhaust gas at which controller switches mode from „Ignition“ to „Burn On“.

**MAX IGNITION TIME** - This parameter specifies the maximum boiler time in „Ignition“ mode. If the boiler does not shift to „Work“ mode, there is either a fuel problem or boiler gaskets issue - please contact Your installer.

**02 GO TO REGULATION** - This parameter specifies the minimum percentage of oxygen in the exhaust gas at which controller shifts from „Burn On“ to „Work“ mode.

**EXH GO TO REGULATION** - This parameter sets the value of exhaust gases temperature above which shifts from „Burn On“ to „Work“ mode

**MAX BURN ON TIME** - This parameter specifies the maximum time in minutes for the boiler to shift from „Burn On“ to

„Work“ mode.

```
PARAMETERS: 3-6 BURNIT ↑
PRI AT REG START: → 086 %
LAMBDA EXIST: 01
TEMP DIFF START: 004 °C
TEMP DIFF STOP: 003 °C
TEMP DIFF PART: 002 °C
02 MIN GLOWPR.: 03.0 % ↓
```

**PRI AT REG START** - This parameter specifies in percentage the extent of opening of the primary air flap in firing up mode.

**LAMBDA EXIST** - This parameter specifies whether there is a lambda sensor available.

**TEMP DIFF START** - This parameter specifies the value of the temperature difference at which the boiler will start (the fan will start running).

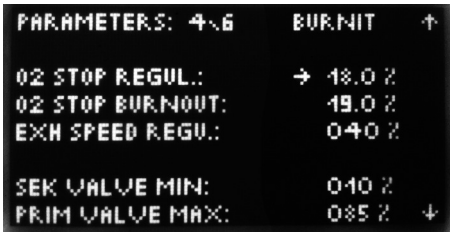
**Example:** When set to maximum temperature (**BOILER TEMPERATURE**) 85°C and preset difference is 5°C, the fan will start running at 80°C.

**TEMP DIFF STOP** - This parameter sets the temperature difference at which the boiler will stop working (the fan will stop).

**Example:** When set to maximum temperature (**BOILER TEMPERATURE**) 85°C and preset difference 1°C, the fan will stop at 86°C.

**TEMP DIFF PART** - This parameter sets the temperature difference at which the controller will start adjusting the combustion process.

**02 MIN GLOWPR** - This parameter specifies the minimum oxygen content in the exhaust gases at which the controller shifts to glow bed sustain mode.



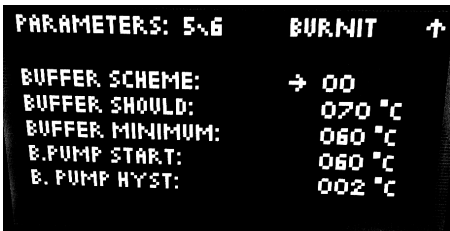
**O2 STOP REGUL** - This parameter specifies the maximum oxygen content in the exhaust gases above which the controller will shift from operation mode to extinction mode.

**O2 STOP BURNOUT** - This parameter specifies the maximum oxygen content in the exhaust gases above which controller will shift from extinction to glow bed sustain mode.

**EXH SPEED REGU** - This parameter specifies in percentage the nominal value of fan performance. During operation the fan can also work at a higher percentage than the preset.

**SEK VALVE MIN** - This parameter specifies in percentage the minimum close-in position of the secondary air flap during operation mode.

**PRIM VALVE MAX** - This parameter specifies in percentage the maximum open-up position of the air flap for entry of primary air in boiler.



**B. PUMP START** - Boiler temperature for switching on the buffer pump

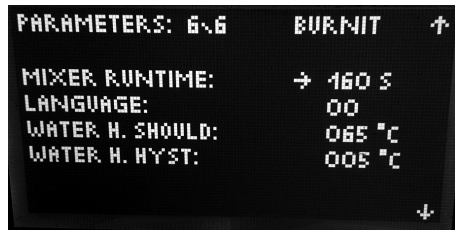
**B. PUMP HUST** - Temperature difference to B. PUMP START for switching off the

buffer pump

**BUFFER SCHEME** - This parameter specifies the typological layout scheme of the heating installation to which the boiler is connected. See section 7.5 Connection diagrams.

**BUFFER SHOULD** - This parameter specifies the maximum temperature inside the buffer tank. This menu is active only if the selected installation layout features a buffer tank.

**BUFFER MINIMUM** - This parameter specifies the minimum temperature inside the buffer tank. This menu is active only if the selected installation layout features a buffer tank.



**MIXER RUNTIME** – Use this parameter to set the run time of mixer valve, which is connected to the boiler (Connection of mixing valve to the boiler is an option and is not required for operation of the boiler).

**LANGUAGE** - From here you can change controller language.

Variant 00 - English language. Variant 01 - German language.

	A mixing valve can be operated by the controller. To connect the mixing valve to the boiler use an inspection slot, located on back panel of boiler.
--	--

**Alarms for emergency situation in the system:**

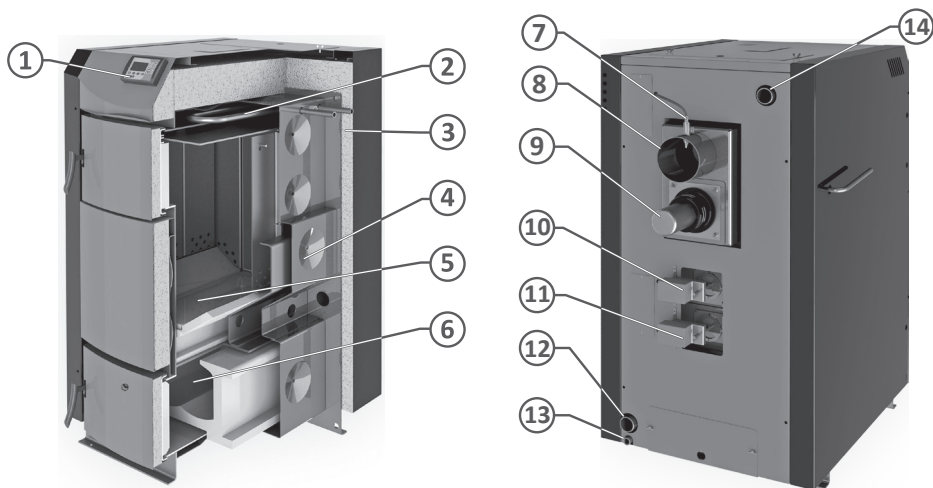
<b>ALARMNUMBER 00</b>	Press Esc to clear Alarm from the controller. When Alarm is cleared display shows ALARMNUMBER 00.
<b>ALARMNUMBER 01</b>	Boiler temperature increases over 95°C.
<b>ALARMNUMBER 02</b>	Interruption of the boiler temperature sensor.
<b>ALARMNUMBER 03</b>	Interruption of the exhaust gas temperature sensor.
<b>ALARMNUMBER 04</b>	Interruption of the return water temperature sensor.
<b>ALARMNUMBER 05</b>	Interruption of the BUFFER TOP sensor.
<b>ALARMNUMBER 06</b>	Interruption of the BUFFER BOTTOM sensor.
<b>ALARMNUMBER 07</b>	Interruption of the DHW temperature sensor.

\* **ALARMNUMBER 00** - Normal condition of the boiler.

## 11. WARRANTY TERMS

The warranty terms are described in the Service booklet included in the supply.

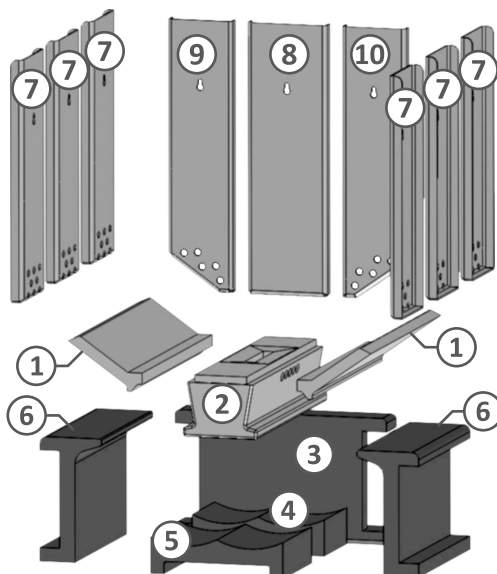
## 12. TECHNICAL FEATURES WOOD GASIFYING BOILER PyroBurn Lambda



- |  |                                |
|--|--------------------------------|
| 1. <i>Microprocessor control;</i>          | 8. <i>Chimney flue;</i>        |
| 2. <i>Safety heat exchanger;</i>           | 9. <i>Draught fan;</i>         |
| 3. <i>Thermal mineral wool insulation;</i> | 10. <i>Primary air flap;</i>   |
| 4. <i>Water jacket;</i>                    | 11. <i>Secondary air flap;</i> |
| 5. <i>Fuel loading chamber;</i>            | 12. <i>Cold water inlet</i>    |
| 6. <i>Gasification chamber;</i>            | 13. <i>Drainage</i>            |
| 7. <i>Lambda sensor</i>                    | 14. <i>Hot water outlet</i>    |

**Diagram 19**  
**Components of PyroBurn Lambda boiler**

### 12.1. Components of the combustion chamber of PyroBurn Lambda boiler



**Diagram 20**  
**Components of the combustion chamber of PyroBurn Lambda**

**Table 7**

No	Element	PB 25 Lambda		PB 30 Lambda	
		Article number	pcs.	Article number	pcs.
1	Side element of upper combustion chamber	31080031000013	2	31080031000002	2
2	Nozzle	31080031000014	1	89080031000006	1
3	Rear element of bottom combustion chamber	89081231000312	1	89080031000005	1
4	Bottom element of bottom combustion chamber - long	31080031000016	1	89080031000001	1
5	Bottom element of bottom combustion chamber - short	-	-	89080031000002	1
6	Side element of bottom combustion chamber	31080031000015	2	89080031000012	2
7	Protective steel plate	89081231000311	6	89081282000014	6
8	Protective steel plate - back	89081231000312	1	89081231000213	1
9	Protective steel plate - left	89081231000314	1	89081231000216	1
10	Protective steel plate - right	89081231000313	-	89081231000214	1

12.2. Components of the cleaning system

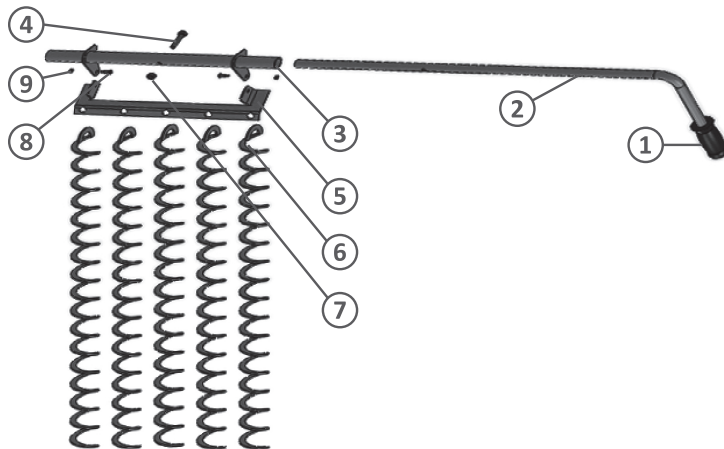


Diagram 21. Components of the cleaning system

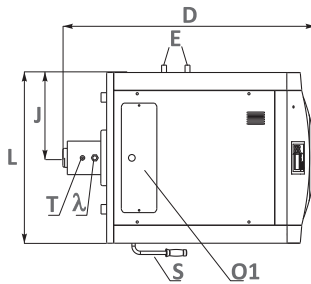
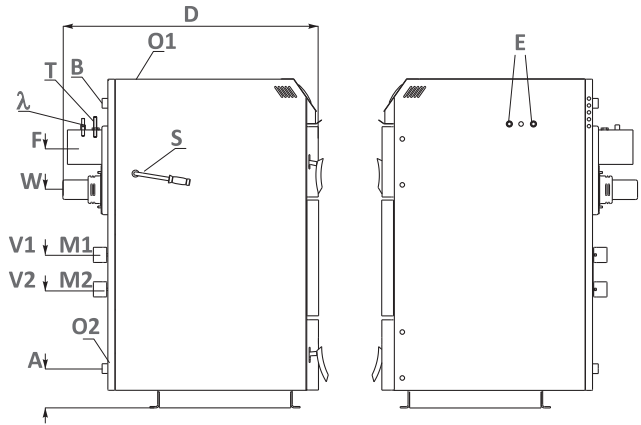
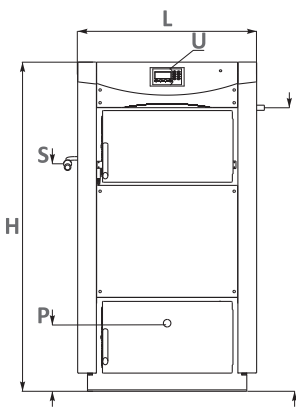
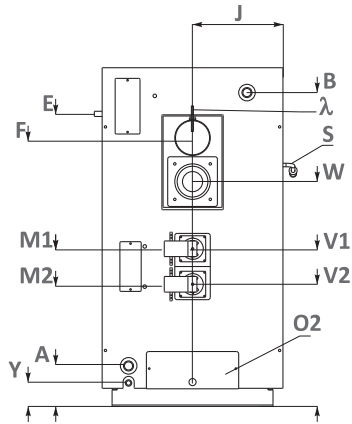
Table 8

No	Element	PB 25 Lambda		PB 30 Lambda	
		Article number	pcs.	Article number	pcs.
1	Rubber handle	31480031000001	1	31480031000001	1
2	Axis of the cleaning system	89081231000308	1	8908123100211	1
3	Tube of the cleaning system	89081231000304	1	89081231000207	1
4	Bolt M8 x 35 DIN 933	-	1	-	1
5	Holder spirals	89081200000373	1	89081231000208	1
6	Spirals cleaning fume exhaust tubes	89081231000310	4	89081231000215	5
7	Nut M x 8 DIN 6923	-	1	-	1
8	Bolt M x 16 DIN 923	-	2	-	2
9	Screw M 4 x DIN 934	-	2	-	1

**12.3. Technical parameters**

Model		PB 25 Lambda	PB 30 Lambda
Nominal heat output	kW	25	30
Min / Max heat output	kW	22÷27	27÷32
Mass flow of exhaust gases, max heat output	kg/s	0,017	0,02
Height H	mm	1285	1435
Width L/ Depth D	mm	675/1130	765/1130
Water mantle volume	L	75	85
Combustion chamber volume	L	98	143
Combustion chamber resistance	Pa/mbar	12/0.12	11/0.11
Required chimney draught	Pa	10÷15	10÷15
Power supply / consumption	V/Hz / W	230/50/200	230/50/200
Loading door size	mm	400/200	490/260
Max. length of firewood logs	mm	500	500
Recommended fuel		wood, humidity 15-20%; wood briquettes	
Fuel consumption for heating season	m <sup>3</sup>	10-20	~15÷23
Burning timepartial / full load	h	10/6	14/8
Operating temp. range / Max.temp..	°C	65÷85/95	65÷85/95
Texhaust gas temperature( operat. mode)	°C	130÷150	130÷150
Operating pressure	bar	3	3
Weight	kg	488	605
Cold water inlet	A, mm	G1¼"/160	G1¼"/170
Hot water outlet	B, mm	G1¼"/1180	G1¼"/1325
Safety line sleeve	K	✓	✓
Safety heat evacuator inlet / outlet	E, mm	R½"/1090	R½"/1235
Flue	F, mm	ø150/1000	ø150/1135
	J, mm	338	382
Cleaning opening	Upper	O1, mm	400/140
	Lower	O2, mm	350/140
Step-regulated motor /servo-actuator/	M1, mm	595	665
	M2, mm	440	515
Drain	Y, mm	R½"/87	R½"/100
Air intake	Primary air	V1, mm	595
	Secondary air	V2, mm	440
Draught fan	W, mm	815	950
Buffer tank volume	L	1000	1956
Lambda sensor		✓	✓
Sensor for exhaust emissions	T	✓	✓
Lever for cleaning smoke tubes	S	✓	✓
Eyepiece for viewing the combustion	P	✓	✓
Controller	U	✓	✓





### 13. RECYCLING AND WASTE DISPOSAL

Submit all packaging material for recycling according to the local regulations and requirements.

At the end of life cycle of each product its components are due to be disposed of in conformity with regulatory prescriptions. According to Directive 2002/96/EC regarding electrical and electronic equipment waste, disposal thereof is required separately from the normal flow of solid household waste. Obsolete equipment shall be collected separately from other recyclable waste containing materials with adverse effect on health and environment.

Expired appliances must be collected separately from other recyclable waste containing substances hazardous to health and environment. Both metal and non-metal parts are sold out to licensed organizations for recyclable metal or non-metal waste collection. In any case they should not be treated as household waste.







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