

**Kotao na
BIOMASU/**

*Heating boiler
BIOMASS
OPERATED*

**SERIJE
Ecoflame
Plus/
SERIES
Ecoflame Plus**



INSTRUKCIJE/ INSTRUCTION MANUAL

Montaža, korišćenje i održavanje kotla/ Assembly, use and maintenance of heating boiler

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1. Important warnings

GENERAL WARNINGS

- After removing the packaging, make sure that the delivery is complete. In case of any shortcomings, address the dealer who sold the product.
- The boiler must be used exclusively for the purpose envisaged by the manufacturer. The manufacturer shall have no liability for damages to persons, animals or things in case of errors during assembly, regulation, maintenance or improper use.
- In case of water leakage, disconnect the device from the power supply, close the water supply and inform the authorised service and authorised installer.
- This instruction manual is an integral part of the device and must be kept with care and must **ALWAYS** accompany the device, even in case of change of the owner or user or in case of connection to another installation. In case it is damaged or lost, ask for a new copy from the authorised dealer.



IMPORTANT WARNINGS

We hereby emphasize that the usage of a device using biomass and solid fuel, that has contact with electricity and water, demands observance of the following safety measures:

- Children and persons with limited capabilities who are unaccompanied are prohibited from using the boiler.
- It is forbidden to use the boiler on installations with working temperature above 110°C and working pressure higher than 3 bars.
- It is forbidden to use easily flammable fuel (alcohol, oil).
- It is forbidden to store easily flammable materials in the vicinity of the boiler and the firing door. The ashes must be disposed of in closed and non-flammable containers.
- It is forbidden to burn the waste or materials the combustion of which causes flame or explosion hazard (e.g. plastic bags, saw dust, coal dust, mud, etc.).
- Any intervention by a technician (this particularly refers to replacing heating elements or checking any other electrical device) or cleaning of the boiler is prohibited before the boiler has been disconnected from the power supply by taking out the plug from the main power supply.
- Any change to the safety elements is prohibited.
- It is forbidden to close the vents in the room in which the boiler is located. Vents are necessary for the proper combustion.
- It is forbidden to expose the boiler to harsh weather conditions. The boiler is not designed for outdoor use and does not contain a system against freezing.
- It is forbidden to turn off the boiler if the outdoor temperature may drop below ZERO (freezing hazard).
- In case of an intervention on any electrical device of the boiler, the boiler must be disconnected from the electrical wiring by taking out the plug from the power supply.

- Any work with the boiler device is prohibited to persons with disability (including children), either mental or physical, except with the supervision of a guardian or a person responsible for their acting.
- Children must be supervised by a guardian so as not to play with the boiler.
- If the power protection has been damaged, it must be replaced in the factory and serviced by an authorized service technician or qualified persons in order to avoid the risk of electric shock.

1.1 Minimum separation distance from flammable materials

- Ensure adequate distance from flammable materials, if necessary to secure protection of those materials.
- Minimum separation distance from flammable materials has been prescribed by the law – please ask the professional dealing with heating or chimney-sweepers.
- Minimum separation distance of the boiler and flue gas pipe from the low or averagely combustible materials should be at least 100mm.
- Minimum separation distance from easily flammable materials is 200mm, and the same applies for the materials flammability of which is unknown.



Risk of fire!

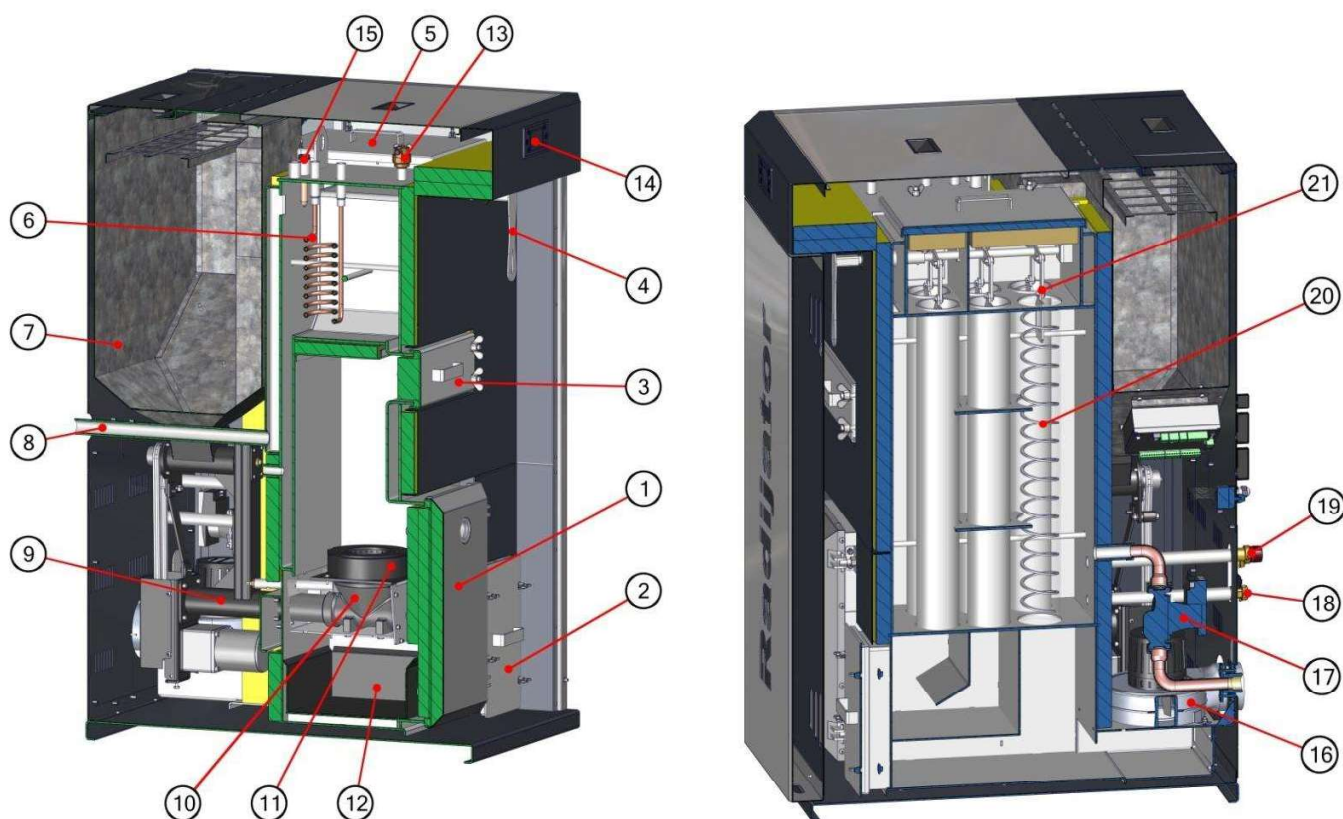
- Storing flammable materials and liquid in the vicinity of the boiler is prohibited.
- Warn the users about the required minimum separation distance between the boiler and flammable materials.

Flammability of building materials	
A... Non-combustible	Asbestos, stone, building stone, ceramic wall tiles, terracotta, plaster, screed (without organic additives);
B... Not easily flammable	Gypsum-cardboard plates, glass fibre, plates of AKUMINE, ISOMINE, RAYOLITE, LIGNOS, VELOX and HERACLITE
C1... Low combustible	Beech and oak wood, composite wood, felt, plates of HOBREX, VERSALITE and UMAKART
C2... Average combustible	Pine wood, larch wood, fir wood, composite materials;
C3... Easily flammable	asphalt, cardboard, cellulosic material, tar paper, chipboard, cork, polyurethane, polystyrene, polyethylene, polypropylene, polyethylene, floor fibres

2. Description of the boiler

- Boiler *Ecoflame Plus 25/30* was developed with the aim for Radijator Inženjering to offer to the market a boiler which, as per its mechanical and thermal properties, is intended for use of pellets as fuel.
- **If the user wishes to use some form of biomass that is not listed, he/she should contact the Construction and Development Department of Radijator Inženjering or the authorized dealer, since some forms of biomass often require specific combustion solutions.** Using the stated fuels implies automatic control of the main work parameters. In all stated examples of use of biomass, a certain fuel dryness level is required. On the other hand, market demands are such that they always seek more universal fuels.
- Wood pellets are produced from 100% cellulose. Wood residues are compressed under high pressure into pellets of 6mm in diameter and 2-3cm in length. Pellets should be appropriately stored in a dry place in order to ensure efficient combustion. Boiler *Ecoflame Plus 25/30* uses pellets of 6mm in diameter, 5-30mm in length and moisture up to 10%, produced as per the **EN 14962-2** standard. If the pellets are not produced as per the stated standard or its quality has deteriorated during the storing or transport, Radijator Inženjering, as the manufacturer, cannot have liability for the poor work of the boiler. In such situations, there might be errors in ignition, pellets might be piling up and falling out of the place for combustion, there might be insufficient power, etc.
- *Ecoflame Plus* is installed in the boiler room or other rooms, and it has an advantage in situations where more compact dimensions are required.
- It is assembled on a classic chimney of minimum 130mm in diameter. The chimney must meet all other standards as classic boilers. More on this may be found in the Assembly section.
- An adequate circulation pump has been installed in the boiler. The boiler is delivered with the safety valve and air vent. In addition to *Ecoflame Plus*, there is also a model *Ecoflame* which does not contain circulation pump, safety valve, filling and drainage tap.
- Adequate circular pump is installed within the boiler. The boiler is delivered with the safety and air vent.
- Pellet combustion is done as per the principle of volcanic fuel supply.
- The entire process is run by the automation system which allows the selection of one of two levels of power (25/30kW).
- It is possible to connect the room thermostat and set the periods of start of work and standby phases for 7 days.

2.1. Cross-section of the Ecoflame Plus boiler with the description of elements



Picture 1. Cross-section of the Ecoflame Plus boiler

No.	Name
1	Door of the boiler;
2	Lower cover of revision opening for cleaning of the exchanger;
3	Upper cover of revision opening for cleaning above the combustion chamber;
4	Handle of the mechanism for cleaning the exchanger pipes;
5	Upper cover of revision opening for cleaning of the exchanger;
6	Thermal safety;
7	Silo;
8	Hot water connection;
9	Feeder;
10	Burner channel - T piece;

11	Chrome plated cup;
12	Ashtray;
13	Air vent;
14	Automation display;
15	Temperature sensor;
16	Ventilator, Ø100;
17	Electronic pump;
18	Filling and drainage tap;
19	Safety valve;
20	Turbulator for cleaning the exchanger pipes;
21	Mechanism for cleaning of the exchanger

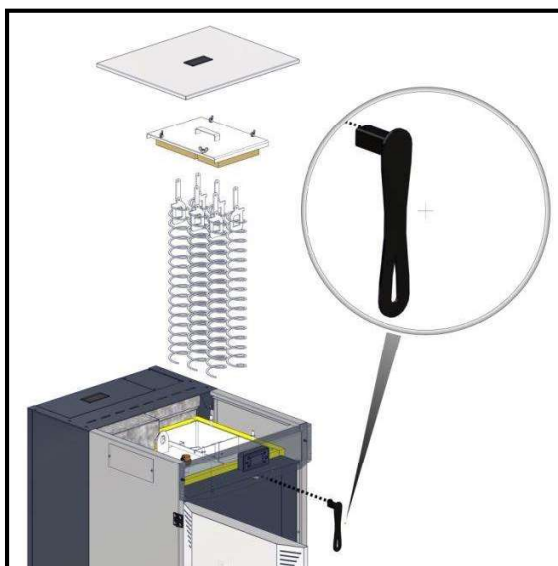
2.2. Construction

As per the manner of combustion, boiler *Ecoflame Plus 25/30* belongs to the group of boilers in which the mass that burns springs into the combustion chamber.

Water portion of the boiler, its mode of heat exchange between flue gases and water, is adjusted to the use of biomass. All parts of the water portion of the boiler are made of seamless pipes of ST 35.4 quality and boiler plates 5mm thick. Plates are of **1.0425 EU** standard or **P265GH** standard **EUII**.

The exchanger is a three-draft exchanger made of vertically placed pipes. Owing to three-draft system of flue gases circulation, the boiler is highly efficient, resulting in saving energy and less pollution of the environment.

Inside the exchanger pipes, there are spiral turbulators with dual function. The first function is to increase the exchange of flue gases and heat exchanger, hence the efficiency of the boiler, while the second function is to mechanically clean the pipe walls. *Picture 2* shows the turbulators which move up-down by moving the handle left-right, thus cleaning the exchanger pipes. It is very important that this cleaning process is performed every day.

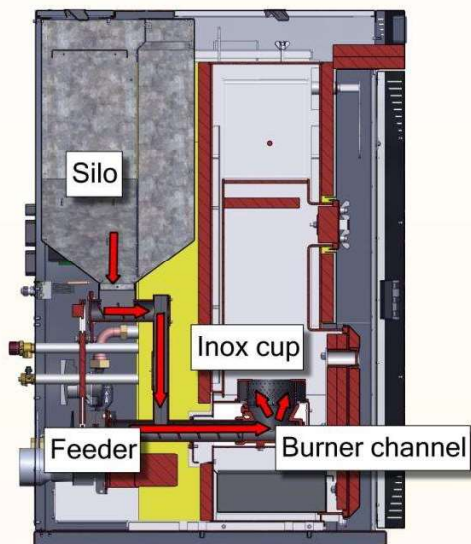


Picture 2. Turbulators

The efficiency level of the pellets is over 91%. Flue gases temperature values can be seen on the display at any time. During the work, the layers of soot and ash are piled on the boiler exchanger which results in significantly weaker exchange and the increase of flue gases temperature. If the boiler is not cleaned for a longer period of time, the flue gases temperature may rise so high that it enters into Modulation operating modality.

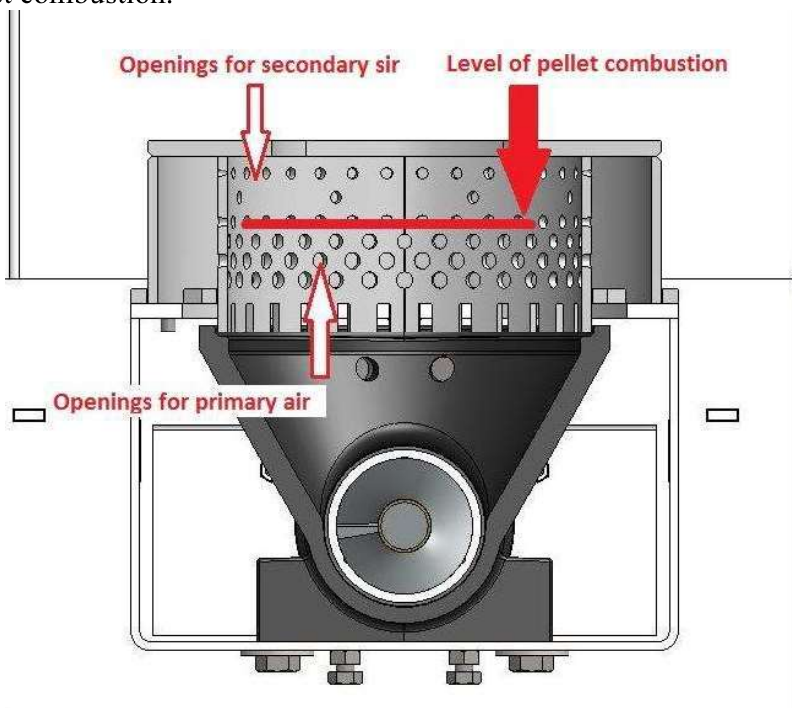
- The combustion chamber works as per the principle of “volcanic” fuel supply, where fuel, i.e. pellets, from silo rise into the feeder which transports it via two horizontal spirals in the combustion chamber zone, that is, to the burner channel, where the pellets pile up, the channel fills in and the pellets spring in the cup in which they burn. The cup is made of waterproof materials, *picture 3*.

Volcanic fuel supply



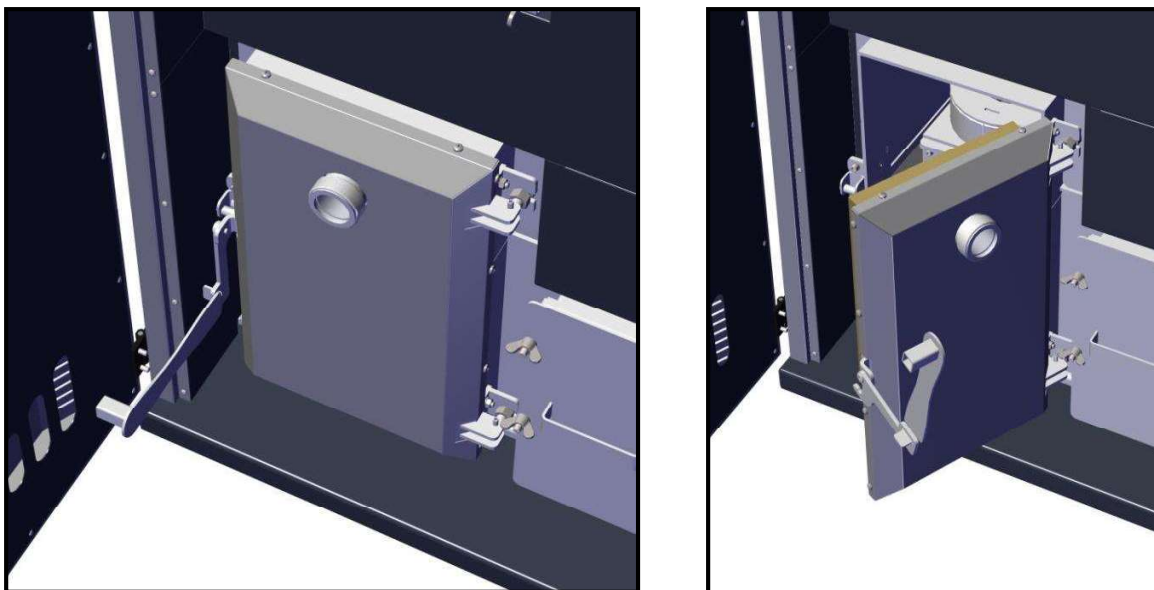
Picture 3. Volcanic fuel supply

Pellet combustion in the chrome plated cup is shown on *picture 4*. Openings above the red line are for secondary air, while the openings under the red line are for primary air. Red line shows the level of pellet combustion.



Picture 4. Pellet combustion in the chrome plated cup

The handle that moves the mechanism for cleaning turbulators is also used for opening the combustion chamber door, *picture 5*.



Picture 5. Opening combustion chamber door

- Capacity of silo is 65kg. There is a possibility of increasing capacity with additional silo for pellets, *picture 6*.



Picture 6. Possibility of an additional silo, capacity 320kg

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3. Assembly

3.1 General warnings

The boiler must be positioned properly for proper operation!



Maximum working pressure of the boiler is 3 bars, minimum working pressure is 1 bar, while the maximum working temperature of the boiler is 110 °C.



The boiler has a fan, automation system, electric heating element and all these devices use 230V power. Therefore, inadequate installation and careless handling may jeopardize human life through electric shock.



Solid fuel boiler and forced draft should be installed as per the norms and legal regulations in effect. Any change on either the mechanical construction or electric installations will be deemed a violation of terms of the warranty and will lead to its breach.



During the assembly on hydraulic installation, the boiler must be secured in the prescribed manner from exceeding the maximum working temperature and pressure.



Central heating installer who connects the boiler to the hydraulic system is responsible for the adequate assembly.



Radijator Inženjering, as the manufacturer of the boiler, shall have no liability for damages caused by inadequate boiler installation.



When doing any interventions on the electrical devices of the Ecoflame boiler, the entire system should be disconnected from the main power supply.

3.2. Measures and safety devices of the Ecoflame Plus boiler

The boiler is equipped with sophisticated safety devices which may stop the operation of the boiler in case of unforeseen circumstances, thus preventing any consequences that may be caused by improper operation of the boiler. Whenever a problem occurs, the devices will stop feeding pellets and the shutting down phase of boiler will begin.

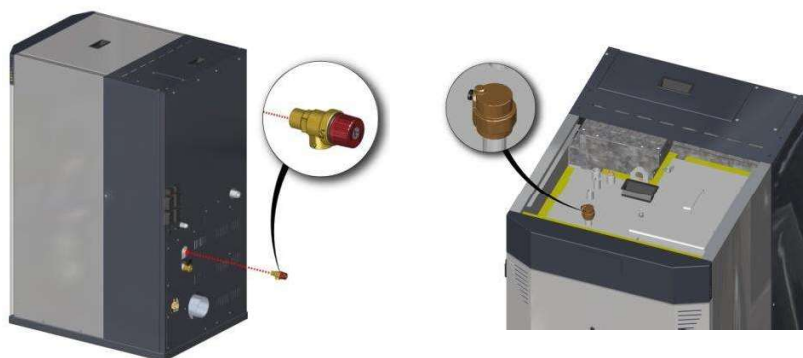
- **Pressure safety valve;**
- **Air vent;**
- **Thermostats in the automation system that regulate the work of the boiler;**
- **Thermal safety valve (TSV) (the boiler has an envisaged connection for TSV on top, which is installed by the boiler user).**

Pressure safety valve, shown in picture 7 on the left

- Pressure safety valve must be of nominal 1/2" in diameter, calibrated to maximum 3 bars. This safety element which belongs to the group of pressure limiters must be of such construction to withstand short-term exceeding temperature and pressure, as well as certain content of glycol in the heating liquid.
- Safety valve is located on the back side of the boiler, outside the casing so that, if activated, the water it lets out does not endanger the work of the boiler.
- Safety valve must be mounted on the boiler without any pipeline or any other elements in between. For this purpose there is a specially designed connector. Any reduction in diameter of the connector is strictly forbidden.
- Drain or exhaust part of the safety valve must be of pipes the diameter of which is at least equal to the nominal diameter of the outlet part of the valve. Furthermore, for its production it is allowed to use, at most, one arc of radius $r > 3d$.
- Safety valve must possess a nameplate with the following data:
 - name of the manufacturer;
 - designation of the type of safety valve/year of testing;
 - nominal flow rate;
 - data stating for which thermal effect the safety valve is set;
 - the highest opening pressure, i.e. 3 bars.
- It is obligatory to check the proper functioning at regular intervals, as well as to have it calibrated again by a certified company. These obligations are carried out in accordance with the law of each country in which the boiler is assembled. Always keep the written documentation containing the data of the latest calibration of the safety valve.
- Assemble at least one more pressure safety valve on the cold water connection.

Air vent, shown in picture 7 on the right

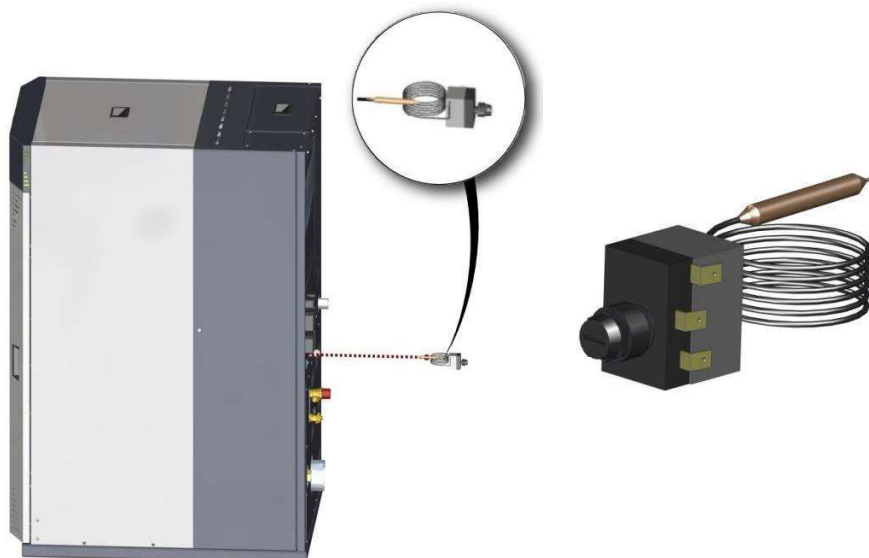
- Air vent is assembled on the highest point of the boiler. This is another safety measure that refers to appearance of air in the system and boiler itself. It also absorbs sudden momentary pressure changes. It can withstand maximum pressure of 10 bars. This safety element must be periodically calibrated again, of which the boiler user must possess valid documentation.



Picture 7. Assembling safety elements

Thermostats in the automation system of the boiler

- In the automation system that runs the combustion process and affects the work of the boiler and cycles of heating, there is one safety thermostat. Safety thermostat functions as a limiter of the temperature of water in the boiler and is limited to 110°C, **picture 8**. In case of overheating, wait until water temperature drops under 60°C and manually reset the button of STB thermostat.



Picture 8. Safety thermostat in the automation system of the boiler

- For boiler automation system and cycles of heating, NTC sensors are used which serve for setting the desired temperature. Boiler NTC probe is limited to 95°C.
- In case of reaction by any safety element, the automation system takes over a series of activities, enters the safety operating modality in which the pump must be turned on for the temperature to drop.
- In addition to the stated thermostats, the automation system is also equipped with a contact thermostat for supervision of the pellets temperature in the silo, **picture 9**. In case this thermostat

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is activated, the automation system takes the following steps: turns off the feeder and turns on the fan, in order to stop the flame.



Picture 9. Contact thermostat

Thermal safety valve (TSV)



Picture 10. Thermal safety valve

- This safety element also has a role of temperature limiter. In some extremely dangerous situations, change of water into water vapour is such that pressure safety valves are not sufficient to ensure the safety of hydraulic system. For this reason, it is mandatory to install the thermal safety valve. Depending on the legislation of the country in which the boiler is being assembled, thermal safety valve should be installed only for powers higher than those specified or it should be installed for boiler of any power. Place for installation is shown on the boiler assembly scheme and on *picture 10*. Copper coil is delivered with the boiler, so it is necessary to use the thermal safety valve with exchanger, as in the *picture 10*. Cold sanitary water is supplied to the thermal safety valve. When the probe of the valve receives information that the temperature is over 95°C, the valve opens and water passes through the copper coil. After some time, the temperature of water in the boiler drops to normal. One connection of the coil is used for the thermal safety valve, and the other for draining of water that has passed through the coil. It is irrelevant which connection is for the valve and which for draining. It is mandatory to adhere to the instructions provided by the manufacturer of the thermal safety valve. The function of the thermal safety

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valve should be checked up at certain intervals. As it has already been said, one end of the thermal safety valve is to be installed onto the boiler exchanger, while the cold water under pressure is supplied to the other end. It is particularly important that the flow of that water is unobstructed even during power cut.

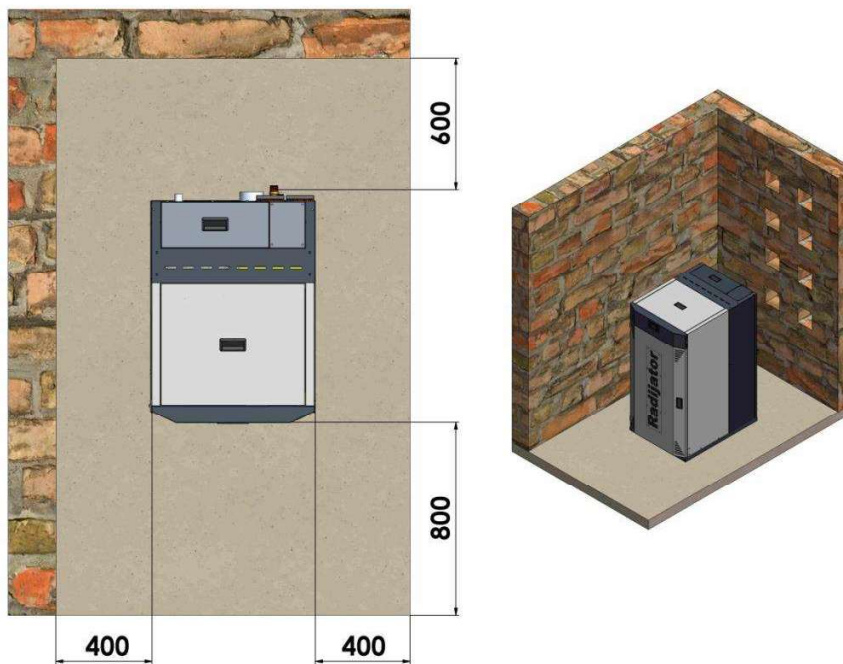


If it is not possible to ensure supply of cold sanitary water even during power cut, it is mandatory to connect the boiler to an open system.

3.3 Positioning of the Ecoflame Plus boiler in the boiler room

Boiler room must be secured from freezing.

The support surface for the boiler in the boiler room must be of non-combustible material. Recommended distances of all four sides of the boiler in relation to the boiler walls or other solid body (buffer, etc.) are shown in *picture 11*. These distance values allow a safe access when firing, sufficient space for cleaning and unobstructed access to the fan and valve for filling and drainage. Boiler at its left hand side should be at a distance of 400mm from the wall. The space behind the boiler is important for assembly into the hydraulic system and for potential removing of the system for electric firing. **Boiler room must have sufficient ventilation holes both for fresh air and for the outlet of the exhaust air.**



Picture 11. Positioning of the boiler in the boiler room

Total area of these openings is minimum 150cm² for powers up to 50kW, while for the power over 50kW, the area must be bigger for 2cm² per kW.

$$A = 150 \text{ cm}^2 + \frac{2 \text{ cm}^2}{\text{kW}} \cdot (\sum Q_n - 50 \text{ kW}) \quad \sum Q_n = \text{of potential power over 50 kW.}$$

Lack of sufficient ventilation in the boiler room may cause more problems in the work of the boiler. The main problem is the inability to achieve high temperature of output water, i.e. not achieving maximum power, which leads to condensation in the boiler.

- Take into account the required minimum space needed for accessing safety elements and for cleaning and regular repair.
- Determine whether the level of electrical protection is in accordance with the characteristics of the room where the boiler will be located.
- It is forbidden to expose the boiler to harsh weather conditions. The boiler is not designed for outdoor use and does not contain a system against freezing.
- It is forbidden to close the vents in the boiler room. Vents are necessary for proper combustion.

3.4 Connection to chimney

During assembly of the chimney, we distinguish two situations:

- **Situation 1:** The boiler is connected to the standard chimney (masonry or metal) that has its own foundation and full cross-section from the foundation to the top.
- **Situation 2:** Boiler is connected to the prefabricated metal chimney attached to the facade.

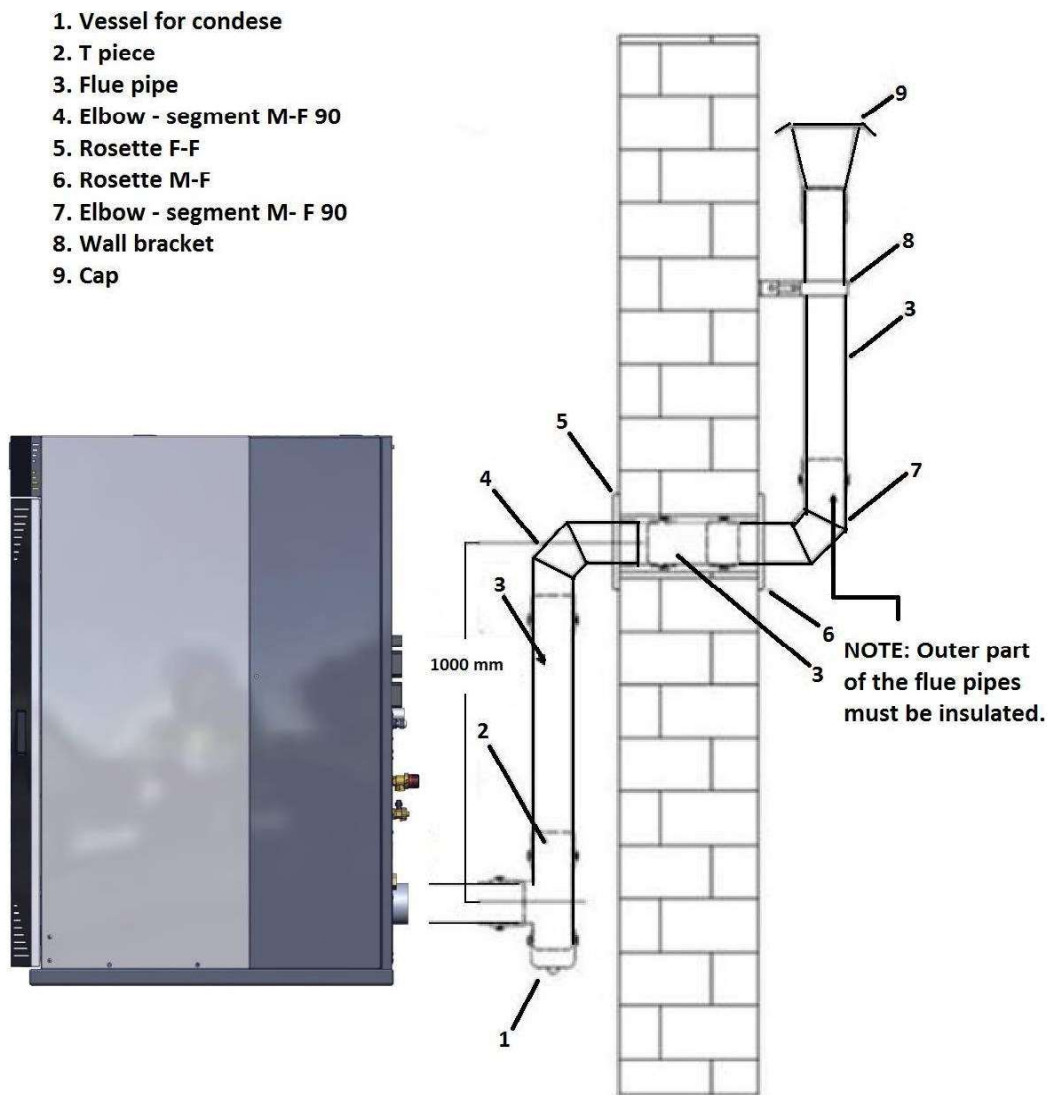
Situation 1:

- Ceramic or metal pipes of circular cross-section of minimum 130mm in diameter should be used for chimney. Flue pipe must be insulated.
- If the chimney already exists and is of square cross-section, then the minimum dimension of the intersection is 130x130mm.
- It is not allowed to use the chimney for connecting multiple devices.
- It is not allowed to use air ducts as chimney.
- Top of the chimney should be protected with a chimney cap because of the impact of rain and wind. Distance from the cap to chimney should be 200mm.
- Chimney should come out above the roof as per the recommendations, *picture 12*. If there are some tall objects near the chimney, this should also be taken into account and the height of the chimney additionally increased.
- The chimney must also have a connection for extracting condensation, as well as a revision door. During operation, the door should always be well sealed.

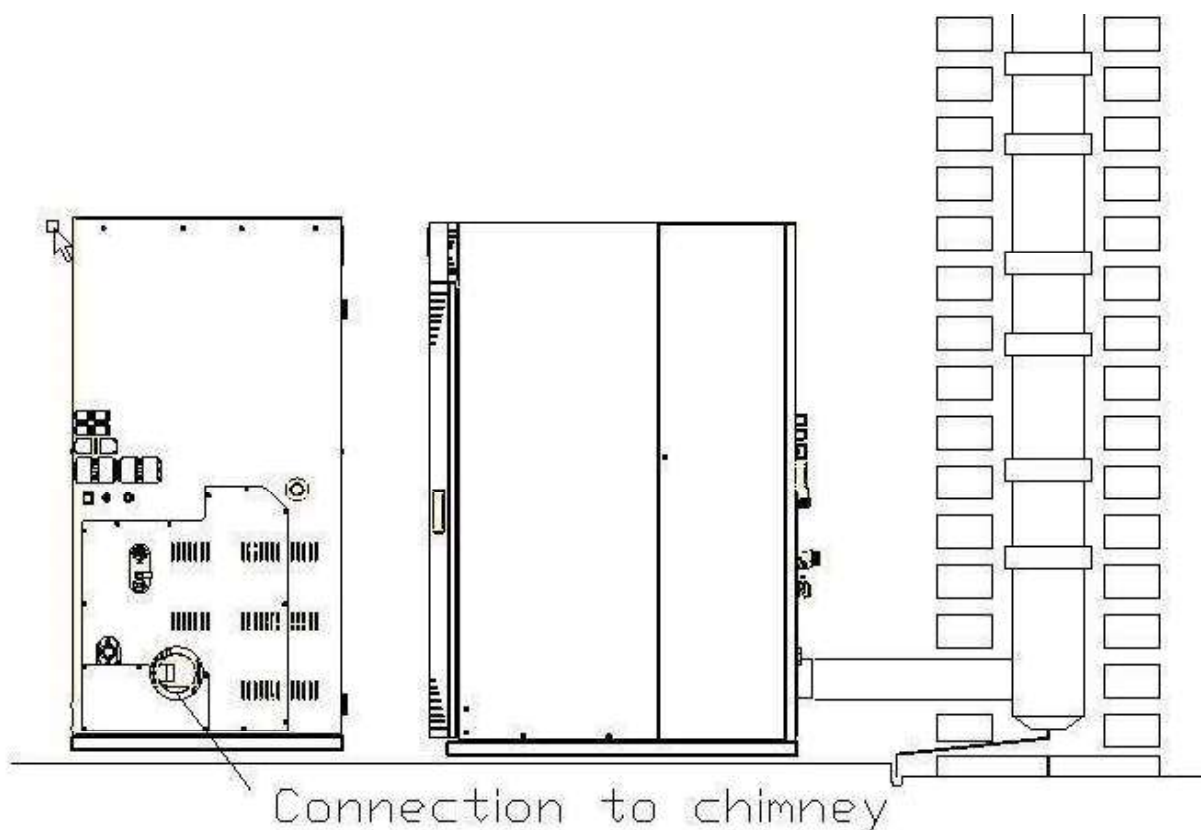
Situation 2:

- In this situation, the flue pipe must go minimum 1.5m vertically upwards in the very room in which the boiler is located, then to penetrate through the wall and be connected to chimney.
- Flue pipe must have a T piece for condensation at the very outlet from the boiler, as well as the possibility to be removed for cleaning.

WARNING: Not adhering to the rules during installation of the flue pipes and chimney may result in improper work of the boiler, but may also endanger human health and even their lives. The greatest threat comes from the toxic gases which are a product of combustion. In such situation where the flue pipes, chimney and inflow of combustion air have not been assembled in a way prescribed by the instruction manual, Radijator Engineering does not have a liability for any undesired consequences.



Picture 12. Installation of flue gas channels

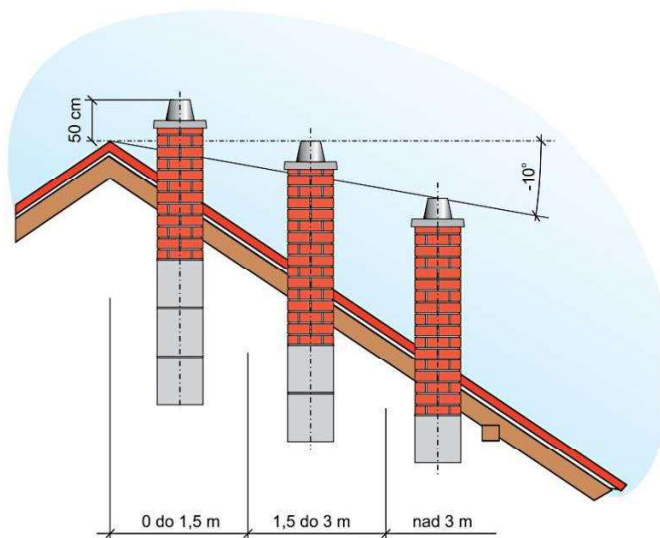


Picture 13 . Connection to chimney

If possible, arches should be avoided. If not possible, then maximum number of arches should be 2. It is desirable to insulate flue gas channel from the boiler to chimney, especially if there are arches and longer sections. Flue gas probe is factory-installed in the housing of the exhaust gas fan. Prior to commissioning of the boiler, check whether the probe is still located in its place after the transport, since without adequately installed probe the boiler will not operate.

The chimney should be made of ceramic pipes, and around them there should be insulation of 3-5cm, while the back outer layer should consist of bricks or special elements. If the chimney is not, however, made of ceramic but of bricks, the light opening area of such chimney must be 30 % higher than the same area of ceramic chimney.

The chimney must have a door for cleaning and the door must be well sealed. Chimney outlet on the roof must be made in accordance with certain regulations. There are two different cases: if the roof angle is smaller than 12° and if it is bigger than 12° . For the angle smaller than 12° , the height of the chimney above the roof is 1m, while for the angle bigger than 12° please take a look at the **picture 14**.



Picture 14. Recommendation when building the chimney

If you think that the chimney is too strong and that too much cold air passes through the boiler, at the exit of the boiler, there is a valve which can reduce the flow of exhaust gases. The chimney should be cleaned regularly or at least once a year.

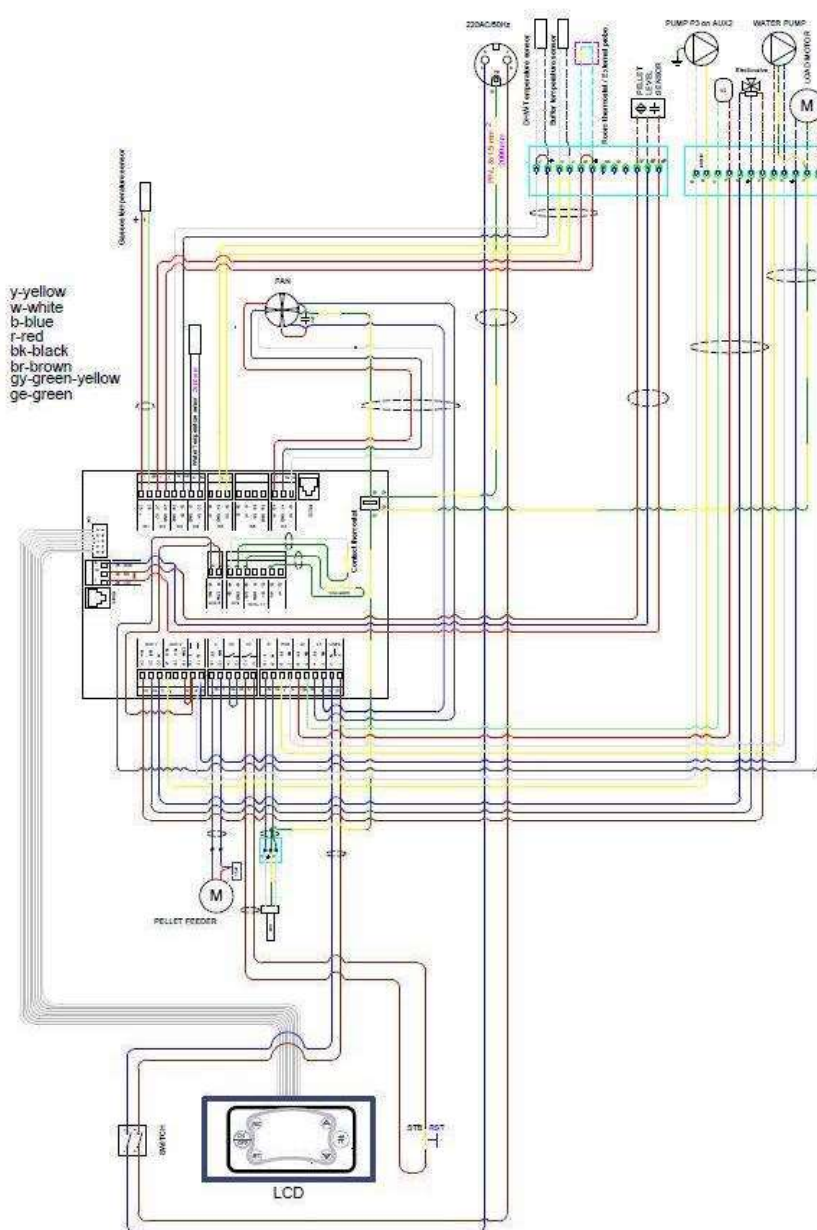


If the chimney is not of the prescribed height, cross-section or if it is not cleaned, there could be complications in the operation of the boiler. Primarily, high-temperature operating mode is not possible, that is, there is no maximum working power, resulting in appearance of condensation that affects boiler life expectancy.





Weak chimney is the main reason for smoke appearing on the upper or lower door during the ignition of the boiler or during the operation, especially at higher fan speeds.

4. Connection scheme of automation system



Picture 15. Connection scheme of automation system

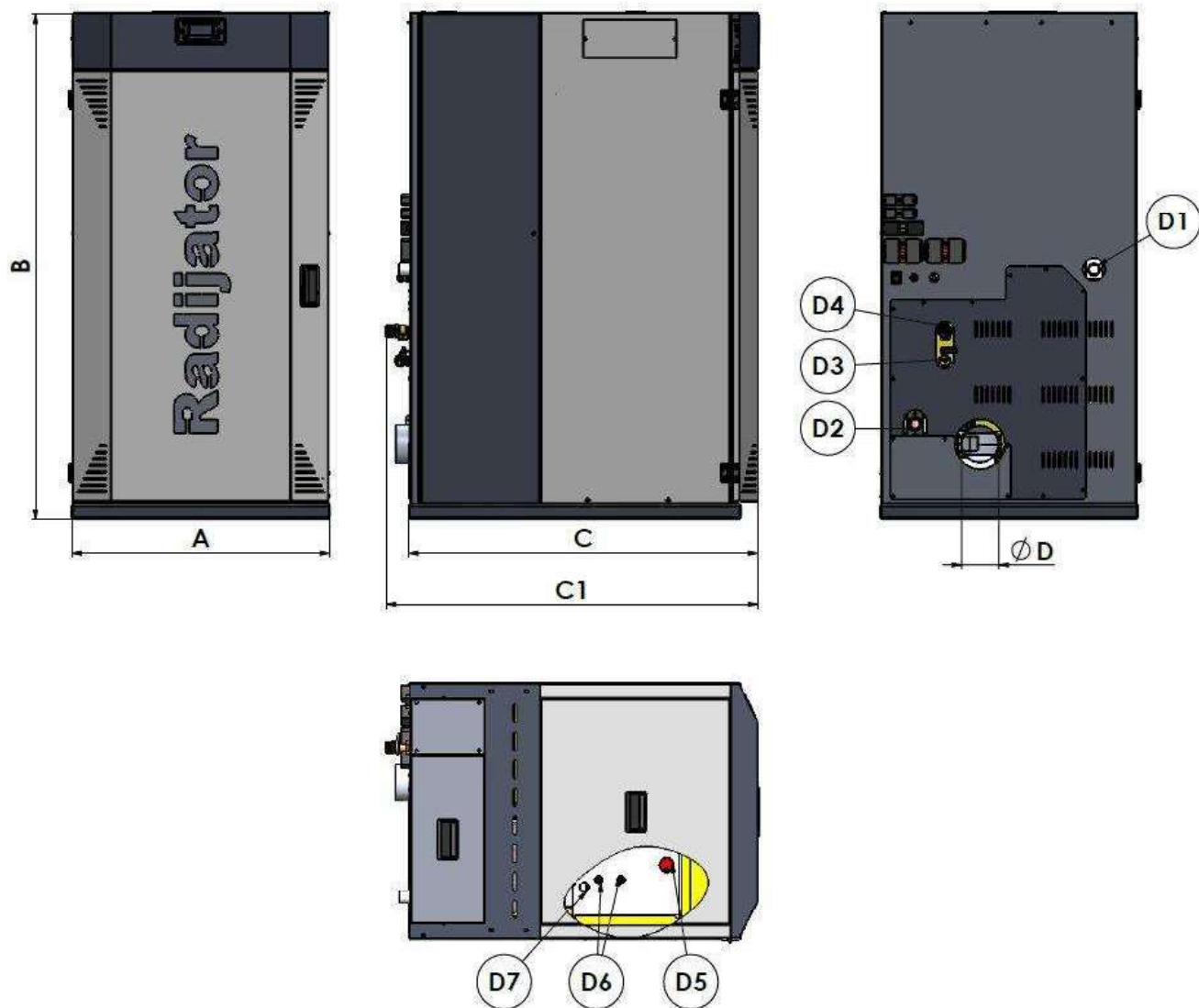
 For the room thermostats, it is important that they are battery-powered, i.e. that they do not have any supply of 220V. NC (normally closed contact) is used for connection on the thermostat itself.

 **The boiler may operate even if the central heating pump has not been connected, but the manufacturer recommends that it be installed because it has a function of a safety element. It turns on when the temperature of water in the boiler exceeds 90°C.**

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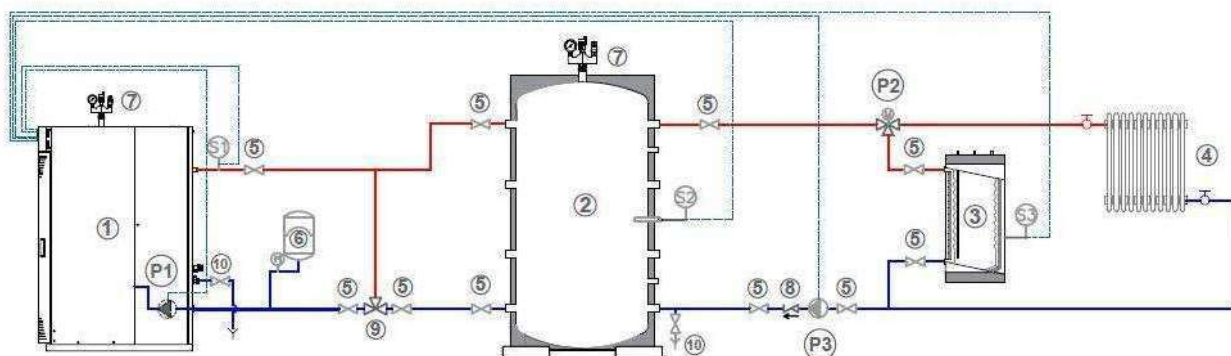
5. Technical data table

Type of boiler		Ecoflame 25	Ecoflame 30
CE designation		CE	CE
Boiler class as per EN 303-5:2012		5	5
Working pressure	<i>bar</i>	2	2
Test pressure	<i>bar</i>	4,5	4,5
Volume of water in the boiler	<i>L</i>	81	81
Boiler weight	<i>kg</i>	375	375
Minimum cross-section of the chimney	<i>mm</i>	130	130
Necessary draft of the chimney	<i>mbar / Pa</i>	0,12/12	0,12/12
Boiler temperature (min / max)	<i>°C</i>	60-90	60-90
Minimum temperature of the cold water connection	<i>°C</i>	60	60
Efficiency degree at nominal/minimal thermal power	<i>%</i>	92,35/92,82	91,98/92,53
Nominal power	<i>kW</i>	25,27	29,97
Minimum/maximum power of boiler	<i>kW</i>	8,5/25,27	11/29,97
Carbon monoxide (CO) emission at minimal thermal power (10%O ₂)	<i>mg / m³</i>	366,3	360,3
Carbon monoxide (CO) emission at nominal thermal power (10%O ₂)	<i>mg / m³</i>	131,85	124,63
Dust at nominal/minimal thermal power (10%O ₂)	<i>mg / Nm³</i>	13,37/23,32	12,65/22,32
Dimensions			
	<i>A</i>	690	690
	<i>B</i>	1355	1355
	<i>C</i>	935	935
	<i>C1</i>	1000	1000
	<i>φD</i>	100	100
Connection for hot water from the boiler	<i>D1</i>	1"	1"
Connection for cold water from the boiler	<i>D2</i>	1"	1"
Filling and drainage connection	<i>D3</i>	1/2"	1/2"
Safety valve connection	<i>D4</i>	1/2"	1/2"
Connection for air vent	<i>D5</i>	1/2"	1/2"
Connection for thermal safety valve (TSV)	<i>D6</i>	1/2"	1/2"
Connections for thermal safety valve probe	<i>D7</i>	1/2"	1/2"



Picture 16. Projections of boiler with dimensions


6. Hydraulic scheme





Picture 17. Hydraulic scheme

LEGEND	
1.	Boiler <i>Ecoflame Plus 25kW</i>
2.	Buffer
3.	Sanitary water heater
4.	Exchanger
5.	Ball valve
6.	Closed expansion vessel
7.	Safety group (safety valve, manometer, air vent)
8.	Check valve
9.	Manual three-way valve
10.	Filling and drainage tap
P1	Pump
P2	Three-way motorized zone valve
P3	Pump
S1	Temperature sensor
S2	Buffer temperature sensor
S3	Domestic hot water (DHW) temperature sensor

 **WARNING!**

 During the assembly on hydraulic installation, the boiler must be protected as prescribed against excessive overheating and overpressure.

 Central heating installer who connects the boiler to the hydraulic system is responsible for adequate assembly.

 Radijator Inženjering, as the manufacturer of the boiler, shall have no liability for damages caused by inadequate boiler installation.

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7. Boiler start-up and maintenance



The first commissioning of the boiler should be performed by a technician certified by Radijator Inženjering. Training the boiler user is mandatory.

In this way, this person is authorized to notify the customer service in the factory about the time when the boiler started its operation and the condition of the boiler at its first firing, while keeping a copy of the report on the commissioning of the boiler. Warranty and instruction manual are given to the customer. One copy of the warranty is sent to the manufacturer. If the warranty has not been filled in, it is not valid.

Only the boilers commissioned by the authorised technician are subject to the warranty conditions. The following text is intended for the user of the boiler, as a reminder, to be able to start up the boiler on their own, should they turn off the boiler (e.g. for cleaning).



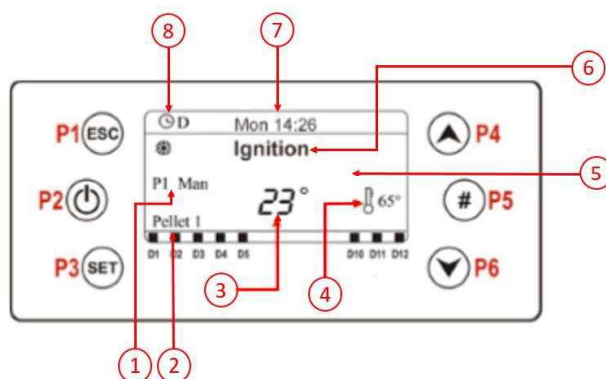
Parameters related to the boiler operation, which are available to the user, are on the display. The remaining parameters which are found in the so-called hidden menu should not be changed without the consent of the technician who commissioned the boiler or the factory itself.

7.1 LCD 100 display

7.1.1 Introduction

The main screen shows:

- 1 Combustion power;
- 2 Combustion recipe;
- 3 Current temperature of water in the boiler;
- 4 Set temperature of water in the boiler;
- 5 Status or error in the work of the system;
- 6 Functional state of the boiler;
- 7 Date and time;
- 8 Chrono is activated.



Picture 18. LCD 100 Display

Button	Function
P1	Exit menu and submenu;
P2	Ignition and extinguishing (push for 3 seconds), Reset error (push for 3 seconds), Enable/disable chrono;
P3	Enter in User Menu 1/submenu, Enter in User Menu 2 (push for 3 seconds), Save data
P4	Enter in Visualizations Menu, Increase
P5	Enable chrono program
P6	Enter in Visualizations Menu, Decrease
Led	Functions
D1	Heating Resistance On
D2	Auger On
D3	Pump On;
D4*	Valve On;
D5	Output V2 On
D6*	Pump 3 active.;
D7*	Engine on auxiliary silo active;
D8	
D9**	External Chrono Reached
D10*	Pellet Sensor signalling lack of material;
D11*	Room thermostat reached;
D12*	Domestic Hot Water (DHW) demand
* It is necessary to install additional equipment that is not found in the scope of delivery of the basic version. For all information, please contact the authorised service technician.	

Automation system has a possibility to diagnose obstructions and problems in operation. Automation system signals any abnormal state via a message on the screen and by undertaking adequate action. The messages shown on the screen are divided into two groups:

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- Errors and
- Other messages.

7.1.2 Errors

Errors are messages that signal a problem in the operation of the system. They are characterized by Err mark and the system will go to extinguish modality and then to blockade. That means that the system is blocked and starting up the system again is disabled until the problem has been removed.

Er01	Safety thermostat signalling. Temperature of water in the boiler is too high. System signals the error even when it's off.
Er02	Safety thermostat signalling. Temperature of water in the boiler is too high. System signals the error only when the boiler is operating.
Er03	Flue gases temperature is too low.
Er04	Temperature of water in the boiler is too high.
Er05	Flue gases temperature is too high.
Er07	Encoder Error. The error may occur due to lack signal Encoder.
Er08	Encoder Error. The error can occur due to problems of adjustment of the number of Revolutions.
Er11	Clock Error. The error occurs due to problems with the internal clock.
Er12	Extinguishing for ignition failure.
Er15	Extinguishing due to power failure.
Er16	RS485 communication error
Er18*	System shutting down due to exhaustion of pellet.
Er23	Boiler probe or Back boiler probe or probe Buffer open.
Er56	Problem with configuration of water distribution, more in the section Heating Management.
In case of errors not defined in this table, contact the service technician. Errors marked with * refer to additional equipment, which is not included in the delivery of the basic version.	

7.1.3 Other messages

Sond	Displaying the status of the Temperature Sensors. The message is displayed during the check-up and indicates that the temperature reading on one or more probes is equal to the minimum value or the maximum value (depending on the probe considered). The message is displayed in the ignition phase. It is recommended to check the connection of probe to the automation system.
Service	Message that signals the achievement of scheduled operating hours. It's necessary to call a service technician for regular service.
Clean	Message that signals the achievement of scheduled operating hours. It's necessary to clean the boiler.
Port	Boiler door is open.
Link error	Lack of communication between keyboard and control board.
Cleaning on	The system is performing its own/automatically scheduled Periodic Cleaning.

Ignition Block	Message that appears if you try to turn off the system in the ignition phase. The system will turn off only after it has entered the Run mode.
Er06	Thermostat Pellet open.
Er20	In the basic configuration, appearance of this error has not been envisaged. In case it appears, call the certified service technician.

7.1.4 Monitoring

In order to access the screen for monitoring, press the button P4 ili P6:

Exhaust T.	Exhaust temperature [°C]
Boiler T.	Boiler temperature [°C]
Boiler Return T.*	Boiler return temperature [°C]
Buffer T	Buffer temperature [°C]
DHW T.	Domestic hot water temperature [°C]
Fan Speed	Combustion Fan speed [rpm]
Auger	Auger work time [s]
Product Code 549	Product Code
*This value is not available in the standard scope of delivery.	


User Menu 1

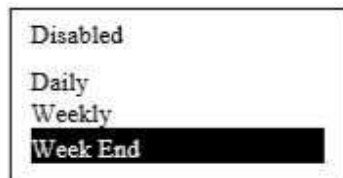
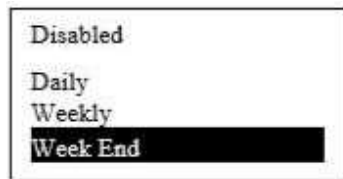
In order to access this menu, press button P3.

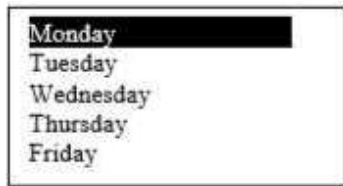
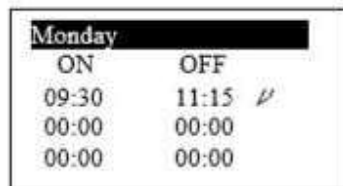

In order to access this menu, press button P5.

Combustion Management	<p>Pellet power</p> <p>This Menu allows to set the system's combustion in automatic or manual mode. If the manual mode is set, the user must also choose the combustion power.</p>						
	<p>Auger Calibration</p> <p>Menu to change the Auger's work time or speed. The system has 10 calibration steps (0 value is set by the factory). The calibration effect is valid only in Run Mode and Modulation. For each step the value is increased in percentage for the value P15.</p> <p>Example: P15=10%, Step= -1</p>						
	Default values	C03=2,0	C04=3,0	C05=4,0	C06=5,0	C07=6,0	C11=1,0
	Calibrated values	C03=1,8	C04=2,7	C05=3,6	C06=4,5	C07=5,4	C11=0,9

	Fan Calibration Menu to change the Combustion Fan speed. The system has 10 calibration's steps (the 0 value is set by the factory). The calibration's effect is valid only in Run Mode and Modulation for the current recipe. For each step the value is increased in percentage for the value P16. Example: P16 =5%, Step= +3						
	Default values	U03=1000	U04=1200	U05=1400	U06=1600	U07=1800	U11=900
	Calibrated values	U03=1150	U04=1380	U05=1610	U06=1840	U07=2070	U11=1030

Heating Management	Boiler Thermostat Menu which allows to modify the Boiler Thermostat's value. *If it is possible to manage the outdoor temperature sensor, this menu is not available because water temperature is automatically calculated.
	Buffer Thermostat* Menu which allows to modify the Buffer/Top Buffer Thermostat's value.
	Bottom Buffer Thermostat** Menu which allows to modify the Bottom Buffer Thermostat's value.
	DHW Thermostat* Menu which allows to modify the Domestic Hot Water thermostat value.
	Flow Thermostat* Menu which allows to modify the Flow thermostat's value in configuration 9.
	Room Thermostat* Menu which allows to modify the Room Thermostat's value in the boiler room.
	Summer-Winter Summer or winter operating modality of the boiler.
	Climatic Function* (Outdoor temperature sensor) Menu to manage the climatic function, i.e. to modify outdoor temperature sensor. Menu has two submenus, Enable and Comfort Function. Enable: allows the user to enable/disable the outdoor temperature sensor. Comfort Function: allows to correct the calculated thermostat by ± 20 °C. Outdoor temperature sensor works only in Winter mode. If the function is enabled, the symbol  is shown on the display.
	Mixer Valve* Menu to manage the Mixer Valve. It is possible to regulate it in automatic mode or force it to open or close.
*Appearance of these values on the display depends on the configuration in which the boiler works. For more information, address a professional.	

Load*	This menu allows loading manually the Auger. The system has to be in Off state to do the loading.	
Cleaning Reset*	This menu allows to reset the message Clean.	
Chrono	<p>Menu that enables the Chrono operating mode. Chrono is the mode that enables ignition/extinguishing of the boiler as per the already defined operating mode.</p>	
	<p>Modality It allows selecting the desired operating modality of the Chrono mode or disable the Chrono mode.</p> <ul style="list-style-type: none"> • Enter modification mode by pressing button P3. • select the chosen modality (Daily, Weekly or Week End) by moving up or down (button P4 or P5). • Enable/disable Chrono mode by pressing P2. <p>Save the settings by pressing P3.</p>	
	<p>Programming The system enables three types of programming:</p> <ul style="list-style-type: none"> • Daily, • Weekly, • Week End. <p>After selecting the desired type of programming:</p> <ul style="list-style-type: none"> • Choose a day in the week or a period that you would like to programme by pressing keys P4 or P6. • When you choose the period, enter submenu by pressing the key P3. • Change the time via keys P4 and P6. • Enable (a “V” is displayed) the time interval by pressing key P5. Disable the time interval (a “V” is not displayed”) by pressing the keys P5. 	

	Programming the interval to include the next day: <ul style="list-style-type: none"> • Example: We want the boiler to turn on on Tuesday at 22:30h, and to turn off on Wednesday at 06:30h. • Set the boiler to turn on on Tuesday at 22:30h. • Set the boiler to turn off on Tuesday at 23:59h. • Set the boiler to turn on on Wednesday at 00:00h. • Set the boiler to turn off on Wednesday at 6:30h. • The system will turn on on Tuesday at 22:30h, and turn off on Wednesday at 06:30h. 	
	Daily Select a day in the week and set the time when the boiler will turn on or turn off.	
	Weekly Programme is the same for all days of the week.	
	Week-end You may programme the intervals for work days (choose between 'Monday-Friday') and for the week end (chose 'Saturday-Sunday').	

User Menu 2

To enter the menu press and hold **P3**.

Keyboard Settings	Time and date Used to set the day, month, year and current time.
	Language Menu to modify the keyboard language.

Display menu	Brightness Menu used to regulate the display brightness.
	Minimum Light Menu used to regulate the lighting of the display when the display is not used.
	Sound It allows to enable or disable the acoustic alarm of the keyboard.
	Keyboard Address This menu is password-protected and no changes should be made in it.
	Node list This menu shows communication address, FW code, FW version, etc. Data are not modifiable.
System menu	A password is needed for entering the menu. Settings in the System menu are intended for professionals.

7.2. Functioning states of the system

- Off – The system is off;
- Check Up – check-up whether everything is fine with the system and whether the ignition may safely start;
- Ignition;
- Stabilization - Operating modality between Ignition and Run mode. Its role is to ensure the stable work of the boiler in the working mode.
- Recovery Ignition – The operating mode is activated during ignition only if the system had not been regularly turned off for some reason (cable unplugged, longer power cuts, etc.);
- Run mode – Normal operating modality, the boiler has still not reached the set temperature;
- Modulation – Normal operating modality, the boiler has reached the set temperature;
- Standby – Boiler is in the standby modality, ready to start. It is usually used in combination with room thermostat.
- Safety – safety operating modality. The boiler enters this modality only if the flue gases temperature or water temperature are too high;
- Extinguishing – Boiler is turning off;
- Block – Automation system has detected irregularities in the work of the system.

7.3. Door sensor

- Sensor on the boiler door is a standard part of the boiler equipment. The sensor detects whether the door of the boiler is open and sends a signal to the automation system. In case you open the door while the boiler is working, the automation system of the boiler will do the following:
 - o Stop the system for feeding pellets;
 - o Fan speed will be at its maximum;
 - o The message port/door will appear on the display.
- After shutting the door, the boiler will continue its normal work.
- Automation system displays a message port/door even in the OFF mode (i.e. when the boiler is turned off).

These precaution measures prevent the return of the flame through the boiler door and guarantee safety to the user.

7.4. Pellet thermostat

- Pellet thermostat is also a standard part of the boiler equipment. In case the temperature of the pellets reaches a critical value, the automation system will do the following:
 - o Stop the system for feeding pellets;
 - o Fan must remain turned on;
 - o Turn of the heating element (if it was turned on);
 - o Write a message Er06 on the display.

These precaution measures increase the safety level of the system.

7.5. Installing additional equipment

7.5.1. Introductory notes

Settings and connecting additional equipment may be performed only by professionals.

The number of inputs and outputs in the automation system is limited. When choosing additional equipment, consider your priorities carefully with a professional. Not all additional equipment can be installed at the same time. Make priorities. You have available three temperature inputs, input for the sensor of pellets level, two outputs that may be used for different purposes (their behaviour is programmed by parameters), output for electro valve and output for boiler pump.

Each output of the automation system has uniformly defined maximum permanent current load.

Maximum one-time permanent current load of the automation system is 6.3A. Maximum load per output is 3A. Factory-installed power is 420W, or 1.8A.

Installer of additional equipment is due to take care of limitations of individual outputs, as well as of maximum on-time load of the automation system.

In the following situations:

- o Maximum one-time load exceeds 6.3A;
- o Individual output is overloaded;
- o You need a three-phase consumer unit;

Our recommendation is to use relays and contactors of adequate characteristics.

7.5.2. Room thermostat or outdoor temperature sensor

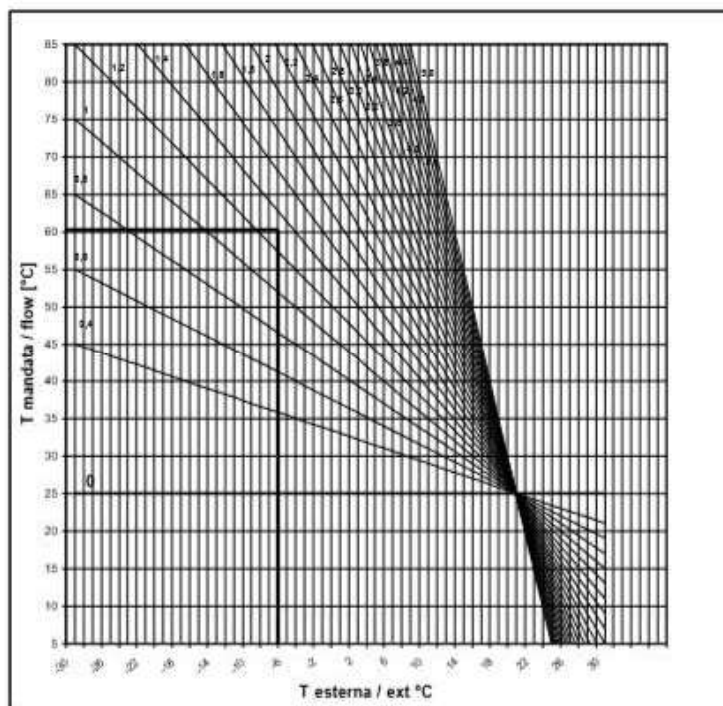
It is not possible to install the room thermostat and outdoor temperature sensor at the same time.

7.5.2.1 Room thermostat

Input for room thermostat is dry contact. For the room thermostat it is important to be battery-powered on, i.e. they should not have any supply of the voltage of 230V. On the thermostat for the connection NC is used (normally closed contact).

Connecting: remove the jumper in the connector and connect the thermostat as per the connection diagram.

7.5.2.2 Outdoor temperature sensor



Picture 19. Outdoor temperature sensor

Outdoor temperature sensor cannot be installed in the configuration 10.0.

Outdoor temperature sensor can be installed with configurations 10.1; 10.2 i 10.3.

Outdoor temperature sensor cannot be installed together with the room thermostat.

WORK PRINCIPLE:

Systems without buffer

Temperature in the boiler is calculated automatically and varies in the range from Th26 to Th27. Calculation is done on the basis of a linear curve. The selection of curve is done by setting parameter P60. Our recommendation for parameter P60=1.

Systems with buffer

Buffer temperature is automatically calculated as per the system described above, while the temperature of water in the boiler is calculated as a sum of buffer temperature and parameter D11. The selection of a linear curve is done by setting parameter P60. Our recommendation for parameter P60=1.

Outdoor temperature sensor and configuration 10.1

Change of parameters:

P74 [configuration of the outdoor temperature sensor] = 7

P26 [confirmation of configuration] = 0

Outdoor temperature sensor and configuration 10.2

Change of parameters:

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P74 [configuration of the outdoor temperature sensor] = 7

P26 [confirmation of configuration] = 2

Outdoor temperature sensor and configuration 10.3

Change of parameters:

P74 [configuration of the outdoor temperature sensor] = 7

P26 [confirmation of configuration] = 4

Connecting

Outdoor temperature sensor should be connected to the output Room thermostat as shown in the connection scheme.

7.5.3. Start of an alternative/additional source of heat

If you wish to have an alternative source of heat (e.g. gas or electro boiler), the automation system may manage (ignite and extinguish) the alternative source of heat.

Work principle: The output is managed by Th56 Thermostat: above this value is supplied.

Connection scheme and parameters: For this function it is possible to use the output V2. The output is of 230V.

Parameters: in System menu, submenu Enables, the parameter P44 is factory-set on value 3.

Then in the System menu, Thermostats submenu, set the parameter Th56 and hysteresis Ih56. Our recommendation is that the parameter Th56 is nearly equal to parameter Th35, and the parameter Ih56 is between 2 and 10°C.

7.5.4. Additional system for feeding pellets

It is necessary to connect the pellet level sensor and the system engine as shown in the scheme.

Work principle: When the pellet level sensor signals the absence of pellet, the output is activated which moves the engine for loading of the silo. If in a time T24 signal of the pellet level sensor is still active, the automation system goes in Extinguishing and the display shows the message Er18.

T23 is the time during which the silo is loaded after the signal of the sensor.

Set the following parameters in the System menu:

Enable: P71=2

Timers: T23 and T24 (our recommendation for the parameters is the following - T23=1900; T24=1800).

7.6. Heating management

7.6.1 Introductory notes

Inputs for temperature sensors in the automation system are adjusted to probes NTC 10K. Configuration 10.0 is implied and factory-set. Configurations 10.1, 10.2, 10.3 are automatically generated from the

configuration 10.0 and it is not necessary to do parametrization. Parameters are stated and intended exclusively for professionals.

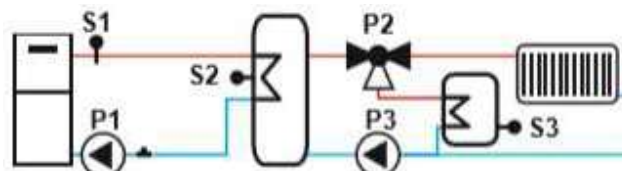
Error Er56

When changing the configuration, Er56 may appear.

In that case, you should do the following:

1. Check the parameters;
2. Turn off the boiler: OFF state;
3. Turn off the power;
4. Check the wiring;
5. Turn on the power;
6. Check in monitoring whether read-outs of probes are in order;
7. Repeat the procedure if necessary.

7.6.2 Configuration 10.0



Picture 20. Configuration 10.0

If you want the configuration as shown in the picture, first set the parameter P26=10.

Work principle

Anti-freeze protection

To avoid the freezing of water, if the temperature drops below the previously defined value (Th18), pumps P1 and P3 are activated, and the valve P2 alternately changes the position.

Run mode

The system heats buffer water if the temperature of water in the boiler is higher than the thermostat value Th19 and if the difference between the temperature of water in the boiler and buffer water temperature is higher than Th57.

The system heats the water in the sanitary water heater if the temperature in the sanitary water heater is lower than Th79 and if the difference between the buffer water temperature and the temperature of water in the sanitary water heater is higher than Th81.

When the water in the sanitary water heater has been heated (Th79), if the room temperature (provided the room thermostat has been installed) has not been reached and if the buffer water temperature is higher than the set temperature (Th59), the system enables home heating.

Over temperature (Overheating of the system – safety function)

If the water temperature is higher than the previously defined value (Th21 or Th25), pump P1 is activated for safety reasons. If the buffer water temperature is higher than the previously defined value (Th78),

pump P3 is activated and the valve opens the sanitary plant. If the water temperature is higher than Th80, the P2 valve opens the plant.

Recommended values of parameters: **Th18**=5°C, **Th19**=40°C, **Th21**=75°C, **Th58**=60°C, **Th78**=70°C, **Th79**=55°C, **Th80**=65°C, **Th81**=5°C, **Th59**=50°C

<i>Anti-freeze protection</i>							
Probe S1	Probe S2	Probe S3	Diff. 1-2	Diff. 2-3	Pump P3	Pump P1	Electro valve P2
T<5°C	-	-	-	-	ON	ON	Heat. (OFF)
<i>Run mode</i>							
Probe S1	Probe S2	Probe S3	Diff. 1-2	Diff. 2-3	Pump P3	Pump P1	Electro valve P2
T<40°C	-	-	-	-	OFF	OFF	Heat. (OFF)
T≥40°C	-	-	>5°C	≤5°C	OFF	ON	Heat. (OFF)
T≥40°C		T<55°C	>5°C	>5°C	ON	ON	DHW (ON)
T≥40°C	T<50°C	T≥55°C	>5°C	-	OFF	ON	Heat. (OFF)
T≥40°C	T≥50°C	T≥55°C	>5°C	-	ON	ON	Heat. (OFF)
<i>Over temperature (Overheating of the system – safety function)</i>							
Probe S1	Probe S2	Probe S3	Diff. 1-2	Diff. 2-3	Pump P3	Pump P1	Electro valve P2
T≥75°C	T<70°C	T<65°C	-	-	OFF	ON	DHW (ON)
T<75°C	T≥70°C	T<65°C	-	-	ON	OFF	DHW (ON)
T<75°C	T<70°C	T≥65°C	-	-	ON	OFF	Heat. (OFF)
T≥75°C	T≥70°C	T≥65°C	-	-	ON	ON	Heat. (OFF)

By short connection of temperature probes inputs from Configuration 10, another three simplified water distribution systems may be obtained.

Wiring:

Connect the DHW Temperature sensor to the connector as shown in the scheme.

Connect the Buffer temperature sensor to the connector as shown in the scheme.

Connect the P3 pump to the connector as shown in the scheme.

Connect the Electro valve to the connector as shown in the scheme.

Parameters:

They are factory-set.

The following parameters are found in the System menu, submenu Enables:

P26 [selection of configuration] =10;

P75 [DHW Temperature sensor] =8;

P76 [Buffer temperature sensor] =9;

P36 [pump configuration] =14

Parameters **Th18**, **Th19**, **Th21**, **Th58**, **Th78**, **Th79**, **Th80**, **Th81**, **Th59** are found in the System menu → Thermostats menu and should be adjusted to the needs of the user and the instruction above.

7.6.3 Configuration 10.1



Picture 21. Configuration 10.1

Work principle:

Recommended values of parameters:

Th18=5°C; **Th19**=40°C; **Th21**=70°C

Heating plant

The pump is active if the boiler water temperature is above the previously defined value **Th19**. In order to avoid freezing, the pump is on even when the water temperature is below **Th18**. If the water temperature exceeds value **Th21**, the pump is activated for safety reasons.

Wiring:

Connect the output for DHW Temperature sensor to the connector.

Connect the output for Buffer temperature sensor to the connector.

Parameters:

They are factory-set.

The following parameters are found in the System menu, submenu Enables:

P26 [selection of configuration] =10;

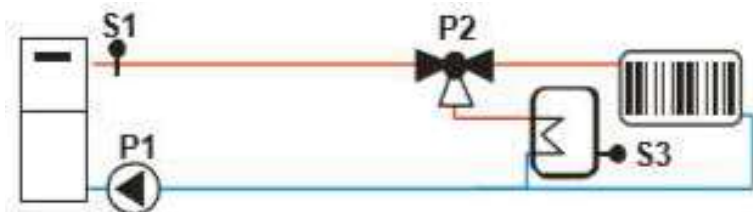
P75 [DHW Temperature sensor] =8;

P76 [Buffer temperature sensor] =9;

P36 [pump configuration] =14

Parameters **Th18**, **Th19**, **Th21** are found in the **system menu** → **Thermostats menu** and should be adjusted to the needs of the user and the instruction above.

7.6.4 Configuration 10.2



Picture 22. Configuration 10.1

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Work principle:

Heating plant

Pump P1 is on if the temperature of water in the boiler exceeds the value Th20 of the thermostat, and the buffer water temperature does not exceed the previously defined value Th79 and the difference between the read temperature by probe S1 and S3 probes is greater than the Th57 thermostat. The pump is on if the water temperature in the boiler is higher than Th19 thermostat. In order to avoid freezing, the pump is on if the water temperature in the boiler is below Th18 thermostat. If the temperature of water in the boiler exceeds the value Th21 thermostat for safety reasons the pump is always on.

Sanitary plant

If the temperature in the sanitary water heater is lower than Th79 and if the temperature in the boiler is higher than Th20 and the difference of temperature of water in the boiler and the sanitary water is Th57, P2 valve is open. If the temperature of water in the boiler has reached the value Th21, P2 valve turns off.

Recommended values of parameters: Th18=5°C, Th19=65°C, Th20=50°C, Th21=70°C; Th57=5°C; Th79=55°C.

Probe S1	Probe S3	Modality	Diff.	P2 Valve	Pump P1
T<5°C				Heat. (OFF)	ON
5°C≤T<50°C				Heat. (OFF)	OFF
50°C≤T<65°C	T<55°C		<5°C	Heat. (OFF)	OFF
			≥5°C	DHW (ON)	ON
	T>55°C		<5°C	Heat. (OFF)	OFF
		Winter	≥5°C	Heat. (OFF)	OFF
		Summer	≥5°C	DHW (ON)	ON
65°C≤T<70°C	T<55°C		<5°C	Heat. (OFF)	OFF
			≥5°C	DHW (ON)	ON
	T>55°C	Winter		Heat. (OFF)	ON
		Summer	<5°C	DHW (ON)	OFF
		Summer	≥5°C	DHW (ON)	ON
T≥70°C				Heat. (OFF)	ON

Wiring:

Connect the output for DHW Temperature sensor to the connector as shown in the diagram.

Connect the output for Buffer temperature sensor to the connector.

Connect Pump P3 to the connector as shown in the diagram.

Connect the Electro valve to the connector as shown in the diagram.

Parameters:

They are factory-set.

The following parameters are found in the System menu, submenu Enables:

P26 [selection of configuration] =10;

P75 [DHW Temperature sensor] =8;

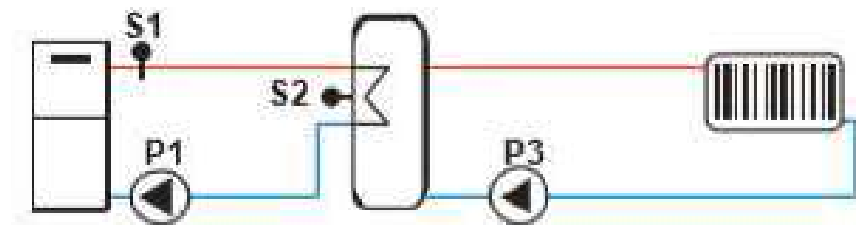
P76 [Buffer temperature sensor] =9;

P36 [pump configuration] =14

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Parameters Th18, Th19, Th20, Th21, Th57, Th79 are found in the system menu → Thermostats menu and should be adjusted to the needs of the user and the instruction above.

7.6.5 Configuration 10.3



Picture 23. Configuration 10.1

Work principle:

If the temperature in the boiler is higher than Th19 and if the difference between temperatures of two probes is higher than Th57, the system heats the water in the buffer. P3 Pump is on if the temperature in the buffer has reached Th59.

Anti-freeze and over temperature protection has been described above.

Example and recommended values: Th18=5°C, Th19=40°C, Th21=70°C, Th57=5°C, Th59=50°C.

S1 probe	Differential	P1 pump
T<5°C		
T<40°C		
T≥40°C	<5°C	OFF
	≥5°C	ON
T≥70°C		ON

S2 probe	Modality	P3 pump
T<50°C		OFF
T≥50°C	Winter	ON
	Summer	OFF

Wiring:

Connect the output for Buffer temperature sensor to the connector as shown in the diagram.

Connect the output for DHW Temperature sensor to the connector.

Connect the Pump P3 to the connector as shown in the diagram.

Connect the Electro valve to the connector as shown in the diagram.

Parameters:

They are factory-set.

The following parameters are found in the System menu, submenu Enables:

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P26 [selection of configuration] =10;
P75 [DHW Temperature sensor] =8;
P76 [Buffer temperature sensor] =9;
P36 [configuration of pump] =14

Parameters Th18, Th19, Th20, Th21, Th57, Th79 are found in the system menu → Thermostats menu and should be adjusted to the needs of the user and the instruction above.

7.6.6 List of temperature parameters/thermostats

Code	Description	Probe	Unit
Th18	Anti-freeze protection	S1	[°C]
Th19	Activation pump thermostat	S1	[°C]
Ih19	Activation Pump Thermostat Hysteresis	S1	[°C]
Th21	Sanitary 2 Thermostat	S1	[°C]
Ih21	Water Boiler Thermostat Hysteresis 2	S1	[°C]
Ih24	Water Boiler Thermostat Hysteresis	S1	[°C]
Th25	Boiler Safety Thermostat	S1	[°C]
Th26	Boiler Thermostat minimum range	S1	[°C]
Th27	Boiler Thermostat maximum range	S1	[°C]
Th51	Minimum temperature which the user may set in the buffer	S2	[°C]
Th52	Maximum temperature which the user may set in the buffer	S2	[°C]
Th57	Difference between the temperature of water in the boiler and water in the buffer	Dif.	[°C]
Ih57	Differential Thermostat Th57 Hysteresis	Dif.	[°C]
Ih58	Buffer Thermostat Hysteresis	S2	[°C]
Th59	Temperature at which Pump P2 is activated	S2	[°C]
Ih59	Thermostat Th59 Hysteresis	S2	[°C]
Th60	Boiler Return Differential 2 Thermostat Hysteresis (valid only for configuration 8)	Ret. Boiler	[°C]
Ih60	Boiler Return Thermostat Hysteresis	Ret. Boiler	[°C]

Th78	Maximum (safety) temperature of buffer water	Buffer	[°C]
Th80	Maximum (safety) temperature in the sanitary water heater	Sanitary water	[°C]
Th81	Difference between the temperatures of buffer and sanitary water heater.	Diff. 2	[°C]
Ih81	Hysteresis Th81	Diff. 2	[°C]
Th83	Maximum temperature that the user may set in the sanitary water heater	Sanitary water	[°C]
Th97	Difference between the water in the boiler and sanitary water	Diff. 3	[°C]
Ih97	Thermostat Th97 Hysteresis	Diff. 3	[°C]

7.7. Protection from blockade of the pump and the three-way valve

If the boiler pump is not working for 24h, the automation system turns on the pump and the three-way valve for 2 minutes in order to avoid the blockade.

7.8. Resetting to factory settings

The system may be returned to factory-set parameters.
 System menu → Restore Parameter's factory value menu.

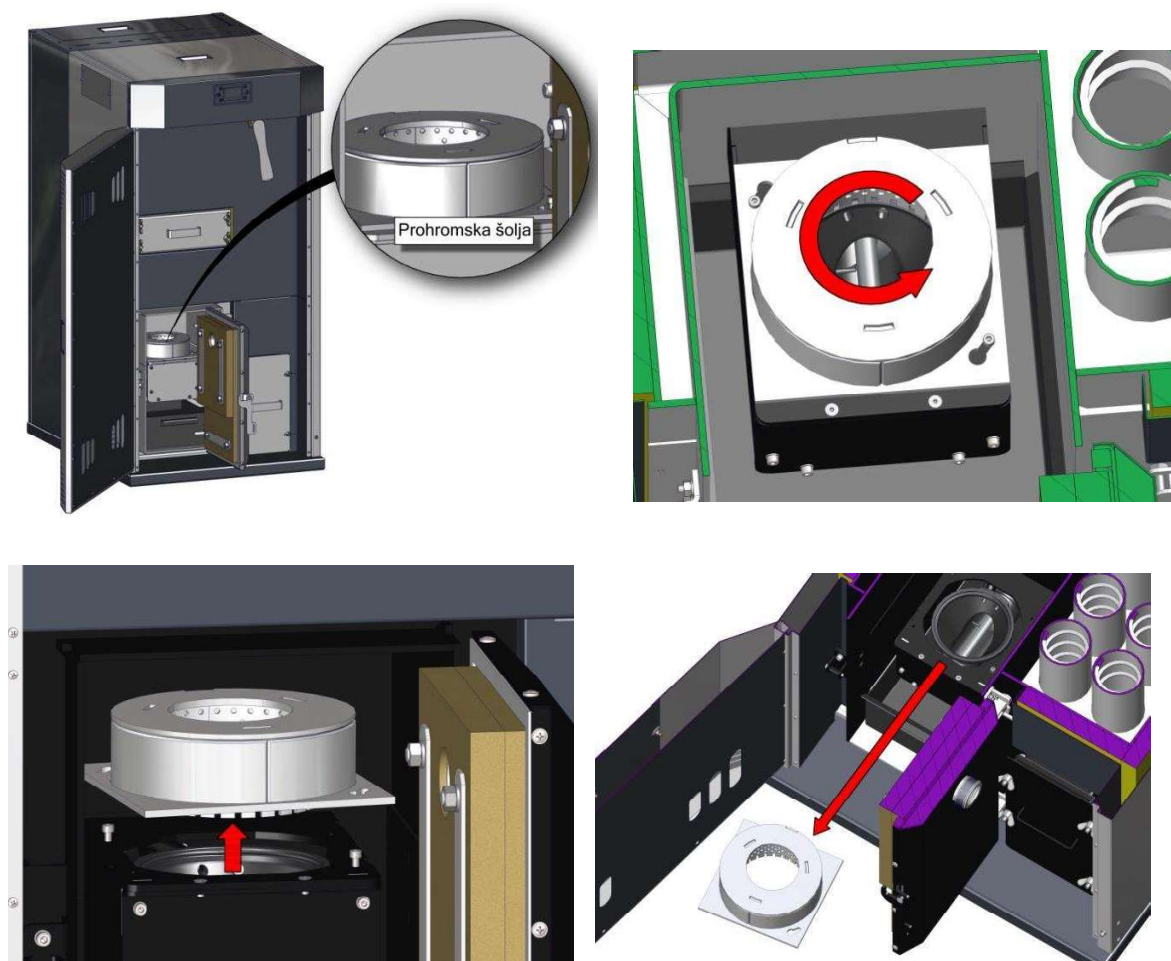
7.9. Boiler commissioning

1. Connect the boiler to the hydraulic scheme;
 In case of appearance of Er56, see the section 7.1.
2. Connect the boiler to power supply; It is mandatory to turn on the switch on the back of the casing;
3. Using the function manual load let the feeder work for 15-20s;
 Press the button Set → load → yes → wait for 15-20s → turn off on NO;
4. Start the boiler by pressing and holding the button ON/OFF for 3 seconds.

7.10. Maintenance of the *Ecoflame Plus* boiler

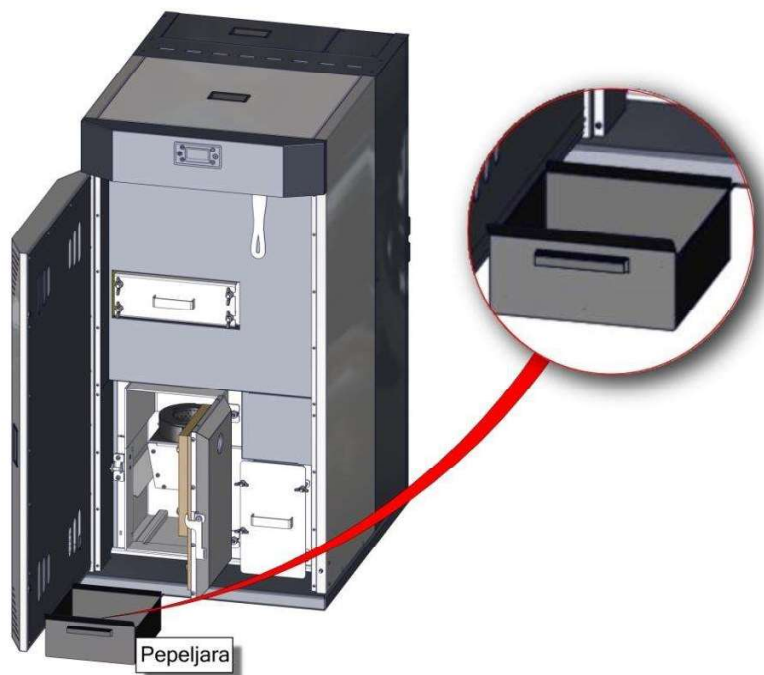
Boiler *Ecoflame Plus* demands daily and periodical cleaning.

- Daily cleaning refers to the area of the combustion chamber and cup where, by regularly throwing out the ashes, we enable better work of the electric heating element for ignition and better combustion, i.e. higher amount of air that passes through the slots on the cup. By average parameters of burning 100kg of pellets, 1kg of ashes is produced. The cleaning is performed by a vacuum cleaner for cleaning ashes, when the boiler is completely cold. Picture 22 shows dismantling of the cup when cleaning.



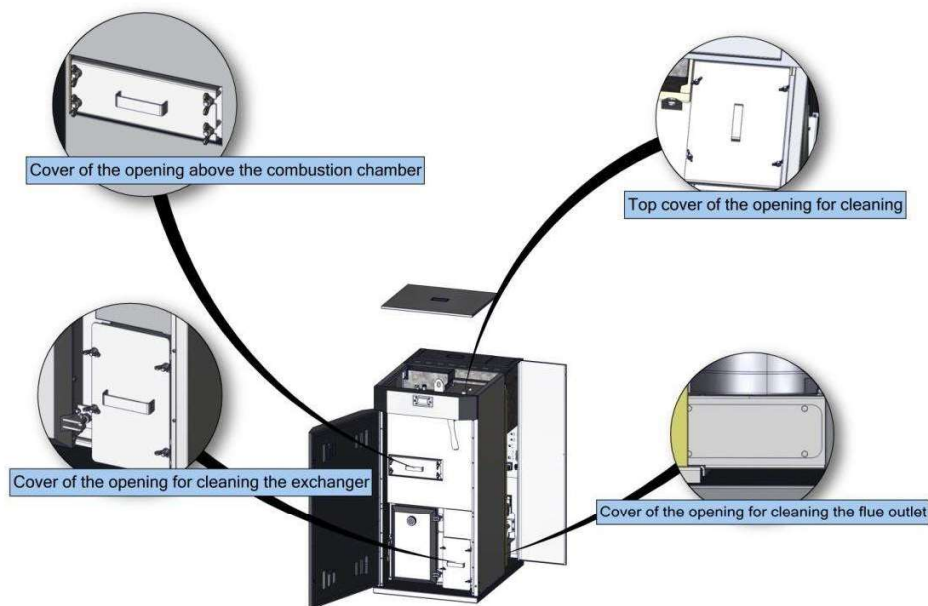
Picture 24. Dismantling chrome-plated cup when cleaning

- Daily cleaning also refers to emptying the ashtray (**picture 25**).

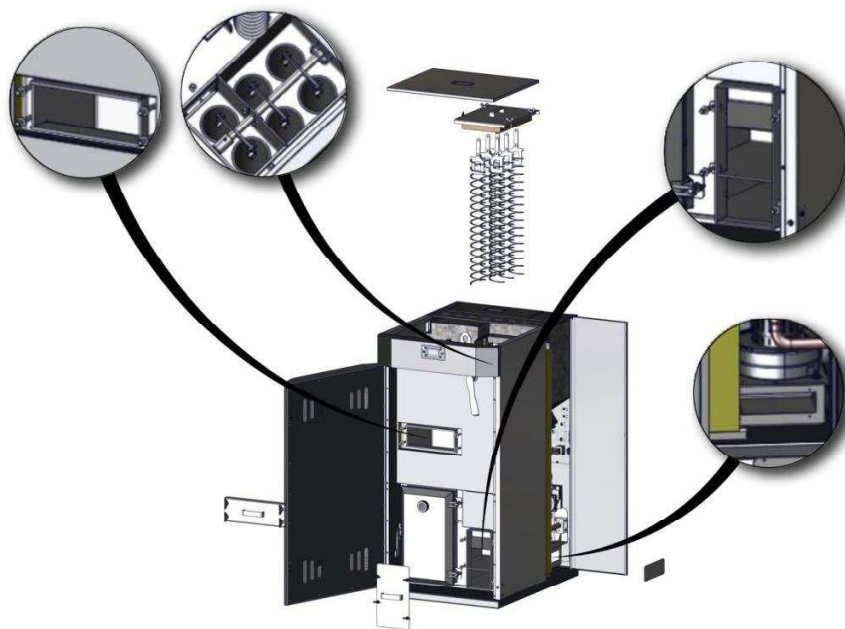


Picture 25. View of boiler with the ashtray out

- Periodical cleaning of the boiler includes cleaning of the flue pipes inside the boiler. In order to achieve that, so-called revision openings for cleaning are found in the boiler (pictured 26 and 27). Open the top cover for cleaning, clean the space around the mechanism for cleaning the exchanger pipes; during regular service once a year, tabulates must be taken out and the tar and soot from the available parts of the boiler must be removed.
 - Then take off the cover from the revision opening in the right corner on the front bottom side and clean the space under the exchanger pipes.
 - Revision opening above the combustion chamber should also be cleaned in this period; take off the cover and, by using the vacuum cleaner, pick up tar and soot;
 In this period, the side door of the casing should be opened and the flue outlet on the back side of the boiler must be cleaned from ashes and tar. (NOTE: Pay attention to the flue gases probe when cleaning the flue outlet).




Picture 26. Covers of revision openings for cleaning the boiler





Picture 27. View of the revision openings for cleaning

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 ***During maintenance and servicing of the boiler, disconnect the boiler from the power supply.***

If condensation appears in the boiler during usage, it is necessary to collect the condensed matter and the entire inside of the boiler should be coated with basic means for cleaning or, at least, with aqueous solution of construction lime. In this way the neutralization of acids is carried out due to condensation.

 ***In this way, make sure to preserve the boiler at the end of the heating season. In that situation, also close all the openings on the boiler to prevent air circulation through the boiler to avoid potential appearance of moisture in the boiler.***

 ***Maintenance of the boiler is one of the most important factors affecting the boiler life expectancy. It is particularly important to clean the boiler when it is not the heating season and neutralize the acid, as described above.***

8. Name plate

Name plate is stuck on a visible place on the boiler and contains the following data (see the picture in the item STICKERS)

1. Technical data on the sticker:

- Manufacturer (Radijator Inženjering)
- Serial number of the boiler (example: N°:100113033)
- Year of production (example: 2019)
- Type of the boiler (Ecoflame Plus 25 or Ecoflame Plus 30)
- Nominal power of boiler
- Heat output range
- Necessary chimney draft (18Pa)
- Electric voltage (230V)
- Frequency (50Hz)
- Current (3A)
- Nominal electrical power (490W)
- Maximum extended electrical power (200W)
- All el. power (690W)
- Weight
- Boiler class as per EN3035 (5)
- Maximum pressure (3 bar)
- Maximum temperature (90°C)
- Quantity of water in litres



- Type of fuel sign – pellets C1



2. Sticker of importer

3. OEEO

4. Other signs on the boiler