



BOILER OPERATING AND INSTALLATION MANUAL

BLAZE COMFORT COMBI 15

BLAZE COMFORT COMBI 20

BLAZE COMFORT COMBI 25

BLAZE COMFORT COMBI 30

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Dear customer,

Congratulations on choosing and purchasing a BLAZE COMFORT COMBI boiler. You have now become the user of a top-class boiler. To ensure that the boiler serves you well and reliably for a long time, use the boiler in accordance with the operating instructions; particularly pay attention to Chapters 6, 7 and 8.

We greatly appreciate your trust, and we will be glad to hear feedback about the operation and service of the boiler.

This boiler has been approved for operation in EU countries by Strojírenský zkušební ústav, s.p., Notified Body EC 1015, Authorized Body 202, Brno, on the basis of certificate no. B-30-00939-18 of 31. 8. 2018.

In accordance with Government Order no. 176/2008 Coll., Annex 1, Article 1.7.4., this is the

ORIGINAL USER MANUAL.

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1	Use and advantages of the boiler	5
1.1	Use and advantages of the pellet burner	7
2	Technical boiler data	8
3	Prescribed fuel for the boiler	9
4	Boiler description	10
4.1	Boiler design	10
4.2	Function description	11
4.3	Operation with lambda sensor	11
1.2	Function description – pellet combustion	12
1.3	Burner diagram	13
4.4	Boiler dimensions	14
4.5	Boiler diagram	16
5	Boiler assembly and installation	19
5.1	Boiler placement	19
5.2	Connection to a chimney	20
5.3	Pellet burner installation	21
5.4	Ensuring air supply to the boiler	21
5.5	Installation and operation of lambda sensor	21
5.6	Heating system design, connection	22
5.6.1	Inlet and outlet connections:	22
5.6.2	Buffer tank size:	22
5.6.3	When there may be no mixing in the boiler-tank circuit:	22
5.6.4	Why is a check valve installed in the boiler-tank circuit:	23
5.6.5	Connecting the boiler - buffer tank with gravity circulation (without a pump):	23
5.6.6	Connecting boiler-buffer tank with forced circulation (with a pump)	23
5.6.7	Residual boiler power	23
5.6.8	The best way to drain residual heat	24
5.6.9	Other methods of draining residual heat	24
5.6.10	Water	24
5.6.11	Open expansion vessel	24
5.6.12	Connecting the boiler to an existing system	24
5.7	Hydraulic circuit diagrams with ecoMAX 860D controller	25
5.7.1	Diagram 1 – boiler-tank gravity connection	25
5.7.2	Diagram 2 – combined boiler-tank connection, with a pump in the ejector	26
5.7.3	Diagram 3 – combined boiler – tank connection, pump in bypass with non-return valve	27
5.7.4	Diagram 4 – forced connection with gravity emergency cooling	28
5.7.5	Diagram 5 – Forced boiler-tank circuit	29
5.7.6	Diagram 6 – forced boiler-tank circuit with thermostatic valve for return protection	30
5.8	Connecting self-cooling	31
5.9	First start of the burner and its settings	31
5.10	Electrical connection	32
6	Boiler operation by the user	32
6.1	Fire-up	32
6.2	Stoking	34

6.3	Amount of added fuel, stoking intervals	35
6.4	Setting the required output	35
6.5	Setting automatic stable heat	36
6.6	Inspection and adjustment of combustion	36
6.7	Ash removal, cleaning the exchanger	39
6.8	Shutting down the boiler.....	39
6.9	Operating inspection and maintenance.....	40
6.10	How (not) to drown properly	40
7	Overheated boiler	41
7.1	Power failure during operation	41
7.2	Boiler operation without electricity	41
7.3	Other defects and their solutions	42
2	Servicing and maintenance of the burner	44
2.1	Cleaning the burner aerating rotation chamber	44
2.2	Settings of the air flow to the combustion chamber	48
2.3	Lubrication of rotation mechanism bearings	49
2.4	Ignition coil replacement	52
8	Additional information	53
8.1	Properties of different fuel types.....	53
8.2	Fuel consumption - stoking frequency	53
8.3	Methods of determining the heat loss of buildings	54
9	Safety instructions	55
10	Disposal of shipping package	56
11	Disposal of the boiler at the end of its useful life	56
12	Optional accessories for BLAZE HARMONY boilers	56
13	Related standards	57
14	Warranty conditions	58
15	ATTENTION!	59
16	Annex to warranty card for the customer - user	60
17	Declaration of Conformity of BLAZE HARMONY boilers	61

1 Use and advantages of the boiler

Boiler use:

BLAZE COMFORT COMBI hot water gasification boilers are designed for efficient, ecological and comfortable heating of houses, flats, cottages, office buildings, small shops and other buildings.

The BLAZE COMFORT COMBI 15 boiler is designed for heating buildings whose thermal loss does not exceed 15kW.

The BLAZE COMFORT COMBI 20 boiler is designed for heating buildings whose thermal loss does not exceed 20kW.

The BLAZE COMFORT COMBI 25 boiler is designed for heating buildings whose thermal loss does not exceed 25kW.

The BLAZE COMFORT COMBI 30 boiler is designed for heating buildings whose thermal loss does not exceed 30kW.

BLAZE COMFORT COMBI boilers are designed for the combustion of lumber.

Advantages of the boiler:

- **Low investment costs**
 - The boiler is equipped with a patented integrated mixing system that replaces standard return protection. It is therefore possible to implement a gravity connection to a buffer tank, and there is no need for an expensive mixing valve (e.g. Laddomat), pump or emergency cooling system. This type of connection enables the boiler to operate even in the case of a power failure.
 - The patented stable heat layer (embers) detection system, along with other progressive elements (such as multi-band primary air supply to the stoking chamber, warm stoking chamber, power control method, preheated secondary air, etc.) ensures uniform combustion, quality controllability and long-term maintenance of stable heat. This ensures the same operation comfort (number of fire-ups) with the buffer tank, with half the capacity of that required for regular boilers (without controllability).
- **Low operating costs**
 - Fuel savings are also achieved by the special design of mechanical turbulators, which keep the heat exchanger clean and free of deposits. The unique boiler design ensures low flue gas temperature and high boiler efficiency. The use of insulation of the highest quality minimizes heat loss into the boiler room.
 - Electricity savings - the ability of a gravity connection (without a pump and mixing valves) saves electricity costs.
 - Service and maintenance savings - progressive conceptual features (e.g. split hot ceramic refractories, double sealing lines, etc.) ensure low costs for parts subject to wear.
- **High-quality combustion**
 - The original design of the combustion chamber and the patented 3-band combustion air supply system is unique, where the fuel burns out evenly with constant output (the fuel does not burn in the entire volume of the hopper, it only burns in the bottom layer).
 - The boiler allows high-quality combustion of fuels of different sizes - chips, sawdust, low-quality briquettes (small or minimally pressed). Regular gas boilers are very sensitive to the size and type of fuel.
 - The boiler has a unique "hot combustion chamber" design, where the walls of the stoking chamber are completely separated from the water. The fuel is therefore not overcooled, and the combustion is good even at low power with fuels with higher moisture content.
 - The controller evaluates the immediate boiler output and makes sure that the boiler operates in a high-quality combustion range with high efficiency
- **Long service life**

- In the gasification of wood, organic acids are formed (acetic acid, etc.). In conventional boilers (from steel sheets or cast iron) these acids condense on the walls of the stoking chamber causing chemical corrosion, which greatly shortens the life of the boiler. The system of a compact hot stoking chamber completely eliminates this problem because the chambers are hotter, which prevents condensation. The durability of boilers designed this way is considerably longer than that of wood-fired boilers without similar protection.
- The patented system of integrated water mixing ensures that the temperature of the other heat exchange surfaces that are in contact with the flue gas is higher during operation than the dew point of the flue gas (60°C). This is the perfect protection of the heat exchanger's heat exchanging surfaces against low-temperature corrosion.

- **Operating comfort**

- Unique controllability and a patented automated stable heat system makes the number of fire-ups in the boiler per season several times lower than in conventional boilers. The integrated weight detector detects the optimal layer for switching to stable heat shutdown, ensuring maximum time until the next stoking without the need for another fire-up. If it does burn out, an ideal hot layer of charcoal remains in the chamber; you only need to light it (e.g. with a piece of paper) and add wood. This eliminates the need for a regular fire-up (i.e. collecting ash with residual fuel from the stoking chamber and fire-up with wood chips) during operation.
- There is no need to remove the ash from the bottom of the refill chamber. The ash continuously slides along the sloping sides of the bottom into the combustion chamber.
- Long combustion time (at reduced power), you only need to stoke the chamber 2-3x a day.
- The inclined stoking door makes it easy for the operator to add loose fuel (chips, small briquettes, sawdust, etc.).
- Due to high-quality combustion, it is sufficient to remove the ash every 2 weeks of operation. The sophisticated boiler design allows easy and time-efficient ash removal and exchanger cleaning. Moving turbulators operated by a lever on the side of the boiler completely eliminate the need for manual cleaning of the main rear flue gas exchanger.
- The powerful exhaust fan and the suction slot in the refill hole ensure that smoke does not enter the boiler room during stoking and fire-up.
- The exhaust fan minimizes dust during ash removal and boiler cleaning.
- Odtahový ventilátor omezuje na minimum prašnost při odstraňování popela a čištění kotle.
- The hot combustion chamber (thermally insulated) ensures higher wall temperature, and there is no unpleasant tar deposition in the stoking chamber.
- A ceramic glass sight glass allows the operator to easily check the combustion and improve combustion by using simple secondary air control.
- The boiler can be operated (to a limited extent) even in the event of a power failure (see Chapter 7.3).

* note: integrated water mixing thermostat and mechanical turbulators are optional accessories

- **Operation with lambda sensor**

- The lambda sensor mounted in the exhaust fan monitors the residual oxygen content in the flue gas.
- Based on information from the lambda sensor, the controller uses an actuator to move the combustion air control orifice plate and thus maintains the required value of residual oxygen in the flue gas. This ensures the best possible combustion quality and lower fuel consumption. Reliability is also increased (eliminating exchanger fouling) and boiler and chimney life is extended (corrosion intensity is reduced with combustion quality).
- Operation with a lambda sensor enables even better combustion of various fuels such as wood chips, briquettes or sawdust. These fuels are very sensitive to the combustion air supply setting

1.1 Use and advantages of the pellet burner

- BLAZE HARMONY XS burner series is designed for the combustion of solid fuels in the form of pellets of various quality and size (according to specification in Chapter 3).
- The burner activity is automatic and does not require supervision. The burner is started automatically on the basis of parameters set in the controller
- The used rotation combustion chamber system prevents the adhesion of slag which emerges during the combustion in the combustion chamber. The cyclical rotation moves the slag forward towards its subsequent removal from the combustion chamber.
- Without the adhesion, the process of burner cleaning is easier and it significantly influences its service life. The combusted fuel is aerated throughout the whole length of the combustion chamber and then stirred thanks to the rotation combustion chamber which intensifies the combustion process and allows perfect combustion of the supplied fuel.
- The burner is an environmentally friendly device which combusts the fuel from renewable resources. It is characterized by very low power consumption.
- The burner is controlled by a state-of-the-art controller which ensures optimal fuel feeding according to the user's requirements and smooth output adjustment.
- The burner is equipped with a safety device which interrupts the feeding of fuel in case of overheating or if the flame goes out.

2 Technical boiler data

Table 1. Boiler dimensions and technical parameters

Boiler type		BC15	BC20	BC25	BC30
Weight	kg	330	330	440	440
Water chamber volume	dm³	40	40	55	55
Flue gas duct diameter	mm	150			
Stoking chamber volume	dm³	80	80	120	120
Boiler dimensions: width x depth x height	mm	530x958x1200	530x958 x1200	714x958x1200	714x958x1200
Size of stoking hole	mm	355 x 355		540 x 355	
Maximum allowable operating pressure	bar	3,0			
Test pressure for type test	bar	6,0			
Range of outlet water temperature control	°C	70 - 95			
Min. operating temperature of return water to the boiler	°C	20			
Maximum allowable operating temperature	°C	95			
Hydraulic boiler loss at Δ T = 20 K	mbar	0,2	0,3	0,5	0,8
Maximum noise level	dB	55			
Minimum operating chimney draft	mbar	0,10			
Maximum operating chimney draft	mbar	0,30			
Boiler connections: - heating water	Js	G 6/4"			
- return water	Js	G 6/4"			
Connection voltage		1 PEN 230V / 0,5A / ~ 50 Hz			
Environment		základní AA5 / AB5			
Electric protection		IP 20			
Energy efficiency class		A+	A+	A+	A+

Table 2. Technical thermal boiler parameters

Boiler type		BC15	BC20	BC25	BC30
Nominal power wood/pellets	kW	15/15	20/20	25/20	30/20
Output adjustability – wood	kW	7,5 – 15	10 – 20	12,5 – 25	15 – 30
Output adjustability – pellets	kW	4,1-15	5,8 - 20	5,8 - 20	5,8 - 20
Wood consumption at nominal power	kg . h ⁻¹	4,2	5,6	7	8,4
Pellets consumption at nominal power	kg . h ⁻¹	3	4,5	4,5	4,5
Burning time of full fuel batch at nominal power					
- softwood	h	4	3	4	3
- hardwood	h	5 - 6	4 – 5	5 – 6	4 - 5
Boiler class according to ČSN EN 303-5		5			
Ecodesign		yes			
Flue gas temperature					
at nominal power - wood	°C	130*	130*	130*	130*
at nominal power - pellets	°C	100*	110*	110*	110*
at 50% power woods	°C	110*	110 *	110*	110*
minimal power pellets	°C	80*	90*	90*	90*
Woods/pellets efficiency – nominal power	%	92/94	92/94	94/94	94/94
Minimum return temperature <u>without</u> integrated thermostat	°C	50	50	50	50
Minimum return water temperature with integrated thermostat	°C	20	20	20	20
Flue gas flow rate at the outlet at nominal power	kg . s ⁻¹	0,01	0,014	0,017	0,02
Flue gas flow rate at the outlet at minimum 50% power	kg . s ⁻¹	0,006	0,008	0,01	0,012
Power input at nominal power - wood	W	29	33	37	40
Power input at nominal power - pellets	W	61	63	65	67
Maximal power input	W	190	190	230	230
Power input in standby mode	W	2	2	2	2
Required buffer tank volume	dm ³	700-1500**	700-1500**	1500-3000**	1500-3000**

Maximum heat loss *** of a heated building where the boiler is the only heat source	kW	15	20	25	35
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* Applies to clean exchanger (during usual clogging the flue gas temperature is 10 – 20 °C higher)

** The method for determining the storage tank volume is described in Chapter 5.4.

*** The method for determining the heat loss of a building is described in Chapter 8.3.”

**** chimney requirements are described in chapter 5.2

3 Prescribed fuel for the boiler

The warranty fuel for the BLAZE COMFORT COMBI COMBI boiler is the fuel listed in Table no. 3. (Warranty fuel). This is the fuel used in the certification of the boiler.

Table 3. Warranty fuel

Type of fuel according to ČSN EN 303-5		A - Biomass logs	C1 – Wooden pellets
Diameter	[mm]	max. 150	6–8
Length	[mm]	330*/500**	3,15–40
Water content	[%]	max. 20	< 10 %
Ash content	[%]	max. 1,5	< 0,7
Calorific value	[MJ.kg ⁻¹]	min. 14	16,5–19

* valid for BCC15 and BCC20

**valid for BCC25 and BCC30



ATTENTION! Poor fuel quality can significantly negatively affect the performance and emission parameters of the boiler.



The boiler is also designed for alternative fuels such as wood briquettes, dry wood chips or sawdust. They can be used in the absence of the warranty fuel.

For more useful information on the fuel - see Chapter 8.

4 Boiler description

4.1 Boiler design

The boiler design meets the requirements of:

ČSN EN 303-5 : 2013 - Boilers for central heating - Part 5: Boilers for central heating for solid fuels, with manual or automatic supply, with a maximum nominal thermal output of 500 kW - Terminology, requirements, testing and marking.

*valid for boilers BCC15 and BCC20

** valid for boilers BCC25 and BCC30

The BLAZE COMFORT COMBI boiler is based on the principle of two-stage combustion, in which the fuel is gasified with subsequent combustion of the generated gases.

The boiler body is welded from steel sheets with a thickness of 3-8 mm. The walls of the stoking chamber (1) are equipped with a steel protective shell (5) made of several segments interconnected with interlocking joints. The lower part of the side walls of the stoking chamber consist of a refractory sheet metal. The bottom of the stoking chamber is shaped like a funnel and is lined with ceramic fittings (21, 44 **). The nozzle (20) opens through the adapter (40) into the combustion chamber (2), which is also lined with ceramic fittings (27). 25 and 30 kW boilers have two nozzles. The heat transfer surfaces of the boiler consist of the side walls of the combustion chamber and the rear tube heat exchanger (4).

The boiler is equipped with 30 mm mineral wool insulation. The outer surface consists of steel sheet covers. The bottom door of the boiler contains a sight glass (19) made of ceramic glass.

The controller control panel (17) is located on the top door. The control unit (6) itself is located on the rear wall of the boiler.

An air distribution panel is located under the front cover of the front part of the boiler (30). The bottom part of the boiler has 3 combustion air inlets (50, 51, 52) equipped with flaps (18). The openings are equipped with a slide valve for regulating the ratio of secondary air (8).

The stoking chamber (1) contains a detector (12) of the stable heat layer with a rotating axis in the front wall of the stoking chamber. A balancing arm (48) located in the space of the air distribution panel (30) is firmly connected to the detector (12). A stable heat detection sensor (36) is located under the balancing arm (48). The arm lock (53) is a mechanism formed by a clamping arm and a compression spring.

The rear flue gas exchanger (4) contains turbulators (31). Mechanical turbulators operated by a lever (32) are an optional accessory that cleans the exchanger.

The water inlet sleeves (15) open into a discharge channel equipped with a flow opening with a thermostat (33), which regulates the amount of water flowing into the switchboard (38), from where water enters the boiler's water space through a number of small openings. The inlet water temperature control thermostat (33) *** is placed on the inlet sleeve (15).

The boiler is delivered with the bottom door mounted on the left side (hinges on the left side). The door can be retrofitted to the right.

The exhaust fan (7) can be rotated so that the flue (14) opens into any direction.

The boiler is equipped with a cooling loop for emergency aftercooling, with an inlet (37) and outlet (39) sleeve (both 1/2" inner) and a sump (42) for the sensor of the safety cooling valve.

The top stoking door is equipped with a safety lock (26) to secure the desired open position.

The controller control panel (17) is located on the top door. The control unit (6) itself is located on the rear wall of the boiler. To ensure better access, the control unit (6) can be attached to any side wall of the boiler or to a wall in the boiler room. The controller (6) and the control panel (17) are connected by a data cable.

The controller allows equithermal control of heating circuits based on outdoor temperature, pump control, and the connection of the room thermostat and the outdoor temperature sensor (see first connection diagram). Additional functions (more mixing heating circuits, etc.) can be connected with an extension module. The standard delivery includes a flue gas sensor, boiler temperature sensor and buffer tank temperature sensor.

4.2 Function description

If the ecoMAX 860D3 controller is used, the sensor (13) is activated by opening the stoking door and the fan (7) switches to full power. If the ecoMAX 800D3 controller is used, "STOKING" mode must be selected by pressing the control button. If there is a hot burning layer in the boiler, the operator will add fuel to the stoking chamber. If the residual layer is cool, it is used as ignition fuel; an ignited piece paper, etc., is thrown on it before adding fuel. When the door is closed, the boiler will start operating. (The flue gas fan creates a vacuum in the boiler, which opens the flaps on the air inlets (50, 51, 52). The pre-drying air enters the distribution panel (30) through the opening on the right (52); it rises through a channel in the distribution panel, passes through an opening in the upper part of the boiler and is led through the longitudinal opening (43) above the fuel layer. This air accelerates the drying and ignition of the fuel layer. Secondary air enters the distribution panel (30) through an opening in the middle (51), from where it flows through a circular channel into a cavity in the bottom of the stoking chamber, and then it is led through a series of openings into channels in the bottom side of the fittings (35, 21); here it is warmed and enters the nozzle (20). The primary air enters the distribution panel (30) through an opening on the left (50), from where it flows through an opening in the boiler below the bottom of the stoking chamber, and then it rises through the rear channels of fittings (43) behind the protective shell of the stoking chamber (5) into the bottom fuel layer. This causes primary combustion of fuel (gasification). The resulting wood gas flows through a nozzle (20) into the adaptor (40), where it mixes with the secondary air - the gaseous components are burned (secondary combustion) in the combustion chamber (2). The hot flue gases flow behind the rear fittings (27) to the exchanger, where they transfer their heat to the heated water. The cooled flue gases are sucked in by the flue gas fan (7) and pushed into the chimney by the flue (14).

The ash slides into the combustion chamber (2), from where it is occasionally removed.

The fan speed is controlled by the controller based on the water and flue gas temperature and the current power requirement.

When the fuel burns to the base layer, the fuel stops pushing the detector (12) and it tilts towards the stoking chamber, which is detected by the sensor (36). The boiler then switches to stable heat shutdown. During the shutdown, the fan switches on in the base layer at regular intervals, so that it remains hot for a few more hours.

When the stoking door is opened, the detector (12) automatically lowers so as not to get in the way of the added fuel. This lowering ensures that the fuel detector (53) is locked.

The thermostat (33) *** restricts the water flow so that the temperature of the heat transfer surfaces is higher than 60 °C.

We use ecological, water-soluble paints to protect the boiler body against corrosion. During the first days of boiler operation, it is possible to smell due to the burning of this paint.

***optional accessories

4.3 Operation with lambda sensor

When operating the boiler with a lambda sensor, the supplied combustion air is controlled automatically. A lambda sensor is installed in the exhaust fan, which detects the amount of residual oxygen in the flue gas. Based on this value, the orifice plate (9) is automatically moved by the actuator, which maintains the optimal amount of residual oxygen in the flue gas, and this results in the most efficient combustion of logs, leading to significant fuel savings.

1.2 Function description – pellet combustion

BLAZE HARMONY XS burner is assembled from individual modules. Components which are exposed to high temperatures are made of stainless and heat-resistant sheet. Other components of the burner are protected by a zinc layer or paint. The external fuel feed (8) is made of a stainless pipe or a painted pipe.

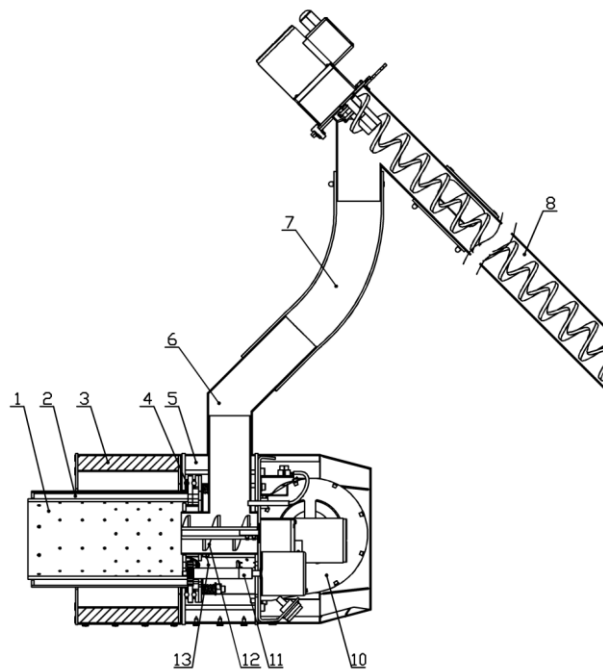
The burner consists of the basic components which are depicted in Fig. 1.

The burner activity starts with the fuel feeding from the external tank (9) by a screw conveyor (8) connected with the burner itself. The fuel is then moved to the flue gas chamber (1) by a screw conveyor (12). When enough fuel is supplied to the combustion chamber, it is ignited by a ceramic coil (13). When ignited, the burner will switch to the standard operation mode according to the pre-defined parameters. Air which is necessary for fuel combustion is supplied by a fan (10) through an aerating chamber to the combustion chamber and a certain amount of air blows through the chamber to the ignition coil. The air is supplied through the burner from its bottom part. When the burner works, the combustion chamber is cyclically rotated together with an external pipe (2) thanks to the drive (11). The rotation frequency is adjustable. Combustion products are moved to the front part of the burner and they are collected in the boiler bottom chamber.

The burner activity is fully automatic and adjustable. The fuel is automatically supplied from the tank, depending on the required heat output. If the required values are reached, the burner switches to the standby mode. The switch from the standby mode to the operation mode is also automatic and the burner will switch to the ignition mode and then to the standard operation mode. The amount of air needed for burning is closely related to the amount of supplied fuel which ensures optimal combustion and doesn't cause overcooling of the combustion chamber. The entire handling of the burner lies only in the proper parameter settings, refilling the required amount of fuel and removing the ashes from the boiler.

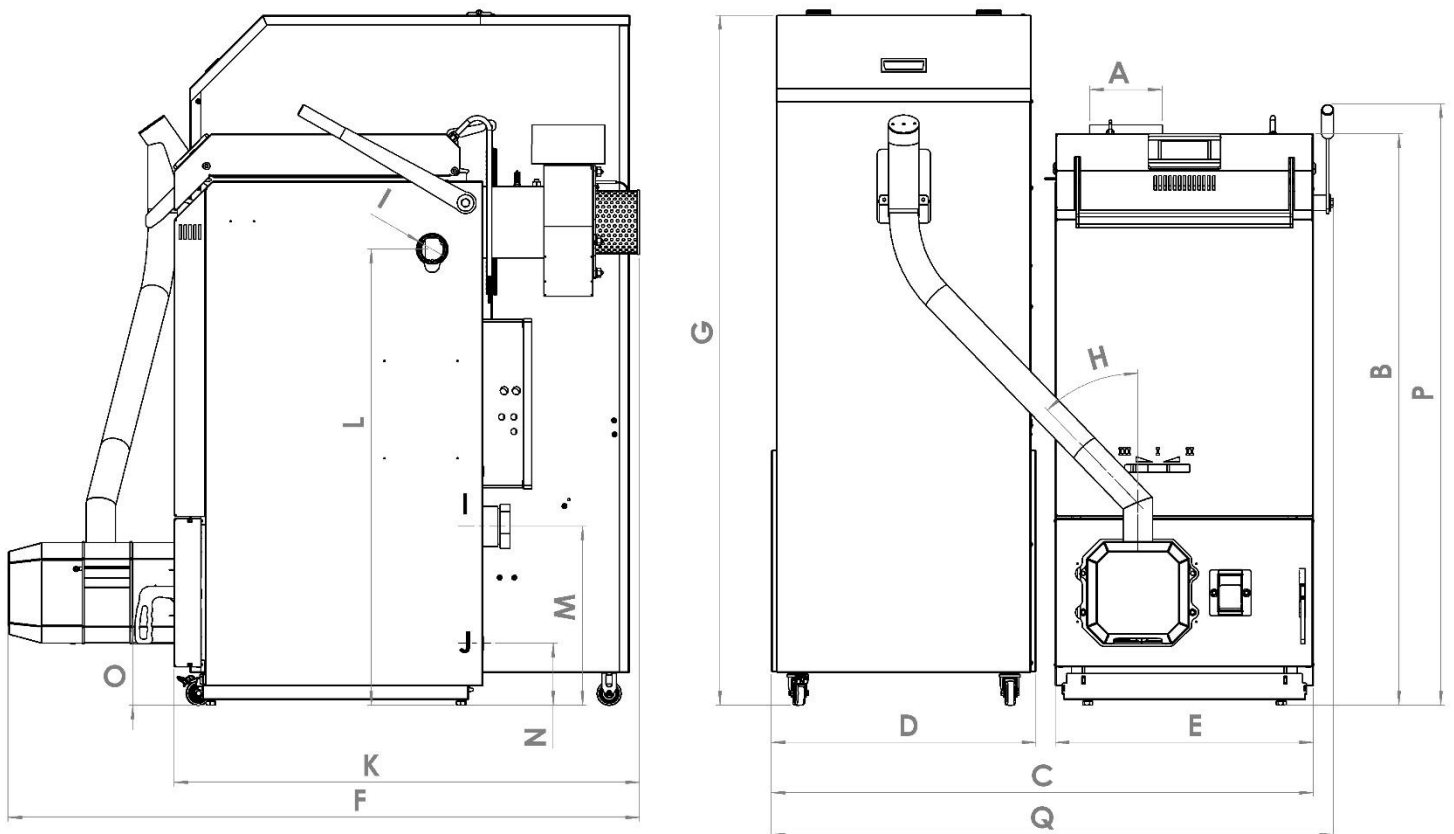
The burner and the regulator are equipped with safety features which protect the burner itself as well as the boiler against overheating and other threats which can occur during the operation. The first of them is a photosensor which is responsible for the detection of flame. If there isn't sufficient flame in the burner, the burner will switch to the automatic ignition. It means that a small amount of fuel is supplied and the ignition coil is activated. The ignition mode is on for ca. 2 minutes and if ignition is not successful, it is repeated three times. When the ignition is not successful, a relevant alarm shows up on the regulator and the burner doesn't work until the breakdown is repaired. The second security feature is a temperature sensor which is located at the place where pellets are supplied and it interrupts the fuel supply from the main tank if the fuel burns through inside the screw conveyor feeding pellets to the combustion chamber. It is switched on when the temperature reaches 60°C. It is a constant alarm which can only be switched off by the user. Another security feature is the structure of the fuel feeding system itself – thanks to the use of two screw conveyors (the first one supplies the fuel from the external feeder and the second one to the combustion chamber), connected by a meltable flexible pipe which separates the supplied fuel from the tank. If the fuel from the burner burns through, the fuel in the external tank won't be ignited.

1.3 Burner diagram



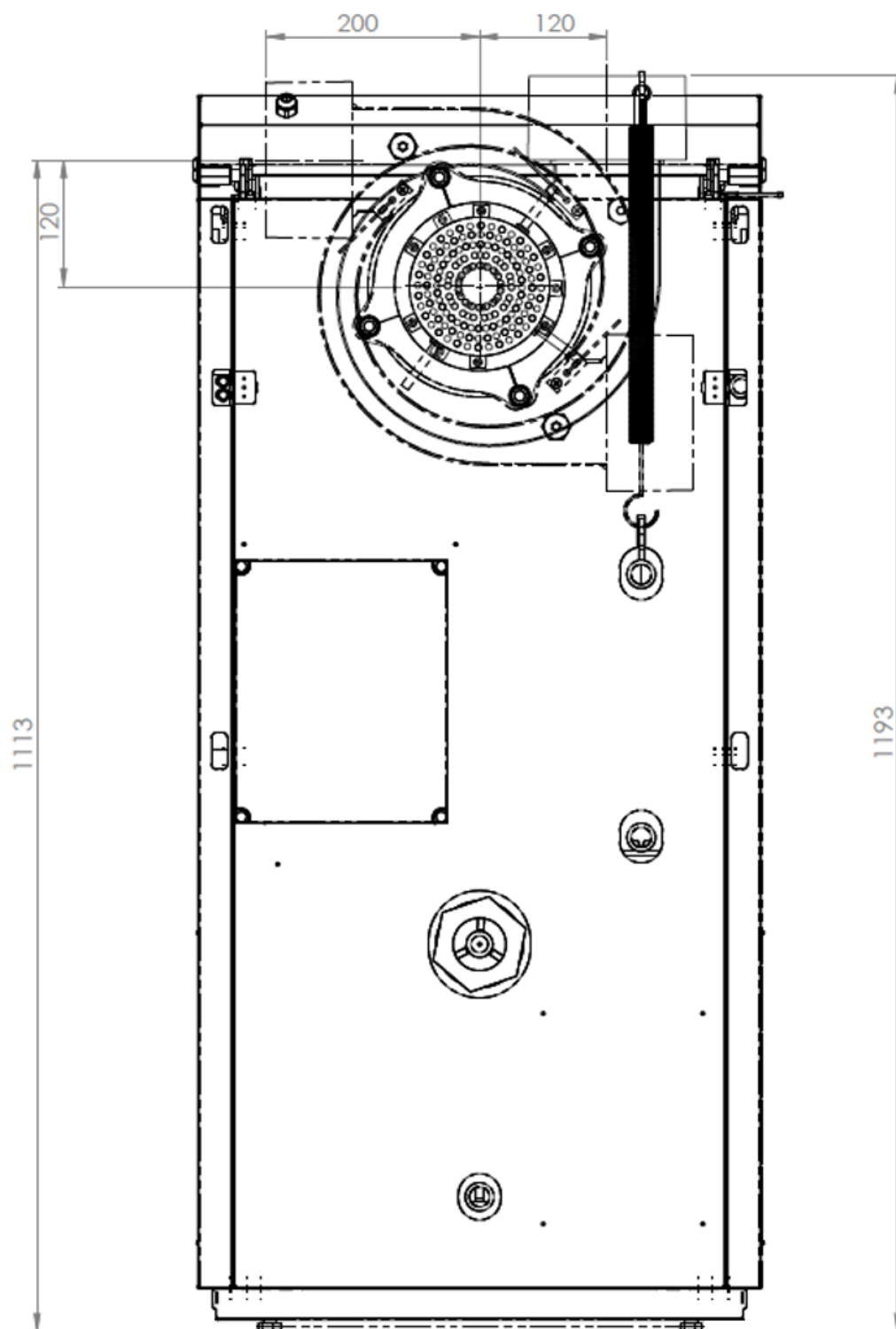
No.	Description
1.	Rotation combustion chamber
2.	Aerating rotation chamber
3.	Heat insulation
4.	The bearing of the aerating and combustion chambers
5.	Aerating chamber
6.	Connecting bend of the pellet supply
7.	Connecting flexible pipeline
8.	The fuel feed from the external tank
10.	Fan
11.	Combustion chamber rotation mechanism
12.	The fuel feed to the combustion chamber
13.	Ignition coil

4.4 Boiler dimensions



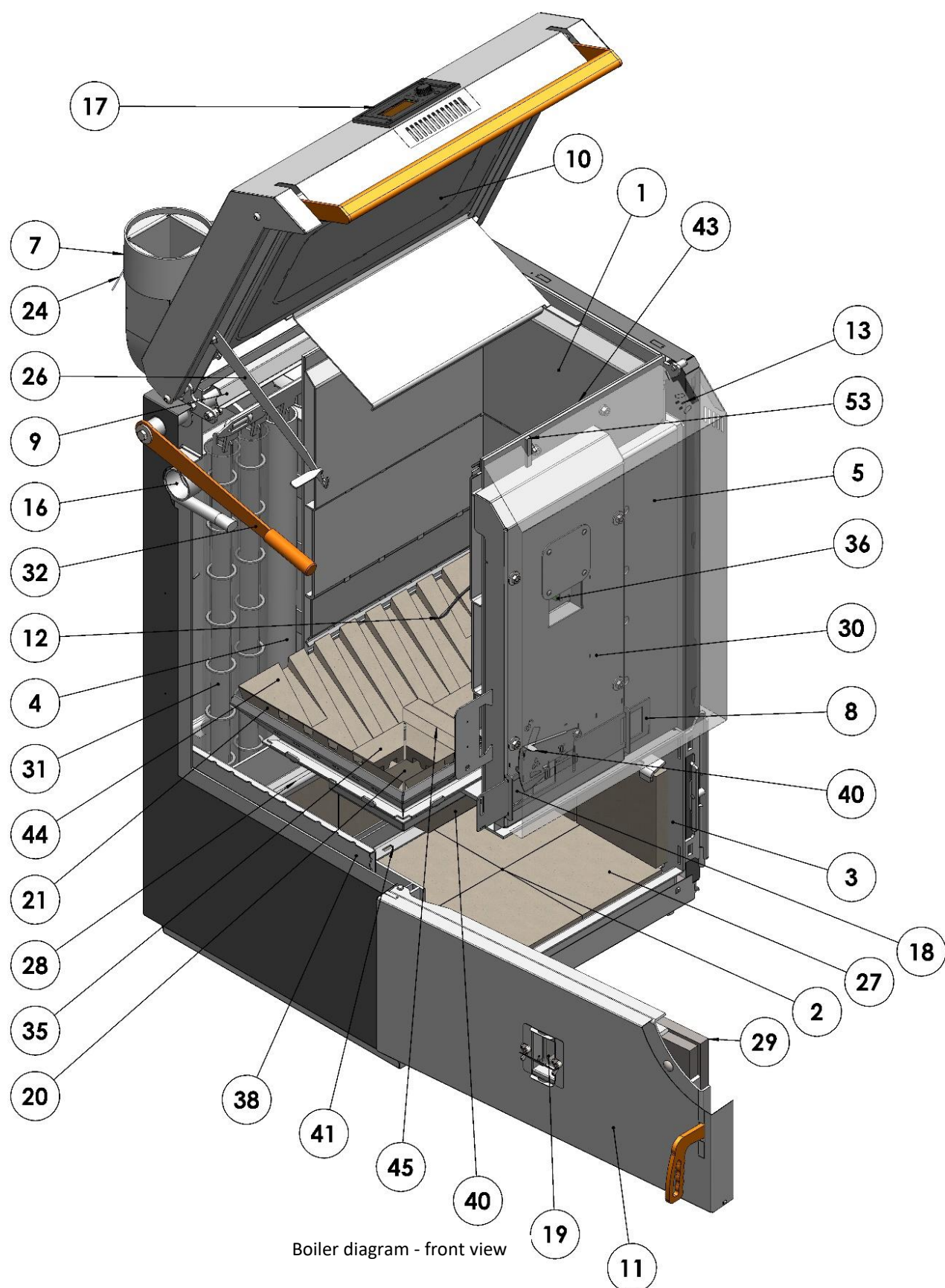
	BCC15/20 dimension(mm)	BCC25/30 dimension(mm)
A	Ø 149	Ø149
B	1193	1193
C	1104	1288
D	544	544
E	530	714
F	1294	1294
G	1417	1417
H	45°	45°
I	G 6/4"	G 6/4"
J	G 1/2"	G 1/2"
K	956	956
L	937	937
M	367	367
N	127	127
O	127	127
P	1235	1235
Q	1155	1339

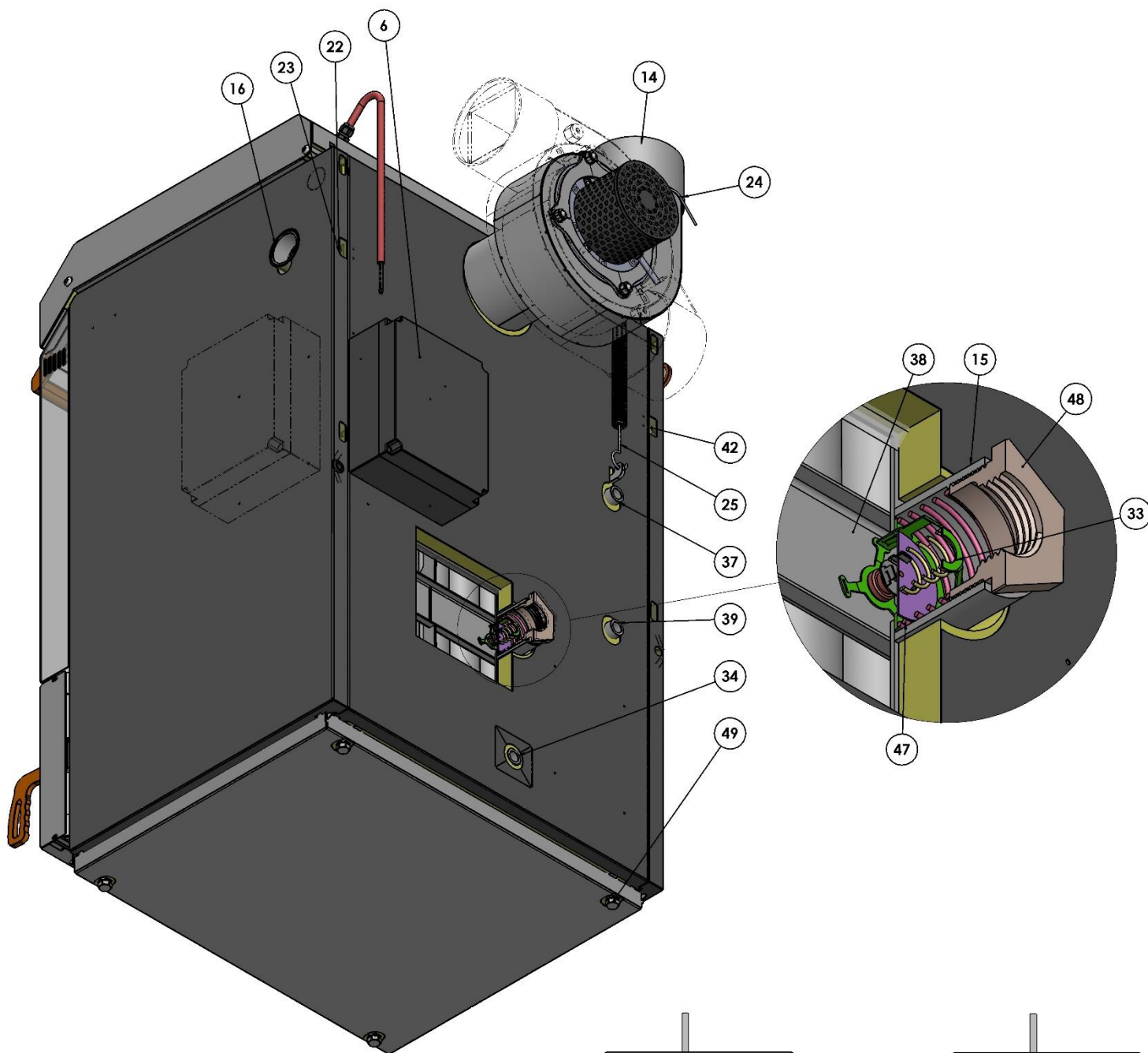
Front and side view of the boiler with dimensions table



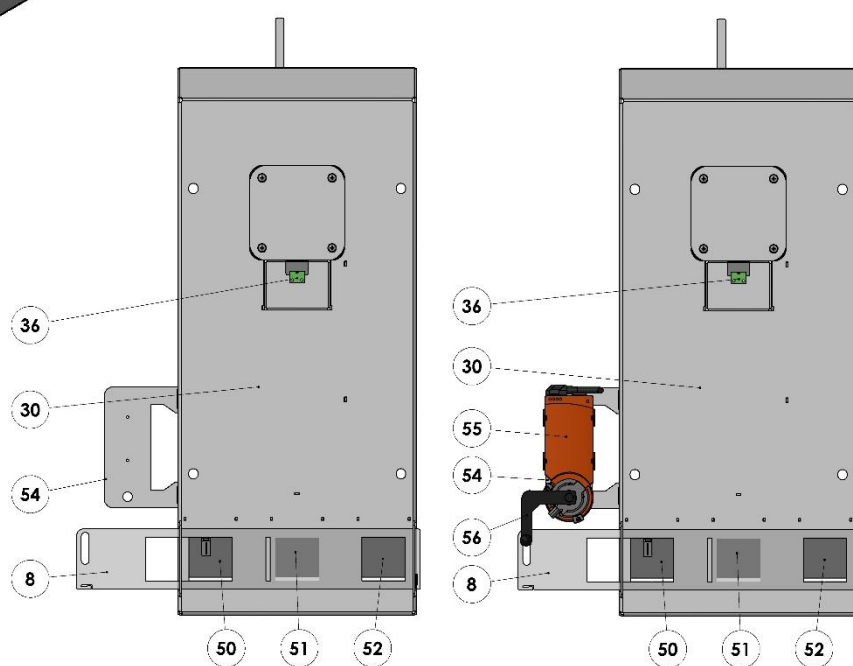
Back view of the boiler with dimensions

4.5 Boiler diagram





Boiler diagram - back view



Boiler diagram - air inlet detail

Legend

- | | |
|--|---|
| 1. stoking chamber | 30. air distribution panel |
| 2. combustion chamber | 31. turbulators (6x*,9x**) |
| 3. side flue gas heat exchanger | 32. turbulator levers *** |
| 4. rear flue gas heat exchanger | 33. boiler water temperature control thermostat *** |
| 5. protective shell of stoking chamber | 34. outlet and inlet sleeve 1/2" |
| 6. controller | 35. nozzle fitting (4x*,8x**) |
| 7. flue gas exhaust fan | 36. stable heat layer sensor |
| 8. secondary air regulator (sliding orifice plate) | 37. aftercooling water outlet |
| 9. rear heat exchanger orifice plate | 38. water distributor |
| 10. stoking door | 39. aftercooling water inlet |
| 11. bottom door | 40. |
| 12. stable heat detector | 41. adaptor |
| 13. stoking door sensor*** | 42. blanking plug of rear heat exchanger collection opening |
| 14. flue gas outlet | 43. tank for aftercooling valve sensor |
| 15. inlet sleeve G 2 1/2" (inner) | 44. pre-drying air outlet |
| 16. outlet sleeve G 6/4" (inner) | 45. **stoking chamber bottom fitting (2x) |
| 17. controller control panel | 46. **central fitting |
| 18. air flap (3x) | 47. |
| 19. ceramic glass sight glass | 48. thermostat compression string |
| 20. nozzle | 49. reduction 1 1/2" to 6/4" |
| 21. stoking chamber bottom fitting (4x*,2x**) | 50. boiler foot bolt |
| 22. emergency thermostat | 51. primary air inlet |
| 23. water temperature sensor | 51. secondary air inlet |
| 24. flue gas temperature sensor | 52. pre-drying air inlet |
| 25. top door reinforcement spring | 53. fuel detector lock |
| 26. locking strut | 54. actuator holder for Lambda sensor |
| 27. combustion chamber fitting (10x*,13x**) | |
| 28. combustion chamber fitting bar, (1x rear) | |
| 29. bottom door heat insulation | |

Note: The depicted boiler diagrams are designed with mechanical turbulators and an integrated thermostat for return protection. These accessories are optional, and the basic version of the boiler does not have this equipment.

*only for 15 and 20kW boilers

*only for 25 and 30kW boilers

***optional accessories

5 Boiler assembly and installation

5.1 Boiler placement

The boiler must be installed in compliance with the requirements of ČSN 061008 - Fire Safety of Thermal Equipment.

The boiler is supplied with transport legs that allow transport by pallet truck. These are attached with 4 M10 screws. After placing the boiler in the boiler room, the transport legs are dismantled and the screws are reinstalled (used for positioning the boiler) as follows:

1. the transverse protection boards are removed (front and rear wall of the boiler)
2. The screws of the transverse steel angles (side walls of the boiler) are unscrewed.
3. the boiler is tilted on its side and the longitudinal beam is slid out on the opposite side.
Do the same on the opposite side.
4. The boiler is tilted slightly backwards and the front cross-beam is extended. Do the same on the opposite side.
5. Loosen the 4 M12 bolts (nut wrench No. 19) between the floor and the transverse angles (no need to retract the boiler when loosening). Just loosen 1 full turn.
6. Tilt the boiler slightly backwards and move the front angle sideways by approx. 20mm.
This will release it from the bolt head and it will fall down. Do the same on the opposite side.
7. The bolts are used to set the boiler in a stable position (level).

There must be enough free space (see boiler diagram) around the boiler for maintenance or service.

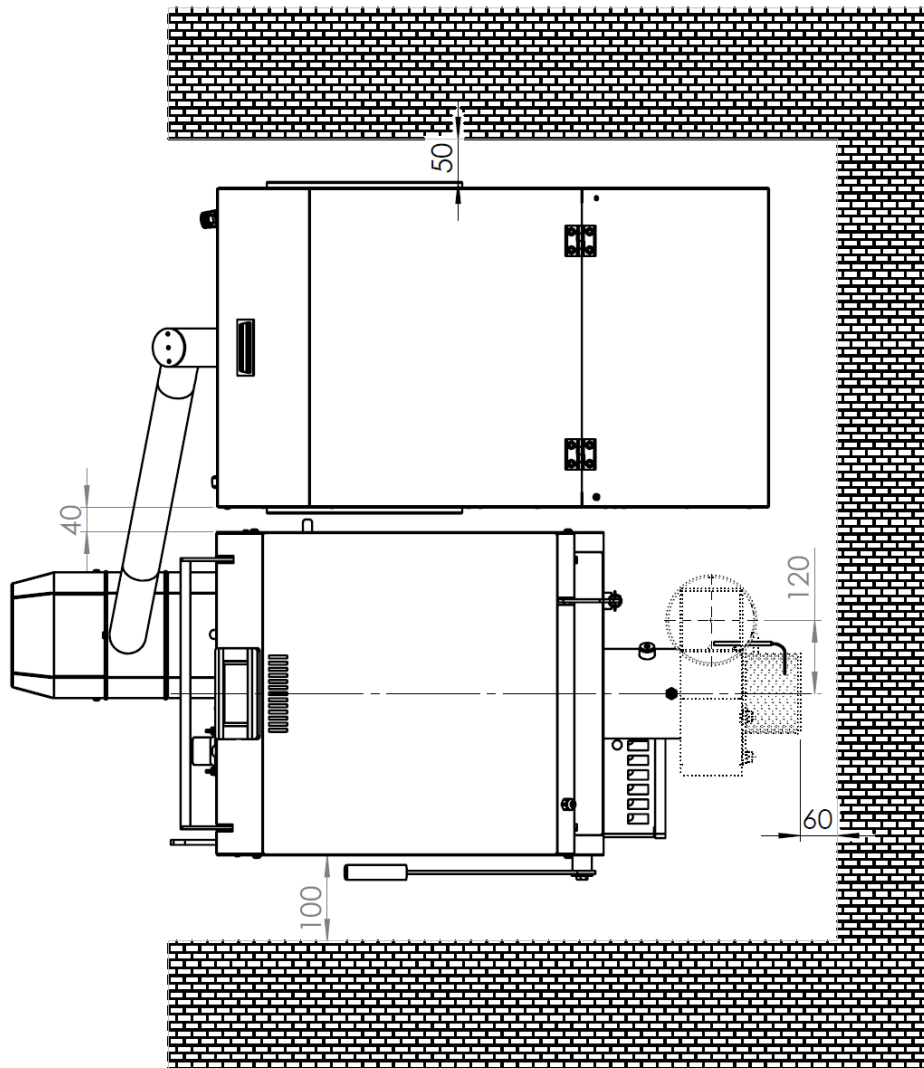
To facilitate access, the control module from the rear wall of the boiler can be mounted on the side wall of the boiler or on the boiler room wall.

The boiler must be placed on a non-flammable, heat-insulating material exceeding its bottom door ground plan (10, 11) by at least 300 mm, and by at least 100 mm on the other sides.

The smallest allowable distance between the external outlines of the boiler and flammable materials (see specifications in ČSN EN 13501-1) must be at least 400 mm.

Flammable materials must not be placed on the boiler or at a distance smaller than the safe distance from the boiler.

Minimum dimensions of the boiler location according to the ČSN 061008
standard



5.2 Connection to a chimney

Because the boiler is equipped with an exhaust fan, the chimney draft requirements are minimal. The cross-section of the chimney must not be less than 200 mm², so that the chimney is able to carry more flue gases during loading and unloading.

	BC15,20	BC25,30
Recommended chimney flue diameter	200mm	250mm
Minimum flue diameter	160mm	180mm

Chimney height should not be less than 3m.

A chimney draft regulator *v* is not recommended for conventional chimneys (with an operating draft of 10-30 Pa).

The height of the chimney should not be less than 3 m.

The flue must be firmly assembled and secured to prevent accidental or spontaneous release. An exhaust pipe longer than 2 m must be firmly anchored. All components of the flue duct must be made of non-flammable materials.

We recommend sealing gaps in the flue duct (joints) with a sealant designed for these purposes, or with aluminum foil tape. Aluminum foil tape can also be used to seal chimney door joints (overpressure may occur in the chimney during fire-up).

We recommend that the chimney flue be sufficiently heat-insulated and protected from cooling with a suitable location in the building. A chimney that is overcooled must be lined so as to prevent the condensation of vapors in the cooled flue gas and the seeping of condensate into the chimney.

We recommend providing suitable insulation for a flue duct longer than 1 m (e.g. mineral wool with outer aluminum foil). In a non-insulated flue duct, the flue gas is cooled, and during low-power operation there is a risk of condensation and flue gas humidity.

The minimum allowable flue gas temperature 1 m below the chimney's upper edge (mouth) is 90 °C.

The boiler must be connected to the chimney in accordance with the requirements of ČSN 73 4201:2008 Chimneys and flues.

5.3 Pellet burner installation

If the boiler was delivered and the burner was not installed, it is necessary to insert the burner into the hole of the bottom boiler door and use the holes in the burner flange to mount it on two screws protruding from the door, according to figure nr.8. Then tighten the burner to the boiler door using two M8 nuts. Connect the fuel feed with the burner using a plastic meltable pipe. Connect the connector of the twelve-conductor cable from the ecoMAX 860D3-HB regulator distribution board and also connect the power supply of the main burner feed using a PC connector.

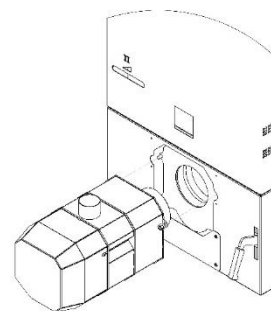


Figure 1 Installation of the burner

5.4 Ensuring air supply to the boiler

The air needed for combustion can be supplied to the boiler room directly from the outdoor environment or from the living space. Air supply from the living space is in a sense a better option, because it provides ventilation and also uses heat from the air that would be lost in conventional ventilation (heat savings are about 2%). At an output of 10 kW, the air consumption is about 20 m³/hour, which corresponds to the hygienic minimum for air exchange of an apartment with a usual area.

When adding fuel (when the door is open and the boiler fan is running at full capacity), the air consumption is approx. 200 m³/hour.

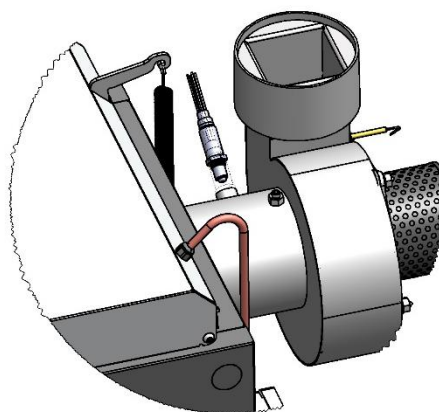
If the natural infiltration of the building does not provide a sufficient amount of air, it must be provided with a ventilation opening from the outside with an area of at least 50 cm².

The control grilles on the ventilation openings must be positioned so that they do not become clogged.

5.5 Installation and operation of lambda sensor

The boiler is supplied with a lambda sensor, which ensures continuous regulation of air supply for combustion. This results in more efficient to the lambda sensor, the residual oxygen in the flue gas, secondary and primary air for inlet orifice plate.

The lambda sensor is supplied accessories and must be mounting the fan on the flue. sensor, make sure that the sensor control module are The fan has a threaded hole on



combustion, saving fuel. Thanks controller knows the level of and it determines the ratio of combustion by moving the air

in the boiler along with other installed on the boiler after Before installing the lambda controller and the lambda disconnected from the mains! which a lambda sensor can be

Installation of the lambda probe to the exhaust fan installed, see picture no. 7. Then connect the lambda sensor to the control unit using a cable with a connector.

5.6 Heating system design, connection

We recommend connecting the boiler to a buffer tank with a gravity circuit (Chapter 5.6.1). If the installation does not allow this (the buffer tank is too distant or is below the boiler level), the connection is performed with a forced circuit (Chapter 5.6.2 and 5.6.3).

5.6.1 Inlet and outlet connections:

The boiler inlet is placed in the rear 2" spigot (G 6/4" reducer included). If the installation includes an integrated thermostat, it is placed in the aforementioned 2" sleeve, together with the mounting spring before screwing in the 6/4" reducer. The boiler outlet is connected to either of the 2 upper G 6/4" sleeves. The remaining sleeves are blanked off or used for a parallel branch (see below).

A drain valve is placed in the ½" sleeve at the bottom of the rear wall.

5.6.2 Buffer tank size:

We recommend connecting the boiler to a buffer tank (or tanks) with a minimum volume according to the following table. If the boiler output significantly exceeds the heat loss of a building * (e.g. 1.5 times), we recommend that the tank volume be proportionally bigger (i.e. at least 1.5 times). A greater volume is also selected when the boiler service intervals are greater than 12 hours. However, we do not recommend a larger tank volume than twice the minimum value (see table) due to disproportionate financial cost and high heat loss.

* The method of determining the heat loss of a building is described in Chapter 9.3.

Table 4. Buffer tank volume

Boiler	15kW	20kW	25kW	33kW
Minimum volume (l)	700	700	1500	1500
Maximum volume (l)	1500	1500	3000	3000

The minimum volume of the accumulator tank is determined by standard EN 303-3 according to the following relation:

$$V_{SP} = 15T_B \times Q_N \left(1 - 0,3 \frac{Q_H}{Q_{min}} \right)$$

Q_N ... rated power output of boiler (kW)

Q_H ... heat loss of building (kW)

Q_{min} ... minimum guaranteed power output of boiler (kW)

T_B ... combustion time of one fuel batch at rated output (hours)

The minimum volume of the accumulator tank must not be less than 300 liters.

The volume of the hot water tank (boiler) can be included in the accumulator volume.

5.6.3 When there may be no mixing in the boiler-tank circuit:

The boiler is equipped with an integrated mixing system - where the indoor thermostat* (see Boiler diagram position 33) along with a system of mixing channels ensure that the temperature of all heat transfer surfaces is higher than 60 °C. This protects the boiler against low-temperature corrosion even when connected without a controlled mixing branch (with a Ladomat thermostatic mixing valve, etc.). This mixing works very well even in a gravity connection with an accumulator tank.



* This is an original Blaze Harmony thermostat that is supplied with the boiler as an optional accessory.

It is placed in the boiler inlet sleeve. Of course, the thermostat is not installed if the boiler is connected to a storage tank with a controlled mixing branch (Ladomat, etc.).

5.6.4 Why is a check valve installed in the boiler-tank circuit:

We recommend placing a suitable valve into the boiler-tank circuit, which will prevent tank-boiler re-circulation while the tank is hot and the boiler isn't working (The heat output that escapes into the boiler room is 100-300W depending on the temperature in the tank). For more information on the valve, see chapter 5.5.5e

 *If the height of the buffer tank is significantly above the boiler, the check valve is not required.*

5.6.5 Connecting the boiler - buffer tank with gravity circulation (without a pump):

When the storage tank is near the boiler, we recommend a gravity boiler-tank circuit (without a pump, with a larger pipe dimension) - see connecting diagrams (Chapter 5.7). Advantages of a gravity connection include reliability and operational savings (for electricity and pump maintenance), similar cost to forced connection (more expensive piping is compensated by savings for the pump and accessories).

** The gravity "boiler - buffer tank" circuit must be designed to transfer the boiler's nominal power at a temperature gradient of 90/60 °C. This is achieved if the following conditions are met:*

- a. The total pipe length is up to 4 m.*
- b. The copper pipeline has a diameter of 28mm in a 15kW boiler, 35mm in a 20kW boiler, and 42mm in a 25 and 30kW boiler. If steel pipes are used, they must have a diameter of 6/4" (for all boiler types).*
- c. The number of elbows does not exceed 3 or the number of arches does not exceed 6.*
- d. The boiler and tank are at least at 1 height level (floor). The inlet into the tank is at least 50 cm (80cm for a 30kW boiler) above the boiler outlet. If the height of the ceiling enables it, it is recommended to place the tank higher (10-50cm).*
- e. If there is a check valve, its pressure loss must be less than 0.3 mbar (at nominal power and gradient of 60/90 °C) ($K_v < 3 \text{ m}^3/\text{hr.}$). This is true for the gravity valve specially developed for this type of boiler supplied by BLAZE HARMONY s.r.o. A standard horizontal valve (floating) is inappropriate for high pressure loss.*

5.6.6 Connecting boiler-buffer tank with forced circulation (with a pump)

If the location of the tank allows at least partial gravity circulation (the tank and the boiler are at the same height level), we recommend placing the boiler circuit pump in the bypass branch, see wiring diagrams (Chapter 5.7).

The advantage of this connection is the ability of gravity circulation (the pump does not limit the flow with gravity circulation). It is necessary to use Cu 28 mm pipes. With this connection, there is gravity circulation for most of the operation (the pump does not switch on until the temperature in the boiler exceeds 85 °C, for example). We recommend installing a pump with lower power (approx. 25-40 W).

The non-return valve for this connection must allow gravity circulation according to 5.6.5 e. The non-return valve (by the pump) is standard - with a spring.

Installations where the buffer tank location does not allow even partial gravity connection (buffer is below the level of boiler) the boiler pump is installed „directly“ at the return pipe from the buffer to the boiler (see Chapter 5.7). The return check valve does not need to enable a gravity circulation - a non-return valve can be used.

5.6.7 Residual boiler power

The connection must be designed to ensure that the residual boiler power is drained, e.g. due to a power failure (In the event of a power failure, the air valve closes and the burning is stopped, but the hot fuel layer and the walls continue to release heat for about 1 hour. The amount of residual heat is 5-10MJ depending on the actual power and level of fuel burning.)

5.6.8 The best way to drain residual heat

The best way to ensure the draining of residual power is to connect the boiler to a **buffer tank** with a circuit that allows the residual power to be drained through gravity circulation (see recommended connections) (With a 1000 l tank, the residual power will cause an increase in temperature by 2-4 °C).

5.6.9 Other methods of draining residual heat

If a buffer tank cannot be used to drain residual heat (if the tank is too far from the boiler or is located below the boiler), another method must be chosen, e.g.:

1. Connecting an **emergency cooling system** (see Chapter 5.8).
2. Install a combined DHW tank in the gravity branch (it drains the extra heat if the pump fails). The DHW tank volume should be at least 120 l (the residual power will cause a temperature increase of 10-20 °C). The DHW outlet from the boiler can be fitted with a thermostatic mixing valve (to prevent scalding).
3. Use a **backup power source on the circulation pump**. It is necessary to use a source with a sinusoidal shape of supply voltage.
4. Use a suitably connected **open expansion vessel** (excess power is drained by boiling when the pump fails). For more information, see Chapter 5.6.11.

5.6.10 Water

We recommend using soft water without mechanical impurities that is chemically inactive to fill the boiler. The draftsman may also suggest appropriate additives for water in the heating system.

5.6.11 Open expansion vessel

If there is an open expansion vessel in the system, it must be placed so that it does not freeze; oxidation can be reduced by a thin layer of oil on the surface. The volume must be at least 5% of the total water volume in the system.

5.6.12 Connecting the boiler to an existing system

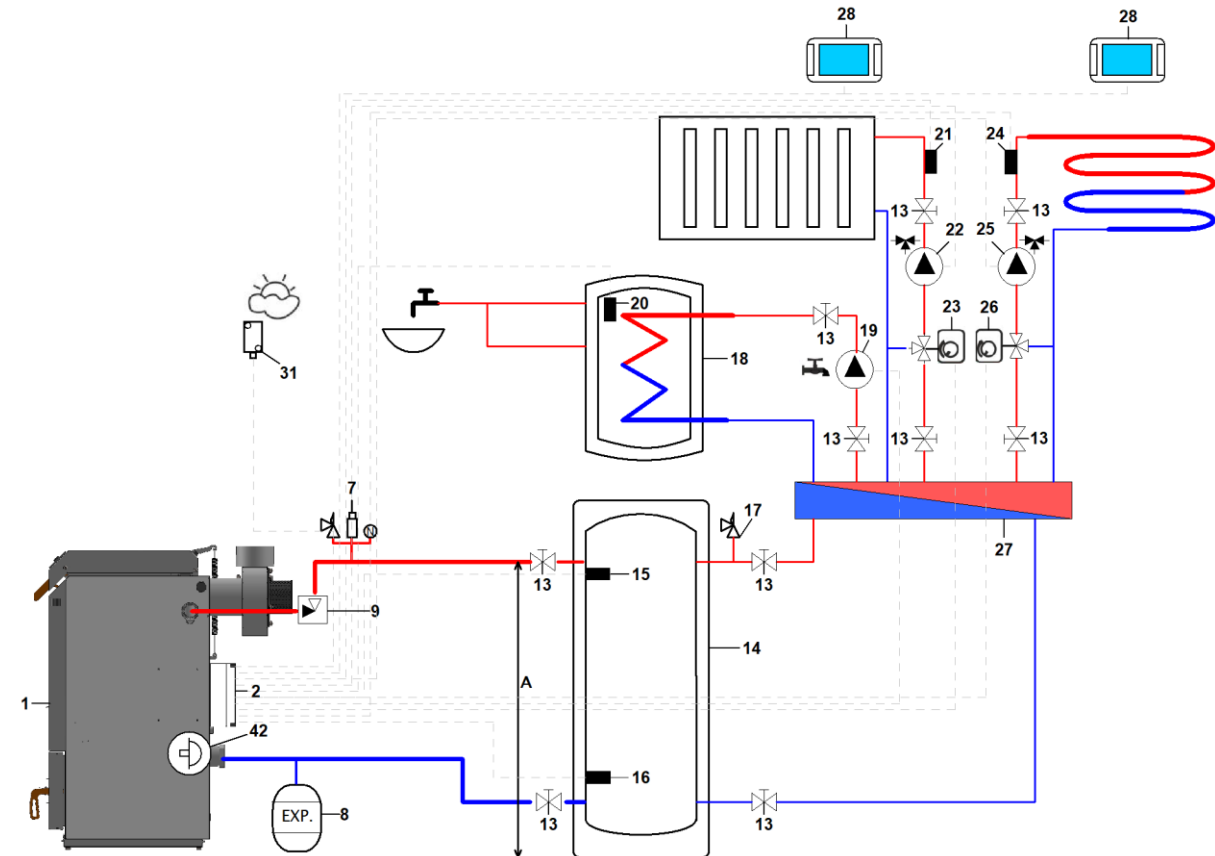
If the boiler is installed instead of another type of boiler and the mixing valve with "return" protection or Ladomat remain in the circuit, the overall functionality of the connection must be assessed with regard to the draining of residual heat, and appropriate safety devices must be installed in accordance with Chapters 5.6.8 and 5.6.9, if necessary. The water temperature control thermostat (see Boiler diagram position 33) is not installed in this case.

5.7 Hydraulic circuit diagrams with ecoMAX 860D controller

5.7.1 Diagram 1 – boiler-tank gravity connection

This connection can only be used if the boiler is equipped with an integrated thermostat for return protection (optional accessory). The safety cooling exchanger for excess heat dissipation is not connected.

We recommend to connect the return water to the boiler in the way to have simply and fast access for the integrated thermostat replacement (e.g. with fittings).



1 – boiler BLAZE COMFORT COMBI, 2 – controller, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 - expansion vessel, 9 -special gravity back-flow valve, 11 – filter, 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 – lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 - mixer 2 pump, 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER Touch, 30 – universal thermostat, 31 – outdoor temp. Sensor (CT4-P), 42 – integrated anti-condensation thermostat

Table of conditions for gravity connection

Model	A – minimal distance from floor of entry into buffer	Dimension of copper piping between boiler and buffer tank	Dimension of steel piping between boiler and buffer tank
BLAZE COMFORT COMBI 15	150 cm	28 mm	6/4"
BLAZE COMFORT COMBI 20	160 cm	35 mm	6/4"
BLAZE COMFORT COMBI 25	160 cm	42 mm	6/4"
BLAZE COMFORT COMBI 33	190 cm	42 mm	6/4"

It is necessary to assure conditions for gravity connection, see Chapter 5.6.5

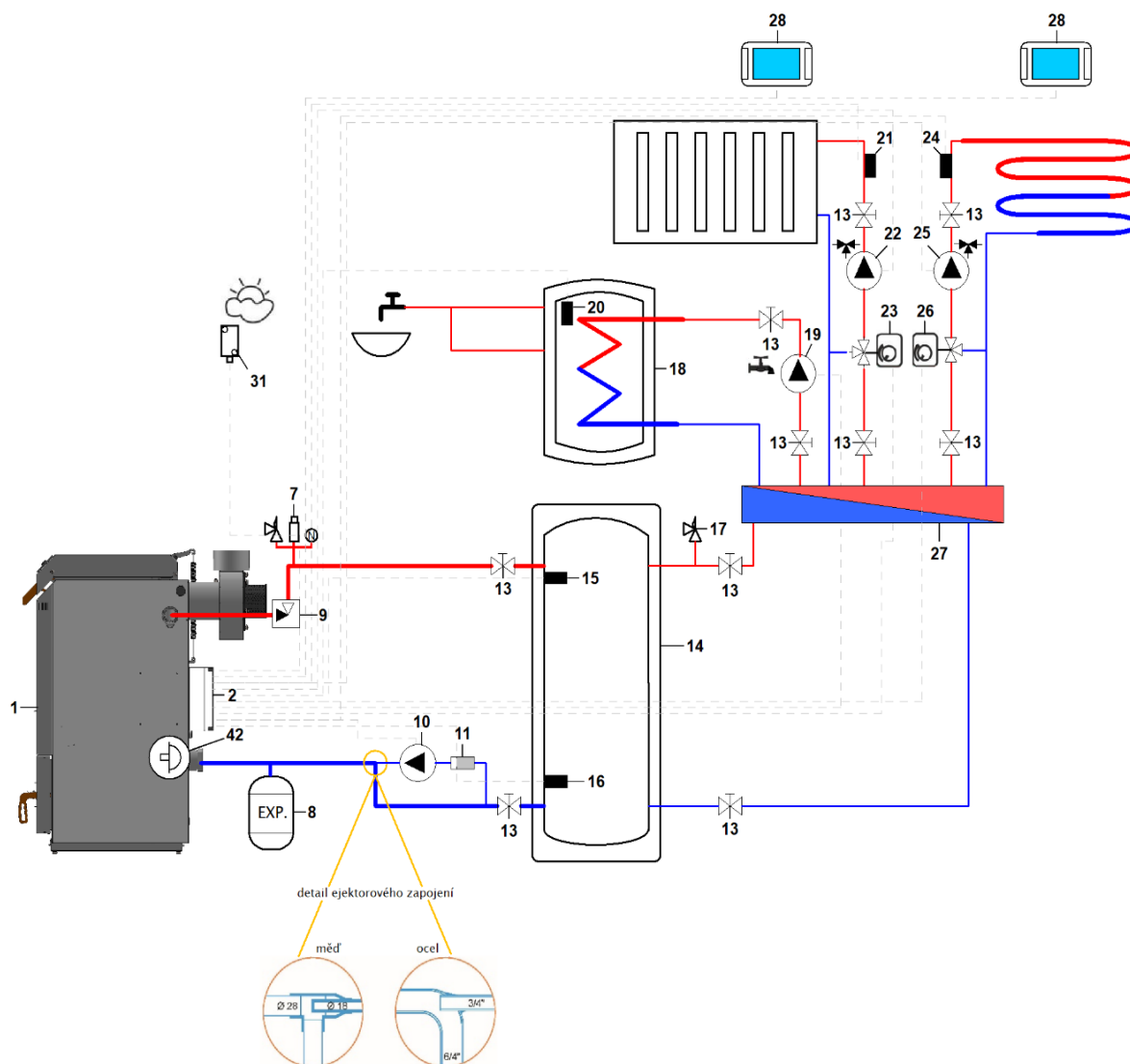
The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.7.2 Diagram 2 – combined boiler-tank connection, with a pump in the ejector

This connection can only be used if the boiler is equipped with an integrated thermostat for return protection (optional accessory). Gravity circulation works 70-80% of the time, the pump only switches on at the end of the charging of the accumulator tank (at 80 °C on the boiler).

The safety cooling exchanger for excess heat dissipation is not connected.

We recommend to connect the return water to the boiler in the way to have simply and fast access for the integrated thermostat replacement (e.g. with fittings).



1 – boiler BLAZE COMFORT COMBI, 2 – controller, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 – expansion vessel , 9 -special gravity back-flow valve 10 – boiler pump, 11 – filter, 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 - lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 -mixer 2 pump , 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER TOUCH, 31 – outdoor temp. Sensor (CT4-P), 42 – integrated anti-condensation thermostat

Pipe dimension between boiler and buffer tank is 28mm (Cu).

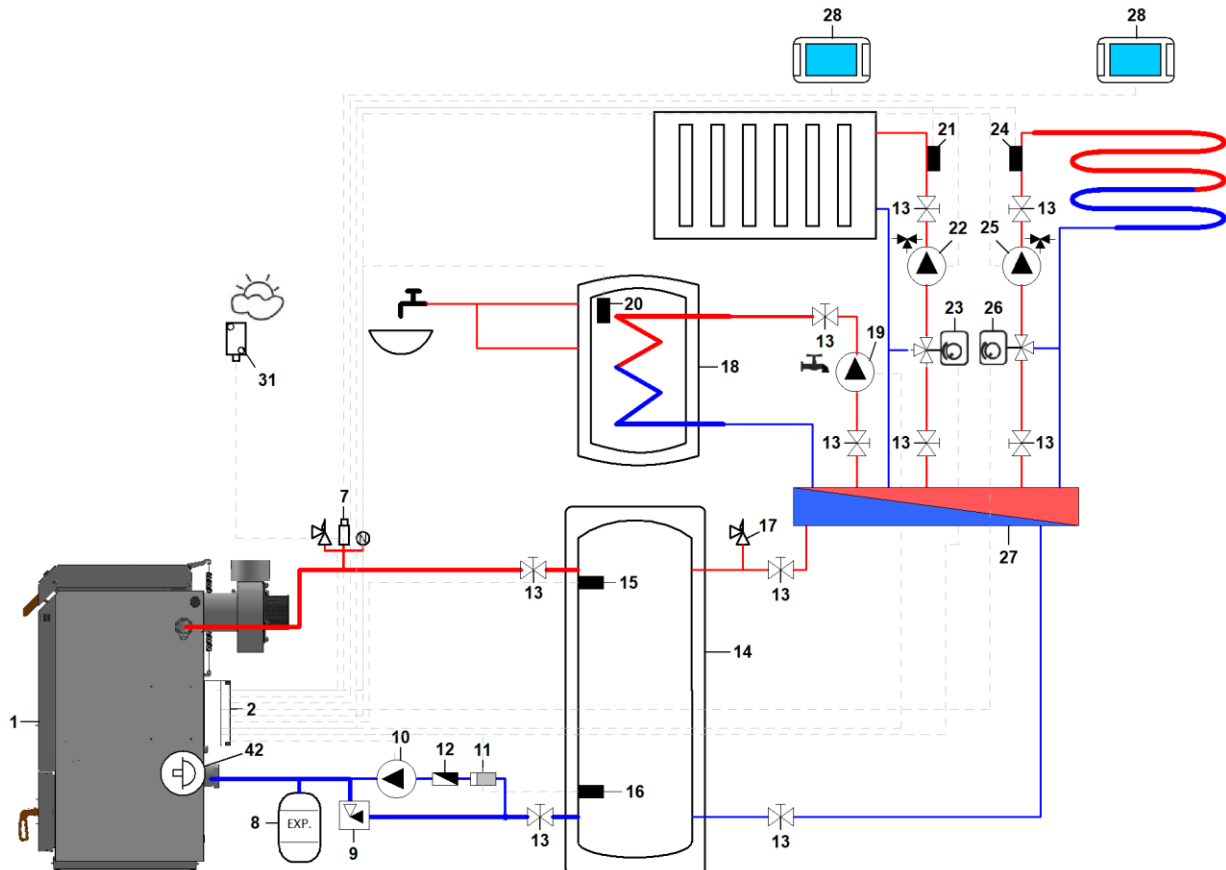
The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.7.3 Diagram 3 – combined boiler – tank connection, pump in bypass with non-return valve

This connection can only be used if the boiler is equipped with an integrated thermostat for return protection (optional accessory). Gravity circulation works 70-80% of the time, the pump only switches on at the end of the charging of the accumulator tank (at 80 °C on the boiler).

The safety cooling exchanger for excess heat dissipation is not connected.

We recommend to connect the return water to the boiler in the way to have simply and fast access for the integrated thermostat replacement (e.g. with fittings).



1 – boiler BLAZE COMFORT COMBI, 2 – controller, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 - expansion vessel, 9 -special gravity back-flow valve 10 – boiler pump, 11 – filter, 12 – horizontal back-flow valve (floating), 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 - lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 -mixer 2 pump, 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER TOUCH, 31 – outdoor temp. Sensor (CT4-P), 42 – integrated anti-condensation thermostat

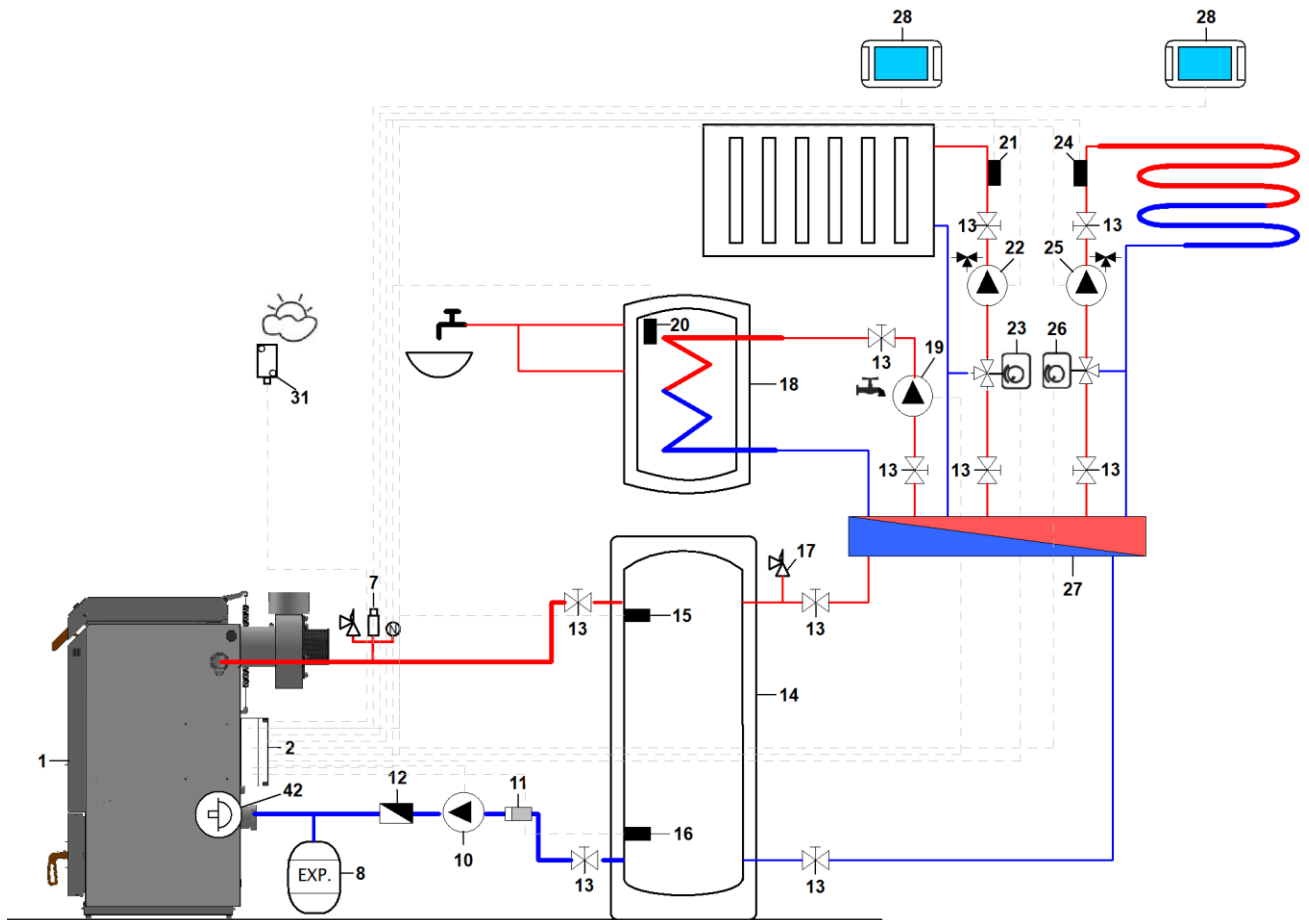
The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.7.4 Diagram 4 – forced connection with gravity emergency cooling

This connection can only be used if the boiler is equipped with an integrated thermostat for return protection (optional accessory). Circulation is fully forced during operation; in the event of a power failure, limited gravity circulation manages to dissipate residual heat to the tank.

The safety cooling exchanger for excess heat dissipation is not connected.

We recommend to connect the return water to the boiler in the way to have simply and fast access for the integrated thermostat replacement (e.g. with fittings).



1 – boiler BLAZE COMFORT COMBI, 2 – controller, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 - expansion vessel, 10 – boiler pump, 11 – filter, 12 – horizontal back-flow valve (floating), 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 - lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 -mixer 2 pump , 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER TOUCH, 31 – outdoor temp. Sensor (CT4-P), 42 – integrated anti-condensation thermostat

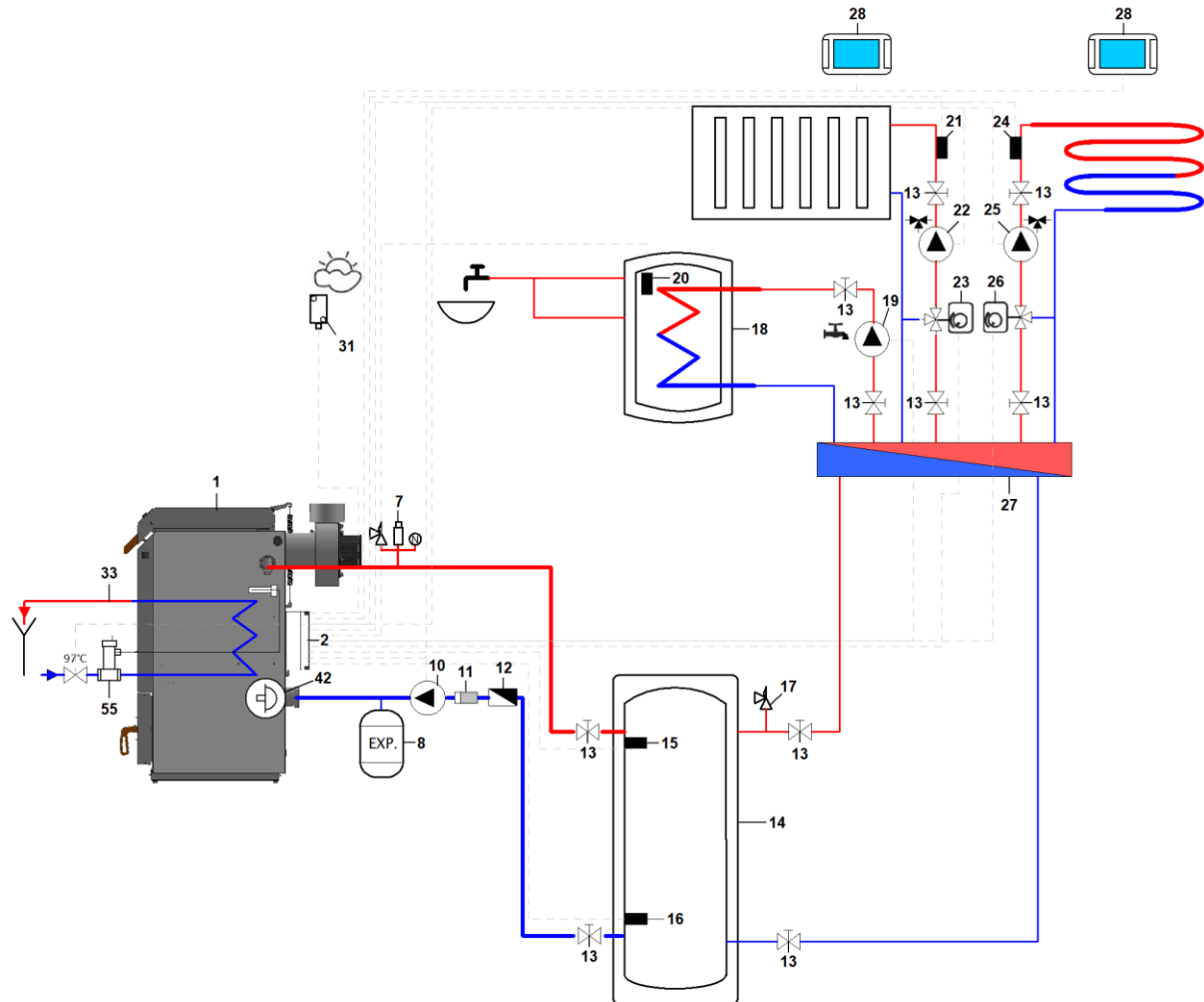
The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.7.5 Diagram 5 – Forced boiler-tank circuit

Only for installations when the accumulator tank is below the boiler level.

This connection can only be used if the boiler is equipped with an integrated thermostat for return protection (optional accessory).

The safety cooling exchanger (33) for excess heat dissipation is connected. We recommend to connect the return water to the boiler in the way to have simply and fast access for the integrated thermostat replacement (e.g. with fittings).

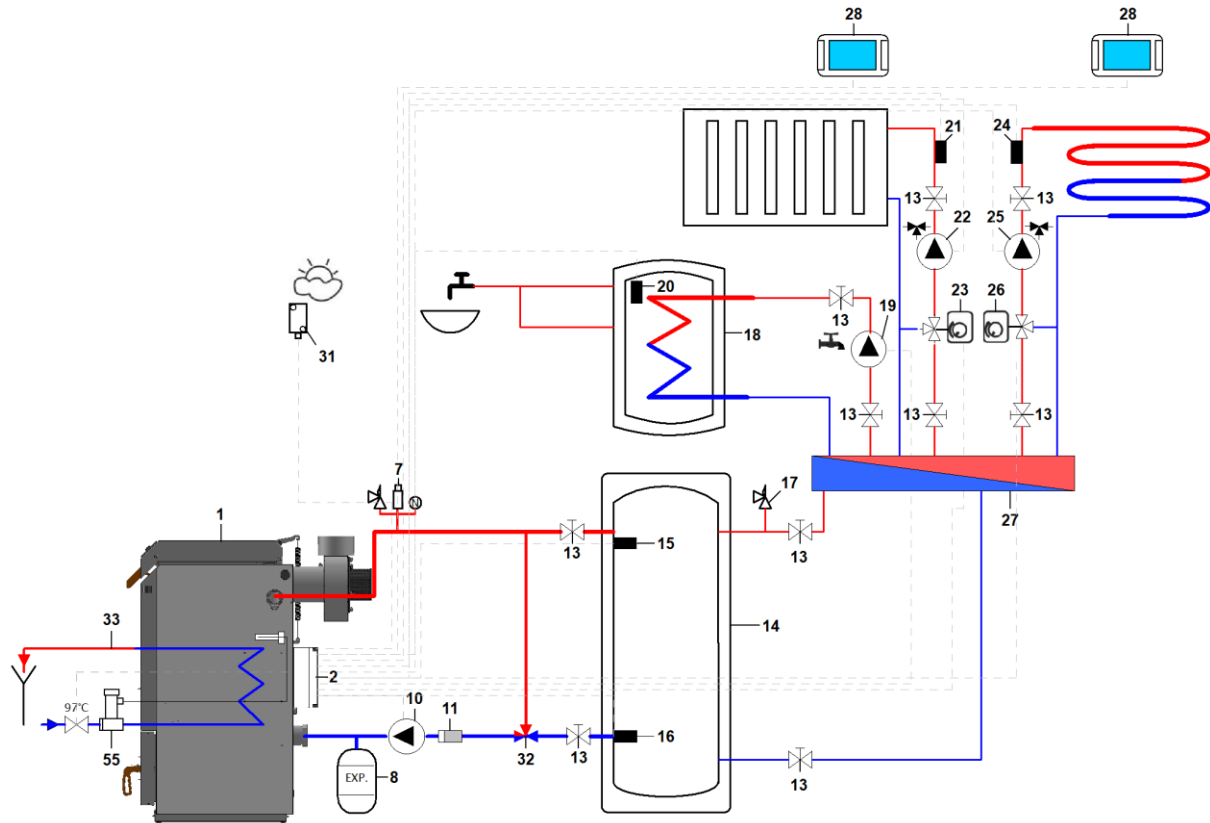


1 – boiler BLAZE COMFORT COMBI, 2 – controller, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 – expansion vessel, 10 – boiler pump, 11 – filter, 12 – horizontal back-flow valve (floating), 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 - lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 -mixer 2 pump , 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER TOUCH, 31 – (outdoor temp. Sensor), 33 – safety cooling coil, 42 – integrated anti-condensation thermostat, 55 - aftercooling thermostatic valve

The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.7.6 Diagram 6 – forced boiler-tank circuit with thermostatic valve for return protection

This diagram is used if the boiler is not equipped with an integrated thermostat for return protection. The safety cooling exchanger (33) for excess heat dissipation is connected.



1 – boiler BLAZE COMFORT COMBI, 2 – controller, 3 – control panel, 7 - safety group (air-vent valve, manometer, safety pressure valve), 8 - expansion vessel, 10 – boiler pump, 11 – filter, 13 – valve, 14 – buffer, 15 – upper buffer temp. sensor (CT4), 16 - lower buffer temp. sensor (CT4), 17 – air-vent valve, 18 – HDW tank, 19 – HDW pump, 20 – HDW temp. Sensor (CT4), 21 – mixer 1 temp. Sensor (CT4), 22 – mixer 1 pump, 23 – mixer 1 valve actuator, 24 - mixer 2 temp. Sensor (CT4), 25 -mixer 2 pump , 26 - mixer 2 valve actuator, 27 – manifold/collector, 28 – ecoSTER TOUCH, 30 – universal thermostat, 31 (outdoor temp. Sensor), 32 – anti-condensation valve (60°C), 33 – safety cooling coil, 55 - aftercooling thermostatic valve

The hydraulic diagram shown does not replace the central heating project and only serves as an example!

5.8 Connecting self-cooling

For cooling, domestic water from the water supply system with an inlet pressure of 2-4 bar (at higher pressures it is necessary to install a relief valve) and a temperature of up to 25 °C is used. The water supply must not depend on electricity (domestic waterworks cannot be used). A WATTS STS 20 cooling valve safety with an opening temperature of 97 °C, or Regulus BVTS, can be used.

The cooling water inlet is connected to the bottom sleeve (39) via the safety valve, and the cooling water outlet is connected to the top sleeve (37). The outlet from the cooling loop is led by a hose, for example, to the sewer. We recommend mounting a filter on the inlet.

If the water temperature in the boiler exceeds 97 °C, the safety valve opens and water from the water supply system begins to flow through the cooling loop - the residual power of the boiler is thus dissipated.



ATTENTION!!! It is important to make sure that the safety fitting is correctly connected to the cooling water INPUT to the heat exchanger. The safety cooling exchanger MUST NOT be under constant pressure, otherwise there is a risk of damage.

5.9 First start of the burner and its settings

- Filling the external feeder

Service settings -> Ruční řízení -> Podavač ON/OFF

Activate this function and wait until the feeder is completely full of pellets. When the feeder is full, it should operate for next 2–3 minutes so it would fill in its whole length.



ATTENTION! Filling the feeder with pellets is necessary to properly start the burner for the first time. When the tank is completely emptied, it is also necessary to fill the feeder before the start of the burner.

- Burner calibration

The regulator is connected to the power supply – the display shows: Boiler off and current time.

Menu -> Boiler settings -> Pellet output modulation -> Feeder -> Feeder efficiency test

Activate the test by confirming START.

The feeder test takes 6 minutes. During this time, the pellets are fed continually. Pellet feeding is controlled by the regulator during the standard burner operation. Before the start of the test, make sure the feed is really completely filled with pellets. Then start with the feed test – put a suitable container under the feeder tube. The whole number of pellets which is fed by the feed during the test has to be weighed and this value needs to be entered into parameter *Množství paliva v testu*.



If the test of feed efficiency is not performed according to the given instructions, it can cause an incorrect burner function (too little or too many pellets may be fed). If you change the type of pellets or you handle with the feed, it is necessary to repeat the feed test.

- Amount of fuel from the test

Menu -> Boiler settings -> Pellet output modulation -> Feeder -> Fuel weight

Enter the weight of the fuel which was fed during the feed test.

- Fan settings

Menu -> Boiler settings -> Pellet output modulation

There are fan settings for minimal, medium and maximal burner output. They are set by the factory but they can be different depending on the type of chimney, pressure resistance, etc. This is the reason why it is the best to adjust fan settings during each installation using an analyser (the measurement of CO in flue gases) or by a visual test (during the standard operation of the burner) – watch the smoke after one hour of the burner operation.

- Smoke colour assessment:

Grey to black – not enough air for the fire – the output of the fan should be increased.

Invisible – the flue gases which get from the boiler cause air waves – the humidity of the gas is above the dew point and the fan is set properly.

White – it is the result of condensation of vapours which means that CO value is low = proper settings.

A sign of proper burning parameter settings is an odourless, light-yellow flame getting out of the burner combustion chamber.

5.10 Electrical connection

Electrical connection information is in a separate document titled "Controller operation and installation manual", which is supplied with the boiler.

6 Boiler operation by the user

In order to achieve good and safe function, the boiler must be operated in accordance with the instructions given in the boiler operating manual and the controller operating manual (separate document).

6.1 Fire-up

https://www.youtube.com/watch?v=w38HTNS0-E&t=5s&ab_channel=BLAZEARMONY

Before fire-up, it is necessary to check and potentially ensure:

- Whether the buffer tank with the heated building are extracting the produced heat (see Chapter 6.3).
- The functioning of the heating system (amount of water - pressure, whether it is frozen, ...)
- The tightness of the top and bottom doors
- The functioning of flue ducts (condition, tightness, ...)
- The functioning of the stoking and combustion chambers (condition, proper assembly ...)
- Whether the side and rear heat exchanger, or the combustion and stoking chamber, are overly fouled



QR code for video of the first fire-up

- 1) Activate "OPERATION" mode on the controller and wait a few seconds for the fan to start at full power. (when using the 860D controller and door switch: Lift the door handle, wait a few seconds for the fan to start running at full power)
- 2) If there is enough charcoal left at the bottom of the boiler (at least 20 cm), it is usually enough to light a piece of paper and throw it on the layer of charcoal, followed by a few pieces of fuel. By doing so, the flames will not rise upwards but flow through the layer of charcoal, igniting it.
- 3) If there is not enough charcoal at the bottom of the boiler, stack small logs in the stoking chamber. Stack them with gaps between them (crossed). This layer should roughly fill the bottom tapered part of the refill chamber. Stack small wood chips or cuttings on this layer. Place lit crumpled paper on the wood chips. It is advisable that the paper covers a large portion of the bottom profile so that the flames do not burn upward but downward through the layer of wood. You can use paperboard or several logs.
- 4) Close the door partially, leaving a 1 to 2 cm opening (do this by closing the door with the handle pressed down). Allow to burn as necessary (about 5 minutes).
- 5) When you are sure that the fire is burning (by looking through the sight glass or the rising flue gas temperature), load the boiler with fuel (see Chapter 6.2). With a correct fire-up, the boiler reaches the nominal power within 30 minutes. If the flame is going down or dying, the top door can be opened to fire it up.



After fire-up, the controller maintains the boiler's output at a higher value to allow the fuel to burn sufficiently and to heat the walls, then it automatically switches to the value set by the operator..



Especially before the boiler is started up for the first time, but also after cleaning, check the correct assembly of the ceramic parts in the lower combustion chamber. Incorrect assembly deteriorates the combustion quality and causes excessive clogging of the boiler and chimney.



It is forbidden to use flammable liquids for fire-up. During operation, it is forbidden to increase the boiler's nominal output in any way. No flammable objects should be placed near the boiler. The ash must be placed in non-flammable containers with a lid.

6.2 Stoking

- 1) Activate "STOKING" mode on the controller, Lift the door handle, wait for a few seconds until the fan is running on full power. Slowly open the top door to about 5 cm, and wait for a few seconds until the fan exhausts any wood gas. When you are sure that sudden combustion of wood gas cannot occur (there is no dense smoke in the stoking chamber), open the door (when using the 860D controller and the door switch, lift the upper door handle and wait for the fan to start running).
- 2) Fill the chamber with fuel. If the base layer is thin, add a few small pieces of fuel.
- 3) Close the door. After 2 minutes (default setting) the controller automatically switches to FIRE-UP or OPERATION mode, depending on the current flue gas temperature.
- 4) If a flame does not appear in the combustion chamber or it dies after a while, slightly open the upper door again and let the fuel fire up for a few minutes.



Do not stir or press the hot base layer to prevent clogging of the jet.

If the base layer is small, the first few logs should also be small.

Place the logs parallel to the front wall of the boiler. Place them close together so that there is as little space between them as possible. The logs should not be longer than 33/50 cm. Longer logs may get stuck, which could prevent the fuel from sliding as well as proper combustion. The first logs should be smaller (to make the fuel load easier to burn). The last logs should be smaller (they easily break down into the base layer).

Wood briquettes of regular quality increase their volume, lose their consistency and expand (swell) at a certain stage of burning. If they are stacked tightly in the boiler (without gaps), they are pushed up against the walls of the stoking chamber and do not slide down. When stoking, it is therefore necessary to leave space between the briquettes and the walls of the stoking chamber (push them loosely). On the contrary, high-quality wood briquettes (their volume does not increase during combustion) can be placed close to each other.

Loose fuel (sawdust, chips) should be freely poured into the stoking chamber. Do not press it down, this would make it harder for it to slide down. Before inserting the fuel, it is advisable to place a few small logs, cuttings, etc. on the hot layer to prevent the fuel from falling through the jet. It is also advisable to place several smaller logs on top to form a stable layer (loose fuel does not usually form a suitable stable layer).

You can prevent smoke during stoking by inserting new fuel when the previous fuel burns out so that only hot charcoal residues remain in the refill chamber - the base layer.

You can insert the fuel by first opening the door partially and only inserting 3 to 4 logs; this will cover the hot layer, preventing the release of excessive smoke. Then, open the door fully and add more fuel.

If smoke enters the boiler room during stoking, check whether there is sufficient air supply into the boiler room, or open the window when inserting fuel into the boiler.

During stoking, it is advisable to clean the rear exchanger by turning the turbulator lever (the lever should be moved to both extreme positions). Leave the lever in the down position (unless the weight of the turbulators lifts it by itself). The recommended cleaning interval is once a day.



Do not open the bottom door when the boiler is running; this will interrupt the combustion and there is a risk of smoke entering the boiler room.

6.3 Amount of added fuel, stoking intervals

Usually, the stoking chamber filled up. **However, if the heat dissipation is small and the buffer tank is hot, it is necessary to extend the stoking intervals or add smaller amounts of fuel.** We do not recommend adding less fuel than half of the volume of the stoking chamber; with a small amount of fuel, the burning time can be shortened so much that a good stable heat layer is not formed - the residual fuel is not completely carbonized and it smoulders. In the case of a smaller fuel batch, turn off the automatic stable heat function.

Do not add fuel to the chamber if the buffer tank is hot - there is a risk of overheating and an emergency shutdown of the boiler.

If the heating system and buffer tank are unable to absorb the heat from the fuel, this would result in overheating (temperature above 95°C) and an emergency shutdown of the boiler with the burned fuel. During a shutdown, the burned fuel creates smoke, and the flue and air paths in the boiler are fouled with moisture and tar. This endangers the proper functioning, reduces the life of the boiler and chimney and pollutes the air.



Overheating creates the risk of blocking the turbulators with tar.

The time for which the boiler is overheated is calculated and stored in the controller's memory. If it exceeds 200 hours, the boiler warranty expires.



A stable heat shutdown is not detrimental to the life or ecology of operation, because it occurs with a primary hot layer of charcoal residues that do not contain volatile flammable substances and moisture.

6.4 Setting the required output

The boiler output can be controlled by two parameters that are set on the controller (after pressing the top button):

- Required boiler output (50 – 100 %)
- Maximum boiler water temperature (60 – 95 °C)

We recommend setting the "Maximum water temperature" parameter to 95°C and adjusting the boiler output by setting the "Required boiler output" parameter.

Do not operate the boiler at a higher output than necessary! This unnecessarily reduces the running time and prolongs the downtime. We recommend setting the "Required boiler output" parameter to 50% to 70%, and if the output is insufficient during a greater heat demand (in winter), increase it as necessary.

** When burning fuel of lower quality (large logs, fuel with higher moisture content), we recommend setting the max. boiler output to 60% or 70% to produce high-quality combustion.*



Controller always primarily keeps boiler output. When the required boiler output is too high and water temperature rises up to value "Maximum water temperature" then the controller reduces boiler output automatically.

6.5 Setting automatic stable heat

The boiler is equipped with an automatic stable heat function, which allows the controller to turn off the fan. The base layer remains hot in the boiler for another 6-10 hours, eliminating the need for another fire-up. The burnout of the base layer is detected by a moving detection arm, which is built into the front wall of the stoking chamber. When fuel is added, this arm is pushed on the wall by the fuel. During operation, the fuel level gradually decreases and the arm is gradually exposed. When the fuel level drops below the end of the detection arm, the arm is released and it tilts into the stoking chamber due to a counterweight. This activates the sensor (in the air panel), which informs the controller that a residual layer of the maximum set size (100%) is in the boiler.

Regulator 860D:

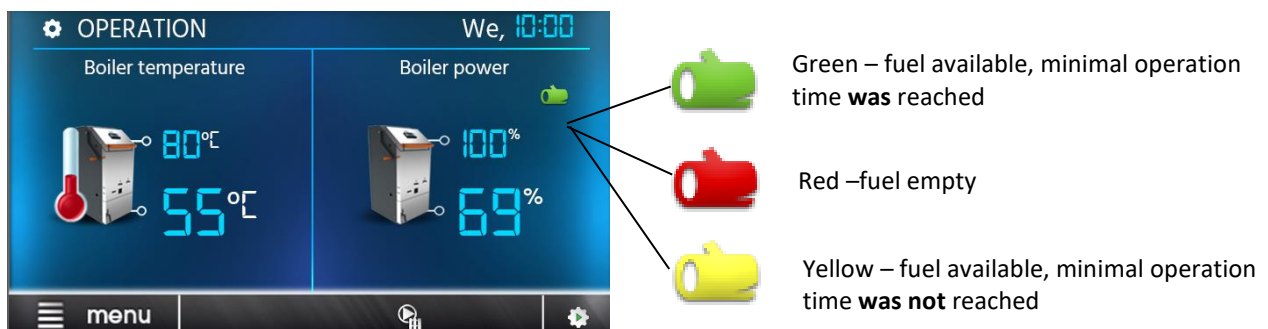
A red wood log appears on the monitor in the boiler output information section. If the size of the stable heat layer (user parameter of the controller) is set to 100%, the controller will put the boiler in stable heat shutdown immediately after the detector is tilted. If the size of the stable heat layer is set (by the operator) to a lower value (90-10%), the boiler continues in OPERATION mode for a certain time so that part of the residual fuel burns up and the stable heat layer reaches the required size. During this burning, the wood log symbol flashes.

When fuel is added, the detector is pressed against the wall by the fuel again and the color of the log changes on the monitor.



When the stoking door is opened, the thrust mechanism coupled with the door presses the detection arm against the wall of the stoking chamber to prevent it from blocking the fuel. When the door is closed, the thrust mechanism releases the arm again.

The transition into a stable heat shutdown (detected by the arm) is also dependent on the expiry of 30 minutes (service parameter) from the last stoking (opening of the door). During this time, the log on the display is yellow (see Figure ...). This function prevents an unwanted shutdown of the boiler when the boiler only has a small layer of fuel. When the door is open for less than 10s (service parameter), this function is not activated (the time in OPERATION mode is not reset.)



Color display of fuel signaling

An optimum base layer should roughly fill the bottom tapered part of the stoking chamber. The base layer must not contain smoldering fuel residues, because they foul the boiler with tar during a shutdown.

The size of the base layer can be set as a user parameter on the boiler's controller.

If the automatic stable heat function is switched off (there is no log on the display), the boiler switches off when the fuel burns out completely and the flue gas temperature drops below the set value (service parameter).

6.6 Inspection and adjustment of combustion

During operation, ensure that the combustion occurs as perfectly as possible. Imperfect combustion reduces efficiency and creates an excessive amount of harmful substances (hydrocarbons, especially tar) that pollute the atmosphere and foul the boiler and flue ducts. The quality of combustion is not only determined by the type and

moisture content of the fuel, but it can also be significantly affected by the way we place the fuel in the boiler and how we control the output.

The quality of combustion can be assessed during operation according to the flames by looking into the sight glass (see next chapter). The smoke coming out of the chimney is not visible during high-quality combustion. Light white smoke that immediately clears away is not a defect, it is caused by the steam generated by combustion.



A good amount of secondary air is a condition for good combustion.

Excessive secondary air causes excess air to not engage in the combustion, cools the flame and drains heat into the chimney without any benefit. The flame is sharp, jagged or there is none at all - the charcoal residues in the combustion chamber that the flame is touching have a pale yellow color - **it is necessary to restrict the amount of secondary air (move the shutter to the left.)**

Insufficient secondary air causes part of the combustible substance to not burn, and it is drained into the chimney. The flame is long, sometimes there is smoke - the color of the charcoal residues in the combustion chamber that the flame is touching have the same color on the entire surface. Smoke that does not clear away even when the humidity is low is coming out of the chimney - **it is necessary to increase the amount of secondary air (move the shutter to the right)**

Pre-drying air (left half of the orifice plate range) is only intended for fuel that burns very poorly when adjusted in the middle position of the orifice plate (soft wood, large uncut or insufficiently dried logs).

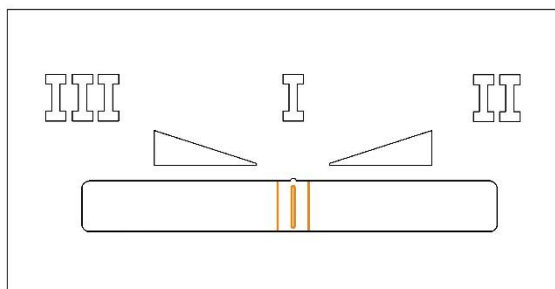
Improper use of pre-drying air (with good fuel quality) can cause the walls of the chamber and the stoking door to overheat and become damaged.



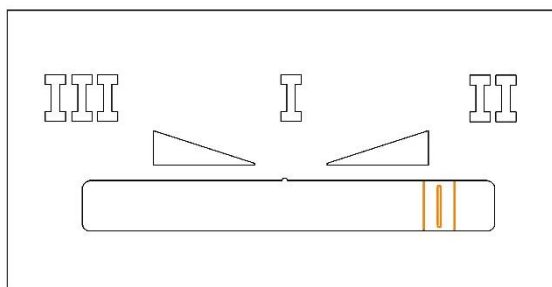
Do not confuse smoke and steam. The flue gas contains water, which condenses above the chimney and produces a fog (similar to gas heaters). Usually (if humidity is low) the fog will dissolve (evaporate) within a few meters.

The amount of secondary air is adjusted with the sliding shutter (position 8 on the diagram).

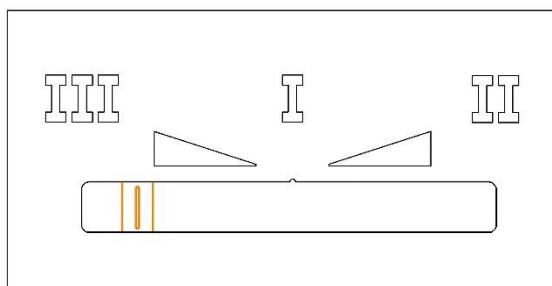
Orientational secondary air setting according to fuel type:



- Usual wood - screen in the middle.



- Hardwood (beech, oak), dry wood chips, wood briquettes - more secondary air - screen on the right



- Softwood, large unchipped or insufficiently dry logs - minimum amount of secondary air (maximum primary and pre-drying air) - screen on the left.



Secondary air control takes place automatically (optional) with the lambda probe and control module. The lambda probe can be additionally installed on the boiler..

6.7 Ash removal, cleaning the exchanger

The ash from the combustion chamber (2) is collected when the central thickness of the layer is greater than 5 cm. Ash is either removed cold or before fuel is added, when there is minimum fuel in the boiler.

The ash from the bottom of the refill chamber usually doesn't need to be removed - it is pulled through the jet into the combustion chamber during operation. Nevertheless, we recommend checking and removing the ash layer from the bottom of the feeding chamber once a month. For fuels with a higher ash content (wood chips) this should be done more frequently (once a week).

The exchanger (if there are no mechanical turbulators) must be checked at least once a week, and if it is clogged, it is necessary to remove the turbulators and clean the pipes with cleaning tools.

The rear flue gas exchanger is cleaned by moving the turbulator lever, preferably after each stoking. The lever must always be pushed to both extreme positions. Neglecting regular cleaning of the exchanger (by moving the turbulator lever) may result in the clogging and blocking of turbulators. Subsequent commissioning can be very difficult (requires opening the heat exchanger cover, pulling out individual turbulators, cleaning and subsequent assembly)

The bottom door is opened and the ash is removed when the boiler is cold, or when there is a minimum amount of fuel in the stoking chamber (only the base hot layer).

Every 2 weeks remove the plug (see Boiler diagram item 41) and check or remove any deposits in the space under the rear heat exchanger. On this occasion it is also recommended to remove any build-up from the wall behind the rear fittings using a hook. We recommend that every 2 weeks any build-up should be removed from the walls of the lower combustion chamber (above the fittings and above the door, e.g. with a spatula, behind the rear fittings with a hook).



Regular cleaning and maintenance of the boiler is essential to maintain the longevity of the equipment. If the boiler is not cleaned regularly and properly, all parts are subject to increased thermal stress and risk of damage. Damage caused by neglected boiler maintenance is not covered by the warranty!



The ash must be placed in fireproof containers with lids.

Wood ash is health and environment-friendly, and it can be used as fertilizer (it mostly contains calcium and potassium).

6.8 Shutting down the boiler

When shutting down the boiler for a long period of time, we recommend cleaning its heat exchanging surfaces and collecting the ash from the boiler (see Chapter 6.7.).

Once a heating season we recommend removing the refractories from the bottom combustion chamber, cleaning the boiler walls and removing the ash. When reassembling, we recommend rotating all the refractories so that their opposite side is exposed to the heat. This will increase their durability.

6.9 Operating inspection and maintenance

Boiler and heating system

The operator is obliged to continuously inspect the device and perform necessary maintenance according to the manufacturer's manual. No special qualification is required for this, training in commissioning the boiler is sufficient. It is necessary that the boiler is occasionally checked by the operator. It is especially necessary to make sure that the temperature does not exceed 95 °C. It is also necessary to monitor the amount (pressure) of water in the system. The state of the ceramic refractories and the tightness of both doors must be continuously inspected.

Chimney and flue ducts

It is necessary to check the tightness and placement of the flue duct and the patency of the chimney flue. A layer of fly ash builds up in the chimney during operation and cleaning, which must be collected through the chimney door in order to prevent the clogging of the chimney (e.g. once per season).

Insufficiently tight flue ducts and chimney doors can be remedied with sealant or aluminum foil tape.

Door tightness

It is necessary to check the tightness of the door - the edges of the stoking openings must be lightly pressed into the sealing cord. Re-sealing is performed by replacing the sealing cord. Tightness - the correctness of the seating is known by the fact that there is a smoothly pressed edge of the sealing surface (boiler body) in the cord. If it is rough - covered with soot and tar deposits, it indicates a leak. This is particularly likely to occur on the inner cord of the feed door.

Lambda sensor

After the heating season, we recommend removing the lambda sensor from the exhaust fan and removing any dirt with a dry soft cloth. Do not use any cleaning agents! We recommend subsequently calibrating the lambda sensor according to the instructions for the control unit of the boiler controller.



Attention! When handling the lambda sensor, the mains supply to the controller and the lambda sensor module must be disconnected.

6.10 How (not) to drown properly

It is recommended to pay attention to the Operating Instructions of the boiler. Especially the sections that describe how to operate the boiler correctly so that the combustion is of good quality. Poor quality combustion reduces efficiency, pollutes the surroundings, shortens the life of the boiler, and causes excessive fouling of the flue gas passages or "clogging" of the turbulators. Think of turbulator stalling as a valuable warning that something is wrong with the boiler operation.

Possible errors and recommendations for boiler operation:

- **Improper plugging into a clean boiler** ... We recommend filling the funnel with pieces of fuel (well dry, ideally hard) so that after the fire is started and the door is closed, the flame remains stable (it may weaken, but it must not wane or go out).
- **Unsuitable fuel** ... Large pieces, too many gaps, damp or all together. Softwoods in particular are harder to burn and require to be dry, split (up to about 15cm). Too long pieces, they can buckle. Logs should be no longer than 33/50cm. For inferior fuel, we recommend a higher power setting. Do not put large pieces at the bottom (not enough to fall apart and get stuck above the funnel) Do not put large pieces on top (they will not char and will splinter after shutting down). It is recommended to stack irregular pieces together with minimal gaps
- **Inappropriate II air setting (see instructions.)**...e.g. softwoods usually require pre-drying air. Hardwoods and chips more secondary air.

- **Insufficient fuel rate**...always recommend full rate (half rate burns short and hardly forms a quality stable layer).
- **Too low output** ... especially when combined with a clogged boiler or unsuitable fuel.
- **Operation with a clogged boiler** ... ash in the lower chamber and exchanger passes. The metal walls of the flue passages and chamber (for BC, the lower door above the fittings and the door opening) should be cleaned. If there is a lot of ash at the bottom of the feed chamber, allow to burn out completely, sweep down and remove.
- **Adding fuel in a state where no extraction is ensured** ... The tank and the object will not absorb the heat from the fuel charge and shutdown will occur with smouldering fuel - it is necessary to determine the free capacity of the tank before adding it (limit temperature e.g. 60°C in frost, 50°C when the outside temperature is above 0°C).
- **Burning of non-standard fuels**... Wood chips, sawdust, etc. require more operator requirements (flooding, feeding, power control, and air adjustment).
- **Inappropriate operation intervention** ...Shutdown before burn down to staggered layers, restart operation time (by panel selection or peeking).Possible defects and their solutions

7 Overheated boiler

If the boiler water temperature exceeds 95°C, the controller shuts down the boiler (switches off the fan). If the temperature exceeds 97°C, an independent emergency thermostat switches off the power supply to the fan. The display and other devices remain in operation. To restart the boiler, it is necessary to unscrew the cover of the emergency thermostat switch STB (22) and press the thermostat switch STB with a suitable object (e.g. a pencil). The emergency thermostat cannot be switched on until the boiler temperature (thermostat sensor) drops below 80°C.

7.1 Power failure during operation

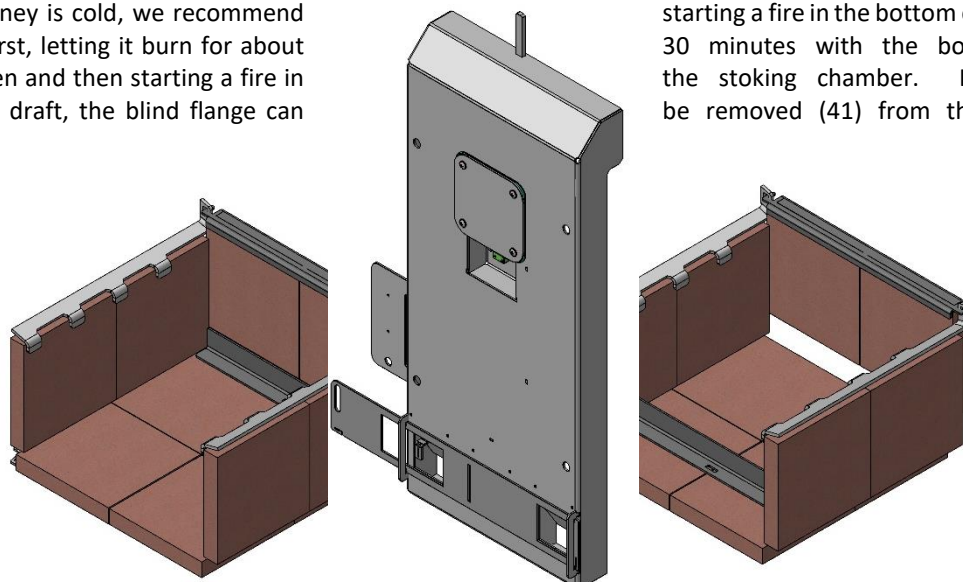
If the power to the boiler is disconnected (mains failure, shutdown by main switch), the valve on the combustion air inlet is closed - the boiler is immediately shut down. If the boiler is not connected to a backup power source, the connected pumps will also shut down. The heated walls and hot fuel layer continue to produce heat for several dozen minutes. The amount of residual heat is 5 - 10 MJ, depending on the output and level of fuel combustion before the shutdown.

7.2 Boiler operation without electricity

The boiler is capable of working only with the chimney draft. For this purpose, it is necessary to remove the front cover (loosen it by lifting it up), and the air valve (18) must be secured in fully open position with a suitable object (e.g. a piece of wood). Sufficient chimney draft is necessary: at a 10 Pa chimney draft the boiler is capable of operating at about 75%.

If the chimney is warm, switching to chimney draft operation is relatively easy .

If the chimney is cold, we recommend chamber first, letting it burn for about slightly open and then starting a fire in insufficient draft, the blind flange can



starting a fire in the bottom combustion 30 minutes with the bottom door the stoking chamber. If there is be removed (41) from the cleaning

Air distribution panel, blockage of the air flaps, curtain on hole. This will increase the flue gas temperature, resulting in increased chimney draft. The output can also be increased by removing the turbulators.

When the boiler is operated this way, it must be under constant supervision. It is necessary to make sure (by adding fuel, opening the combustion air hole) that the water temperature does not exceed 95°C. In the event of a power failure, the boiler can be connected to a gravity circulating system.

7.3 Other defects and their solutions

Bottom combustion chamber -
installed blind flange

Bottom combustion chamber -
removed blind flange



Defect	Cause	Removal
The controller display is not working.	The internal fuse on the control module is burned.	Replace the fuse (service technician, qualified electrician).
	The display data cable connector on the controller panel or module is loose or disconnected, the cable is damaged.	Check the connector, replace the damaged part (service technician, qualified electrician).
	Damaged display.	Replace the display (service technician, qualified electrician).
	Damaged controller.	Replace the controller (service technician, qualified electrician).

The turbulator lever doesn't move.	Poor combustion, inactive turbulators. Frequent boiler shutdowns with a large amount of fuel (overheating).	Remove the top cover, open the rear exchanger cover, gradually bend both arms, remove the oscillating link, individually set the turbulators in motion. Tar may be dissolved with an appropriate alcohol-based solution.
The fan does not rotate in OPERATION mode.	The water temperature is above the required value. The emergency thermostat is open. The fan impeller is blocked. Burned controller fuse. Engine malfunction. Damaged controller.	Change the set value. When the boiler water temperature drops below 80 °C, unscrew the emergency thermostat cover and press the switch with a suitable object (e.g. a pencil). Remove the cause (foreign object, clogging). Replace the fuse (service technician, qualified electrician). Replace the engine (service technician, qualified electrician). Replace the controller (service technician, qualified electrician).
The stable heat layer does not remain in the boiler.	Switched off in the controller settings. The air inlet valve is not tight (19). (under the front cover of the boiler) Damaged inductive sensor (the red LED diode does not switch on) The fuel weight detection mechanism is polluted by tar - Frequent boiler shutdowns with a large amount of fuel in the boiler (overheating)	Enable the „Automatic stable heat“ function in the controller menu Check the tightness of the valve when the fan is switched off, or adjust the valve if necessary (service technician) Replace the sensor (service technician) Remove the air distribution panel (30) and remove the tar along with other deposits
The exhaust fan is making excessive noise	The impeller is contaminated with tar - Frequent boiler shutdowns with a large amount of fuel (overheating). The inner cord of the stoking door is not tight.	Remove fan engine, clean. Remove cause of clogging

The burner does not ignite Alarm: "Unsuccessful ignition attempt"	No fuel in the tank The fuel feeders are blocked Damage to the ignition coil or feeder drives Slag in the combustion chamber Damaged or fouled optical flame sensor	Add fuel to tank. Fill the feeder using the feeder filling function. Remove blocking elements Contact service Clean the burner combustion chamber Clean the optical sensor In the event of damage, contact service
Alarm: "Maximum feeder temperature exceeded"	Excessive temperature rise (above 60 °C) of the burner shell caused by the burning of the flame through the combustion chamber Insufficient chimney draft Slag or ash in the boiler's combustion chamber at the height of the combustion chamber of the burner	The controller automatically switches to burn-out mode. The alarm may be cancelled by the user. Verify the chimney draft value and take all necessary measures to increase it. Clean the combustion chamber Remove ash from the boiler.



Always disconnect the boiler from the mains supply when removing defects! If the boiler unit also controls a backup heat source, it must also be disconnected from the mains supply.

In order to maintain high-quality function and safe operation, boiler repairs must be performed **exclusively by service center specialists**.

Warranty and post-warranty boiler repairs are provided by BLAZE HARMONY s.r.o. through **its specialist service centers and contractors**.

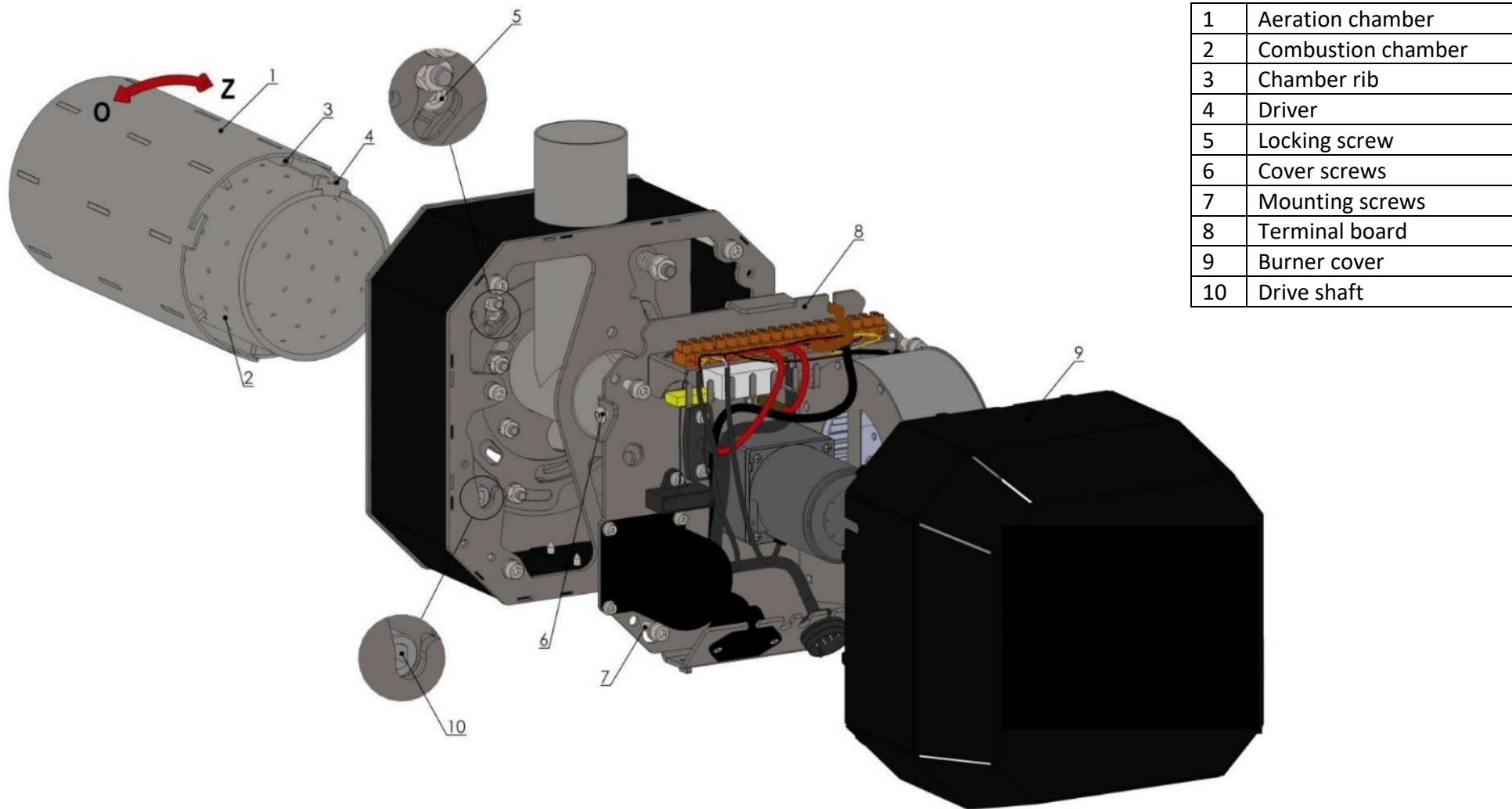
2 Servicing and maintenance of the burner

2.1 Cleaning the burner aerating rotation chamber

During the operation of the burner, a part of combustion products may go through the aerating holes to the space between the combustion chamber and the aerating chamber. Depending on the type of the used fuel, cleaning this space every 6 months of the operation of the burner is recommended. Please follow the instructions below to clean that space:

1. Disconnect the signal cable from the burner and the external cable of the feed from the regulator.
2. Disassemble the burner from the boiler door and put it on a suitable base
3. Loosen the screws (6) which keep hold of the back cover of the burner – 2 pcs. Take the back cover of the burner off.
4. Unscrew the screws (7) – 4 pcs
5. Carefully take out the flange with drives and the fan (8)
6. During the disassembling of the flange (8), take out the ignition coil (12) from the case
7. Put the disassembled assembly aside on a safe place and handle the ignition coil particularly carefully
8. Find and unscrew the security bolt (5) If the settings don't make it possible, rotate the combustion chamber (1) manually in the direction marked by "Z" until you can see the bolt.
9. Rotate the aerating chamber (1) in the direction marked by "O" to take it out from the burner body
10. Take out the aerating (1) and combustion (2) chambers from the burner.
11. Clean both chambers Also clean the aerating holes in the combustion chamber (2) if needed.
12. After the chambers are cleaned, you can start assembling the burner
13. Put the combustion chamber (2) to the aerating chamber (1) – make sure that the feeder (4) was properly placed in the rib (3) which is cut through.

14. Put both chambers into the burner in a way that the hooks of the aerating chamber (1) fit to grooves (11).
15. Rotate the chambers in the direction marked by "Z" to the end
16. Rotate the chambers in a way it is possible to screw the security bolt (5).
17. Screw the bolt (5) – it is important to put the bolt in the position apart from the ribs of the aerating chamber (1) and to screw it fully until the end.
18. Attach the flange with drives (8). During this activity, put the ignition coil (12) to the case in a way it is properly seated and secure it with a rubber end cap. The hole of the transmission shaft (10) should be set the same way as the position of the drive transmission shaft – you can rotate the shaft using the chambers (1) in the direction marked by "Z". The temperature sensor has to be in the sink which is in the tube for fuel feeding. Tighten the screws (7).
19. Put the cover on (9).
20. Tighten the screws (6).
21. Install the burner to the boiler door
22. Connect the disconnected cables.
23. The burner is ready for operation.



1	Aeration chamber
2	Combustion chamber
3	Chamber rib
4	Driver
5	Locking screw
6	Cover screws
7	Mounting screws
8	Terminal board
9	Burner cover
10	Drive shaft

Figure 2. Cleaning the burner aerating chamber

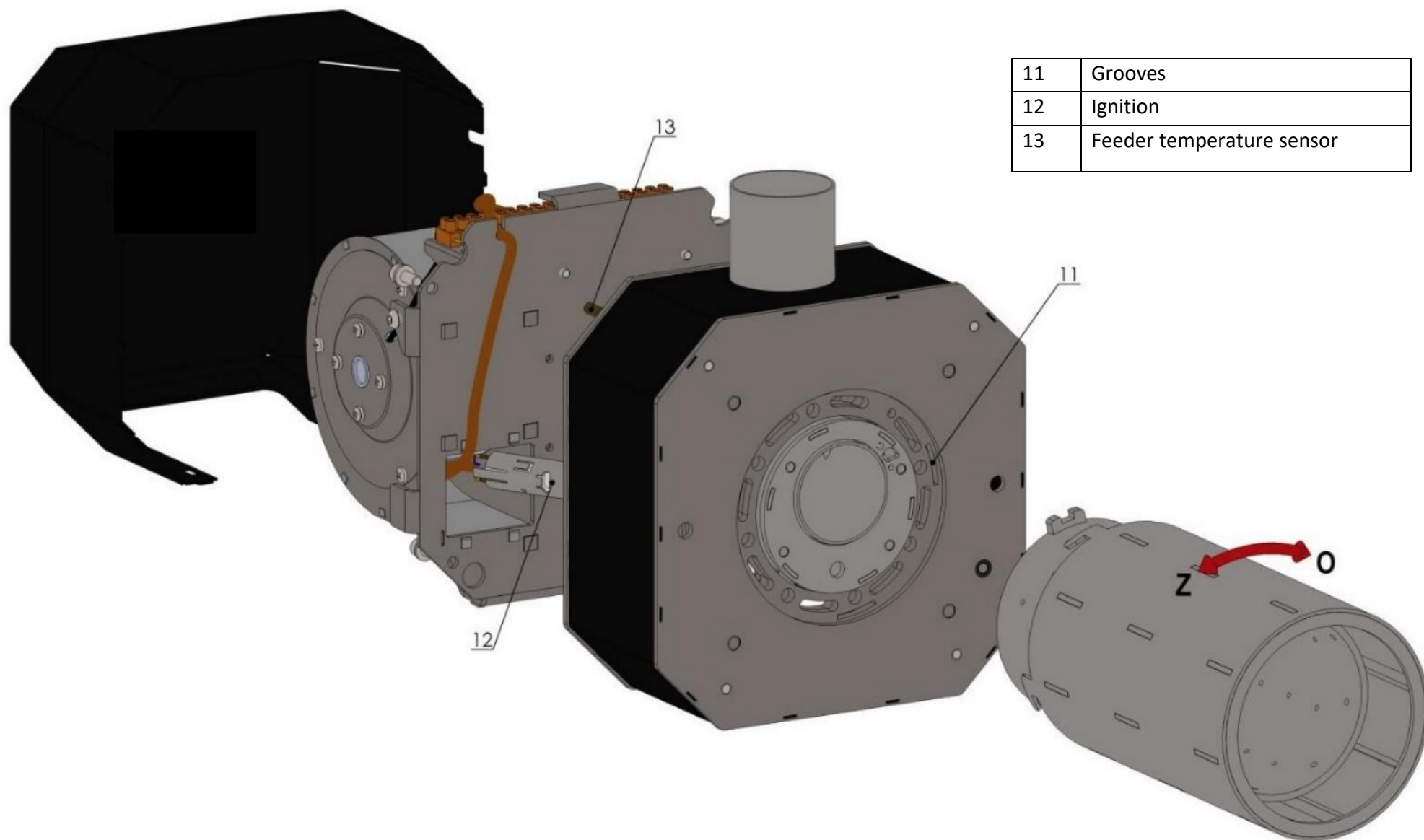


Figure 3. Cleaning the burner aerating chamber

2.2 Settings of the air flow to the combustion chamber

For BCC25 and BCC30 boilers, the ratio of primary and secondary air flow for burning can be set – this setting can be useful when alternative fuels are combusted. According to factory settings, the air flow is set for the combustion of wooden pellets. For BCC15 and BCC20 boilers, this setting is done during the production of the burner and it cannot be changed. If you want to change the settings of the air flow, follow the following instructions:

1. Loosen the screws (1) which attach the cover of the burner – 2 pcs.
2. Remove the burner cover (2).
3. Using a wrench, size 5 (4), turn the bolt (3). By turning it counterclockwise, the secondary air flow will decrease, by turning it clockwise, it will increase. Turning it from the minimal to maximal air flow is 90°.
4. When you finish the settings, put on the burner cover (2) and tighten the screws (1).

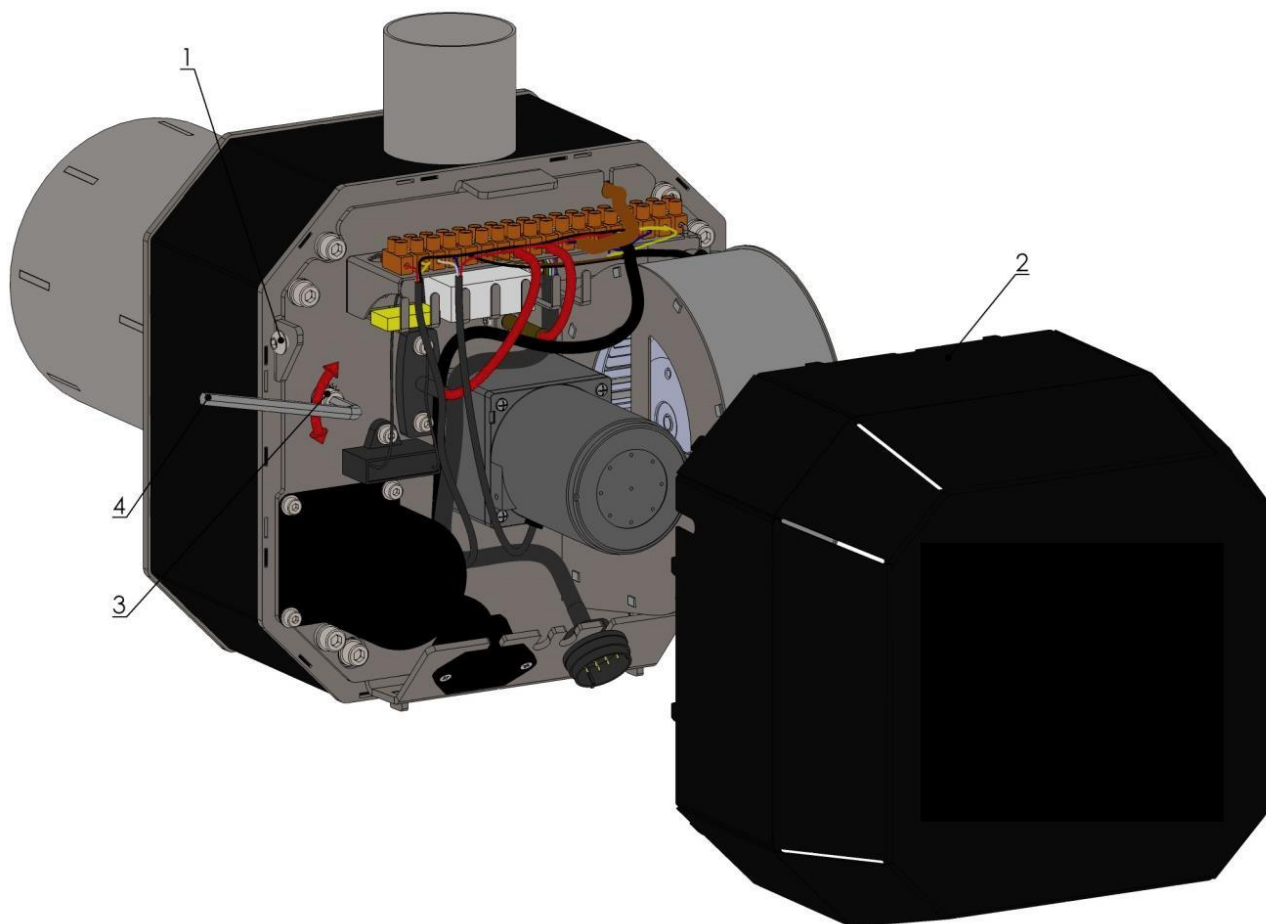


Figure 4. Air flow settings

1	Cover screws
2	Burner cover
3	Air flow setting screw
4	Wrench, size 5

2.3 Lubrication of rotation mechanism bearings

To secure a longer service life of the burner, regular lubrication of the combustion chamber bearings is recommended. Based on the frequency of burner operation, it is recommended to perform the lubrication of bearings every 6–12 months. Follow the following instructions to perform it:

1. Disconnect the signal cable from the burner and the external cable of the feed from the regulator. Disassemble the burner from the boiler door.
2. Loosen the screws (1) which attach the cover of the burner – 2 pcs.
3. Remove the burner cover (2).
4. Unscrew the mounting screws (4) – 4 pcs
5. Carefully take out the flange with drives and the fan (3)
6. During the disassembling of the flange (3), take out the ignition coil (5) from the case
7. Put the disassembled assembly aside on a safe place and handle the ignition coil particularly carefully
8. Unscrew the screws (6).
9. Disassemble the cover of the air chamber (7) together with the frame (8), the T-piece (9), the transmission shaft (14) and the divider rotation shaft (15). If needed, unscrew the security bolt of the T-piece.
10. Lubricate the bearings of the combustion chamber (10) at several places on its whole perimeter by applying the lubricant between the bearing orbit and the bearing housing. Use solid graphite lubricant.
11. Put the shaft (14) to the case (18) of the burner front panel. The latch (12) has to be placed between the gear teeth (13) – as depicted in the picture.
12. Put the shaft (15) to the hole of the bearing panel, set the teeth in a way they are depicted. These settings close the air divider, i.e. minimal secondary air flow.
13. Put the divider of the air chamber (7) together with the T-piece (9) and the frame (8) in place. Pins in the divider sheet have to be properly placed into holes, the T-piece has to be placed to the panel hole. Put on the frame (8) – pins here also have to be properly placed into holes. If needed, tighten the security bolt of the T-piece (2). The end of the drive shaft (14) has to be properly placed into the hole (17) while the divider rotation shaft (15) has to be properly placed to the hole (16).
14. Screw the screws (6).
15. Attach the flange with drives (3). During this activity, put the ignition coil (5) to the case in a way it is properly seated and secure it with a rubber end cap. The hole of the transmission shaft (11) should be set the same way as the position of the drive transmission shaft – you can rotate the shaft using the tube (1) in the direction marked by “Z”. The burner temperature sensor has to be in the sink which is in the tube for fuel feeding.
16. Screw the screws (4)
17. Put the cover (1) on
18. Tighten the screws (2)
19. Install the burner to the boiler door
20. Connect the disconnected cables
21. The burner is ready for operation

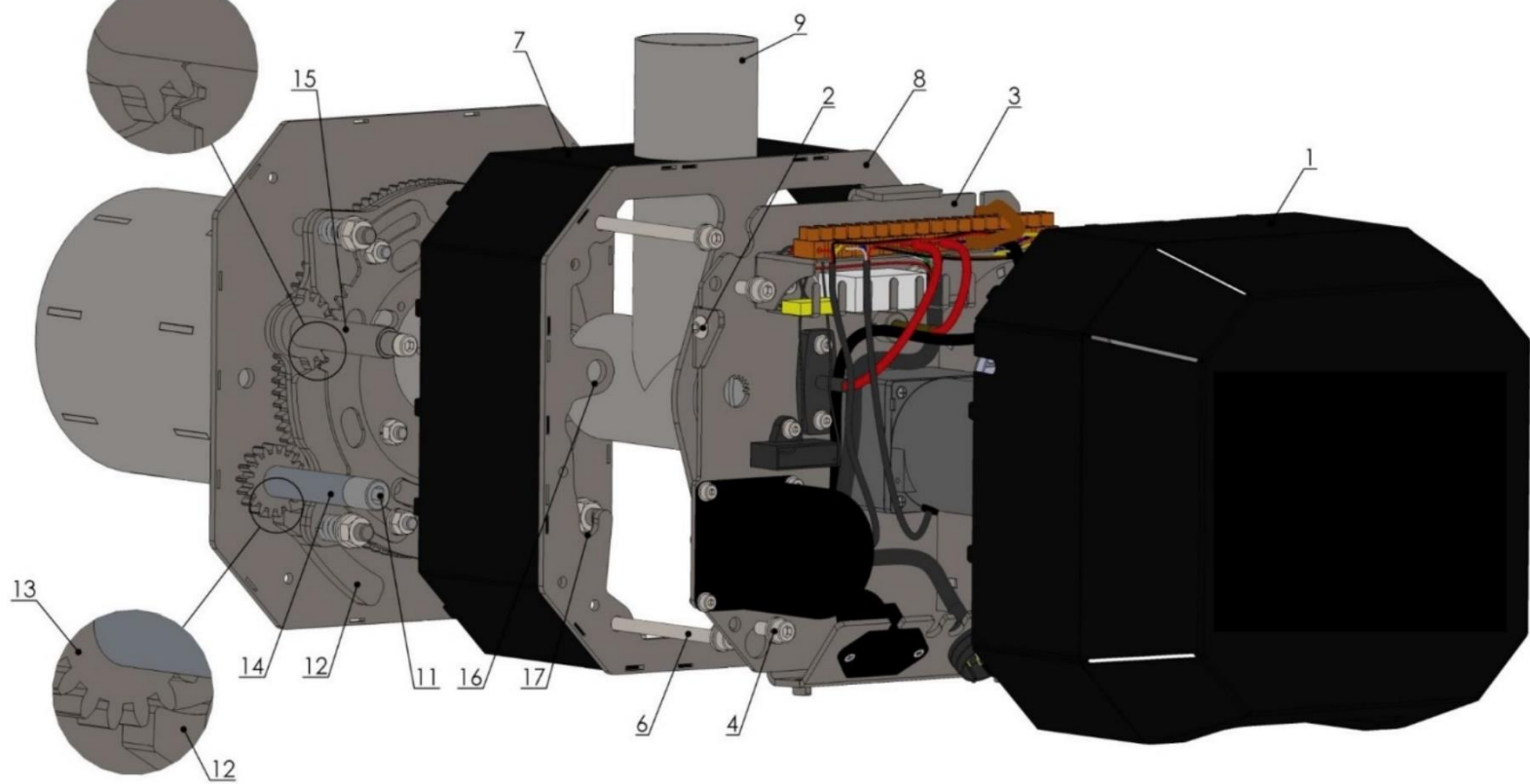


Figure 5. Lubrication of rotation mechanism bearings

1	Burner cover
2	Cover screws
3	Terminal board
4	Mounting screws
6	Screws
7	Cover
8	Frame
9	T part
11	Hole of the transmission shaft
12	Latch
13	Gear
14	Drive shaft
15	Air divider rotation shaft
16	Hole for air divider rotation shaft
17	Hole for Drive shaft komory

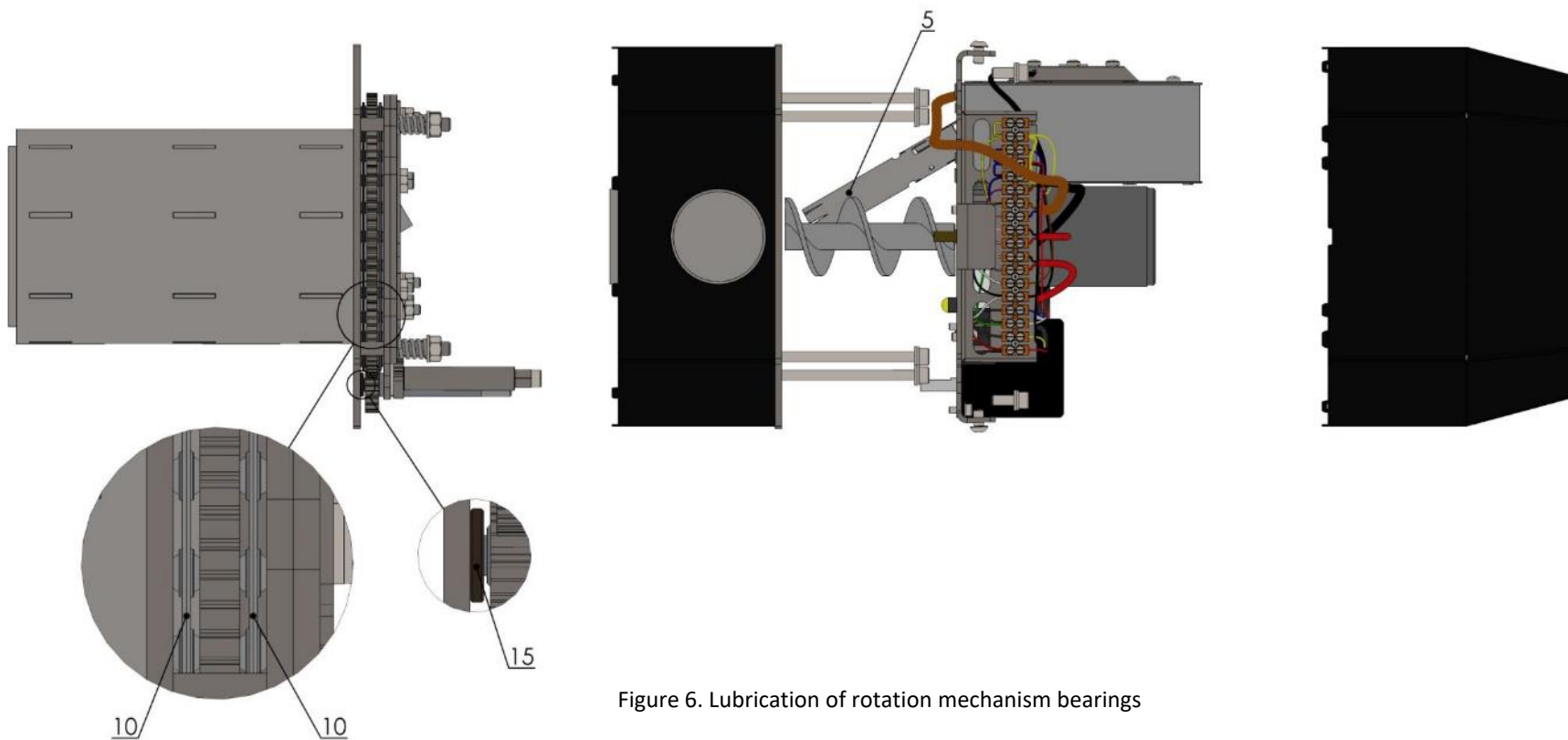


Figure 6. Lubrication of rotation mechanism bearings

5	Ignition coil
10	Bearings
15	Air divider shaft

2.4 Ignition coil replacement

Only a trained repairer or a person with the relevant qualification can replace the ignition coil. Perform the replacement according to the following steps:

1. Disconnect the power cable of the regulator from the power supply. Disconnect the signal cable and the power cable of the feed.
2. Loosen the screws (1) which attach the cover (2) – 2 pcs.
3. Remove the burner cover (2).
4. Disconnect the ignition coil from Z4 and P4 terminals
5. Remove the blind flange (4) from the ignition tube (5)
6. Take the ignition coil (6) out from the ignition tube (5)
7. Insert a new ignition coil (6) to the ignition tube (5). Insert it along the grooves (7) of the ignition tube (5).
8. Put the blind flange (4) back in place to the ignition tube (5).
9. Connect the cable of the ignition coil to the terminal board (3) – the brown one to Z4 terminal and the blue one to P4 terminal.
10. Put the cover (2) on
11. Tighten the screws (1)
12. Connect the disconnected cables
13. The burner is ready for operation

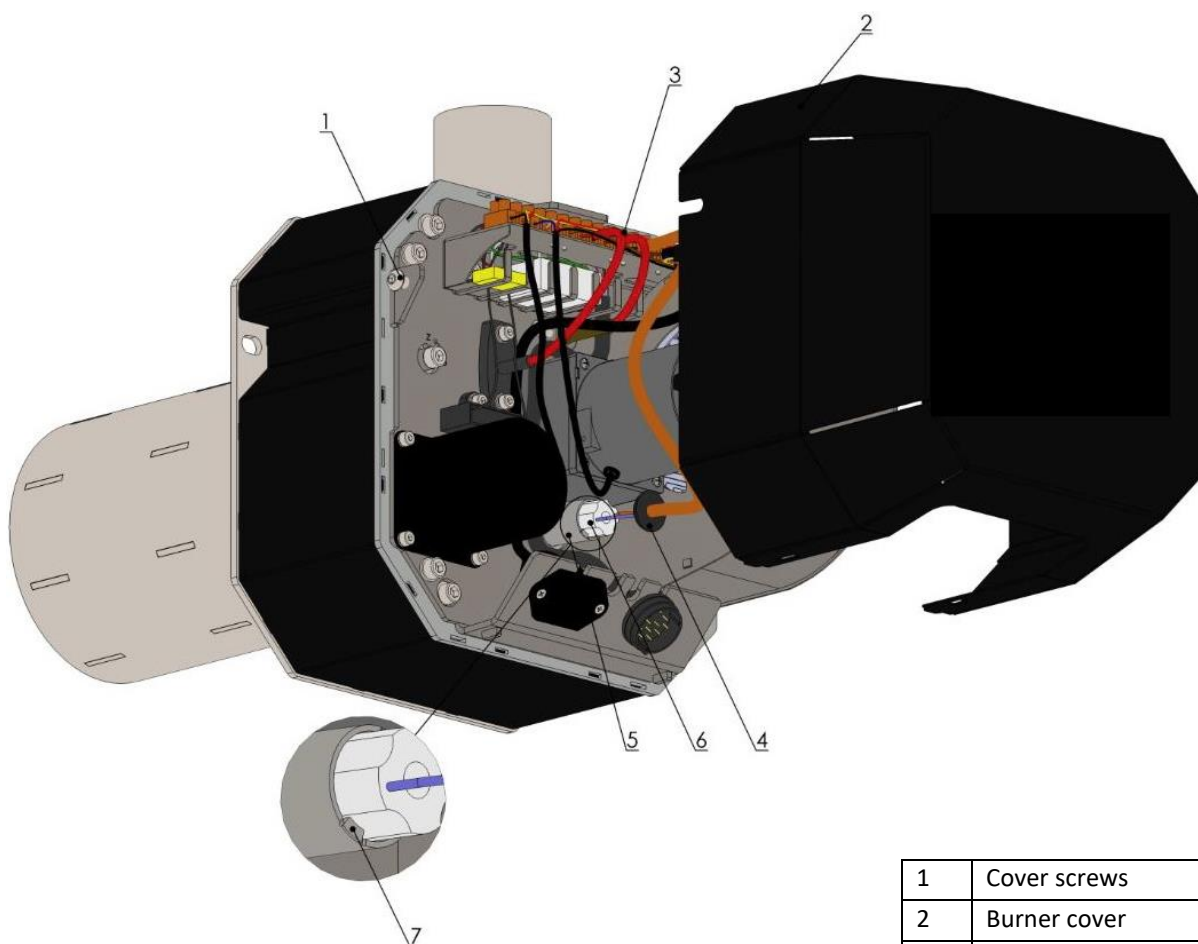


Figure 7. Ignition coil replacement

1	Cover screws
2	Burner cover
3	Terminal board
4	Ignition tube end cap
5	Ignition tube
6	Ignition coil
7	Ignition tube grooves

8 Additional information

8.1 Properties of different fuel types

We do not recommend burning wood that is too damp. Burning damp wood reduces its effective calorific value, which results in increased fuel consumption. Burning damp wood also increases the water vapor content in the flue gas, increasing its dew point. This may result in moisture condensation and shorten the lifetime of the boiler or the chimney. Proper wood drying occurs naturally in split softwood logs after two years, and after three years for hardwood.

The calorific value of all types of wood is roughly the same, about 15 MJ/kg (at a moisture content of 15 %). Hardwood (with high density) is more suitable if we want to achieve a longer burning time.

The usual density of basic wood species in kg/m³ (Festmeter) at 15 % moisture content:

Acacia	750	Hornbeam	680	Alder	520
Pine	500	Ash	670	Spruce	450
Birch	630	Maple	660	Poplar	450
Beech	670	Linden	490	Willow	440
Oak	690	Larch	590		

The density of wood with straightened edges (Raummeter) is 0.6 - 0.8 times smaller than the density of wood itself (Festmeter).

The calorific value of wood briquettes is about 17 MJ/kg. Larger briquettes pressed under great pressure are more suitable. Smaller briquettes or briquettes pressed with small pressure, which break down in the furnace after a short time, are less suitable. The density of wood briquettes is about 1000 kg/m³.

The calorific value of wood chips is the same as that of lumber, about 15 MJ/kg (at a moisture content of 15 %). The density of wood chips is 200 - 300 kg/m³ (loose cubic meter).

8.2 Fuel consumption - stoking frequency

The fuel consumption per season depends on many factors:

- The heat loss of the building (the output required to heat the building at approx. -15°C)
- The efficiency of boiler operation (fuel quality, operation standard and output control)
- The location of the boiler room (whether the heat from the surface of the boiler and chimney contributes to heating the building)
- The temperature to which the building is heated (1 °C corresponds with 5 % of fuel consumption)
- Whether the boiler is used to heat domestic water, and what its consumption is
- The average outdoor temperature during the heating season (differences can be ±20 %)
- Whether the entire building is heated or only part of it, how great the heat loss through ventilation is, etc.

The usual consumption per season for a family house with a heat loss of 15 kW is about 10 000 kg of dry wood, which is about 30 m³ (Raummeters) or 8 600 kg of wood briquettes.

The daily consumption is proportional to the outdoor temperature. An example of the usual daily consumption of a family house with a heat loss of 15 kW during the heating season:

Number of days	Outdoor	Average boiler	Daily fuel	Stoking frequency
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	temperature	output	consumption	per day*
5 days	-8°C	55%	75kg	3x
30 days	-5°C	45%	60kg	2-3x
30 days	-2°C	40%	50kg	2x
70 days	2°C	30%	45kg	2x
50 days	6°C	20%	40kg	1-2x
50 days	10°C	10%	20kg	1x

*... with the assumption of usual wood fuel

8.3 Methods of determining the heat loss of buildings

- Heat loss is a parameter determined by a standard. It corresponds with the heat output required to heat the building to a specified temperature (21 °C for residential buildings) at a standard outdoor temperature calculation. In the Czech Republic this temperature ranges from -17 °C to -12 °C, depending on the location of the building (lowlands, highlands).
- The heat loss can be roughly estimated from the size of the building (built-in volume). In a regular non-insulated family house, the heat loss is about 40W per 1m³, and about 20W per 1m³ in an insulated house. (In the Czech climate zone)
- The exact heat loss is determined by a draftsman from the building's parameters (area, strength, wall material, window type, outdoor temperature, etc.). The calculation is usually done on a computer.
- There are programs available on the Internet where even a layman can perform the calculation (e.g. TZB-info).
- Heat loss can often be accurately determined from the consumption of the current fuel per season:

Consumption of different types of fuels per **1kW** of heat loss.

Fuel	Total efficiency considered	Consumption per season
Dry wood	70 %	650 kg (1.5 - 2 m ³)
Wood briquettes	70 %	600 kg
Wood pellets (automatic boiler)	77 %	550 kg
Coal (boiler with manual stoking)	70 %	600 kg
Coal (automatic boiler)	77 %	550 kg
Gas	85%	260 m ³ (2 400 kWh)
Propane	85 %	185 kg
Electricity	100%	2 000 kWh
Remote heat	100%	2 000 kWh (7 200 MJ = 7,2 GJ)

9 Safety instructions



Only equipment that has been installed and commissioned according to the documentation and is in proper technical condition can be operated

When handling the product at the designated place, safety regulations must be observed. For transportation, we recommend using tools and transport equipment designed for this purpose with the corresponding weight of the transported product (the weight of the product is stated on the nameplate).

Flue gas and chimney inspections must be carried out in accordance with applicable regulations. The flue duct must be securely led into the chimney. The flue ducts must be mechanically rigid, leakproof to flue gases and cleanable, and they must rise from the boiler into the chimney. The condition of the chimney must be checked regularly. The cleaning opening in the chimney must be closed tightly so that the smoke driven by the fan does not escape into the surrounding area. **Only one boiler can be connected to one chimney flue.** The device must be connected to the chimney flue with the consent of the respective chimney guild. Flue ducts must not lead through the commercial or residential premises of third parties. The internal cross-section of the flue duct must not be larger than the inside diameter of the flue socket, and it must not taper in the direction of the socket. The methods for executing flue ducts are listed in ČSN.

With the exception of approved liquid fire-lighters, it is forbidden to use flammable liquids (petrol, oil, etc.).

Boiler defects can only be removed when the boiler is burnt out and disconnected from the mains.

Interference with the boiler and electrical connection of the boiler is prohibited!

The boiler can only be connected to a corresponding 230 V socket or switchboard. After installation, the socket or switchboard must be accessible without restrictions.

There must be adequate lighting in the boiler room.

Only a qualified worker can interfere with the electrical part of the boiler.

The installation and operation of the boiler (boiler room) must comply with the relevant design, safety and hygiene regulations.

The boiler operator must comply with the assembly, installation and operating manual.

The boiler operator must be over 18 years of age, and he must be familiar with the manual and operation of the appliance. Leaving children unattended around operating boilers is unacceptable. Boilers must be operated under occasional inspections by the operator.

Gloves and goggles must be used for all activities associated with the boiler operation.

Do not place flammable objects on the boiler and near the stoking and collection openings. The ash must be stored in non-flammable containers with a lid. Always keep in mind that the outer surface of the boiler may be hot to touch.

If there is a risk of the formation and entry of flammable vapors or gases into the boiler room, or when there is a temporary risk of fire or explosion (bonding floor coverings, coatings with flammable paint), the boiler must be shut down before the work begins.

The operator is required to inspect the boiler and safety equipment at least once a year and perform a functional test according to the local operating conditions. If the boiler is connected to an exclusive pressure device (e.g. an expansion vessel), the operator is obliged to carry out inspections according to the valid regulations.



ATTENTION! The boiler may only be used for the purpose for which it is intended.

10 Disposal of shipping package

- Put the polyethylene film into a container for plastic.
- Take apart the wooden groundsheet and burn it.

11 Disposal of the boiler at the end of its useful life

- Clean the boiler and disassemble it.
- Take the metal parts to a scrap metal yard.
- The ceramic parts can be disposed of as household waste, or they can be used as building material.
- Dispose of the insulation boards and sealing cords as household waste.
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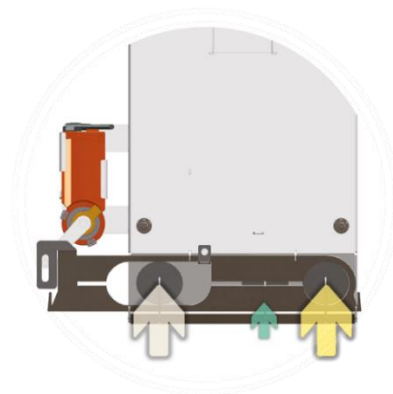
12 Optional accessories for BLAZE HARMONY boilers

a) Inlet water control thermostat of the integrated mixing system

b) Mechanical turbulators

c) Control module with lambda probe and actuator for automatic control of air supply

This accessory controls the supply of primary, secondary and predrying air automatically which ensures the highest quality of combustion and saves fuel. The actuator moves the shutter to keep required value of oxygen in the flue gases. Boilers BLAZE COMFORT COMBI are ready for installation of lambda probe and actuator and there is no need for purchase of additional components



13 Related standards

Heating system

ČSN 06 0310	Heating systems in buildings - Design and installation
ČSN 06 0830	Heating systems in buildings – Safety devices
ČSN EN303-5	Boilers for central heating
ČSN 07 7401	Water and steam for thermal energy equipment

Chimneys

ČSN 73 4201	Chimneys and flues - Design, implementation and connection of fuel appliances
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Fire regulations

ČSN EN 13501-1	Fire classification of construction products and building structures
ČSN 06 1008	Fire safety of thermal equipment

Electro

ČSN EN 60445 ed. 2	Basic and safety principles for the man-machine interface, marking and identification - Labeling device terminals and terminals of certain selected wires, including the general rules of the letter-number system
ČSN 33 2000-3-701	Electrotechnical regulations - Electrical equipment part 3: Determining basic characteristics
ČSN 33 2000-4-41	Protection against electric shock
ČSN 33 2000-5-51	Electrotechnical regulations - Electrical equipment part 5: Construction of electrical devices
ČSN 33 2000-7-701	Electrotechnical regulations - Electrical equipment part 7: Single-purpose devices and devices in special premises
ČSN EN 60079-14-2	Electrical devices for an explosive gaseous atmosphere - part 14
ČSN 33 2030	Electrostatics - Guidelines for avoiding static electricity hazards
ČSN 33 2130	Electrotechnical regulations. Internal electrical wiring
ČSN 33 2180	Connecting electrical devices and appliances
ČSN EN 60 446	Basic and safety principles for operating machinery – Marking wires with colors or numbers
ČSN EN 50 165	Electrical devices of non-electrical household appliances. Safety requirements
ČSN EN 55 014-1	Electromagnetic compatibility – requirements for household appliances part 1
ČSN EN 60335-1 ed.22003,+1:2004+A11:2004+A1:2005+2:2006+A12:2006+a2:2007+ 3:2007+ Z1:2007	Household and similar electrical appliances - Safety – part 1: general requirements
ČSN EN 60335-2-102	Household and similar electrical appliances - Safety – part 2

14 Warranty conditions

The device has been manufactured and tested according to valid documentation and it complies with applicable standard ČSN EN303-5 Boilers for central heating.

The warranty period for the pressure part of the boiler is 7 years

The warranty period for consumable parts is 12 months.

The warranty period for other parts is 2 years.

The warranty period for the burner ignition coil is 12 months or reaching 3000 ignition cycles.

The warranty only applies to boilers that are operated in accordance with the instructions in the assembly, installation and operating manual issued by an authorized company.

Ceramic fittings, sealing cords and refractory steel parts in the lower combustion chamber are considered consumable parts.

The warranty applies to the free **replacement** of a defective spare part. A new spare part will be sent to you within 24 hours of filing a complaint at the sales department of BLAZE HARMONY s.r.o. If the defective spare part is not delivered to the sales department of BLAZE HARMONY s.r.o. within 14 days of the receipt of the new part, the warranty on the product (boiler) shall expire. The warranty does not apply to travel refunds associated with the replacement, which will be charged according to the current travel refunds.

The warranty does not apply to defects arising due to:

- Connecting the boiler to a water pressure higher than 300 kPa
- Using fuel other than the recommended fuel
- Improper operation (e.g. frequent shutdowns and overheating), connecting the boiler to a power supply other than 230V/50Hz or a defective power supply
- Untreated water (e.g. limescale in the boiler)
- Improper operation and mechanical damage to parts
- Incorrectly dimensioned and incorrectly executed heating system
- Forceful treatment, interference with the boiler structure, natural disaster, improper storage or other reasons not affected by the manufacturer
- Boiler overheating and resulting shutdowns. The warranty expires when 200 hours of overheating are exceeded.

(MENU => Information => Operating counters)

Failure to comply with the above will result in the loss of the warranty.

When filing a complaint in the warranty period, please contact the service and installation organization that commissioned your product.

If the first boiler commissioning is performed by an unauthorized person, the product warranty shall expire!

It is necessary to send the manufacturer a properly filled out and signed **Check sheet of boiler commissioning and Protocol of heating test** immediately after the boiler is commissioned. If the user fails to comply with this condition, the manufacturer cannot approve the repair as a warranty repair.

When reporting a fault, you must report:

- The boiler's serial number
- The date of installation
- The authorized company that commissioned the boiler
- Conditions of the failure (description of the failure)

The manufacturer reserves the right for changes implemented during R&D activities which may not be included in the manual.

15 ATTENTION!

Return the properly filled out warranty card for the manufacturers of the BLAZE COMFORT COMBI boiler to the following address:

BLAZE HARMONY s.r.o.

Trnávka 37

751 31 Lipník nad Bečvou

Czech Republic

16 Annex to warranty card for the customer - user

Record of performed warranty and post-warranty repairs and product inspections			
Date of record	Work performed	Contractual service organization (signature, stamp)	Customer's signature

17 Declaration of Conformity of BLAZE HARMONY boilers

ORIGINAL EC AND EU DECLARATION OF CONFORMITY

According to Directive 2006/42/EC of the European Parliament and Council (Government Decree no. 176/2008 Coll.)

According to Directive 2014/35/EC of the European Parliament and Council (Government Decree no. 118/2016 Coll.)

According to Directive 2014/30/EC of the European Parliament and Council (Government Decree no. 117/2016 Coll.)

Manufacturer: BLAZE HARMONY s.r.o.
Trnávka 37, 751 31 Lipník nad Bečvou, Česká republika
TIN: 27816273, VATIN: CZ27816273

Device: Hot water boilers for wood with manual fuel supply

Type designation: : BLAZE COMFORT COMBI 15, BLAZE COMFORT COMBI 20, BLAZE COMFORT COMBI 25, BLAZE COMFORT COMBI 30

Description of the device:

Hot water gasification boiler for wood, with manual fuel supply, designed for heating family houses and other similar buildings whose thermal losses do not exceed the boiler's nominal output.

The manufacturer declares that the product complies with all applicable provisions:

Directive 2006/42/EC (Government Decree no. 176/2008 Coll.)

Directive 2014/35/EU (Government Decree no. 118/2016 Coll.)

Directive 2014/30/EU (Government Decree no. 117/2016 Coll.)

The manufacturer also declares that he has taken measures to ensure the conformity of all products placed on the market with the technical documentation, the basic requirements for the product and the approved type.

List of harmonized standards used for the conformity assessment:

ČSN EN 303-5:201, ČSN 06 1008:1997, ČSN EN 60335-1 ed. 3:2012, ČSN EN 60335-2-102:2007

ČSN EN 55014-1:2007 ed.3 ČSN EN 61000-6-3 ed.2 :2007, ČSN EN 61000-3-2 ed.3 :2006, ČSN EN 61000-3- ed. 2 3:2009, ČSN EN 61000-6-2 ed 3:2006 ed 3, ČSN EN 62233:2008, ČSN EN ISO 12100:2011, ČSN EN ISO 14120:2017, ČSN EN ISO 11202:2010 ČSN EN ISO 3746:2011, ČSN EN 15036-1:2007 a ČSN EN ISO 13857:2008

Conformity assessment:

To assess the conformity, certificate no. B-00072-22 from 20.01.2022, valid until 31.01.2024, issued by the Engineering Test Institute in Brno - Strojírenský zkušební ústav Brno, Hudcova 56b, 621 00, ID no.: 00001490.

Person authorized to draw up the original EC and EU Declaration of Conformity: Roman Tihelka Jr.

This Declaration of Conformity is the original EC and EU Declaration of Conformity.

The last two digits of the year in which the product received CE marking: 22

In Lipník nad Bečvou, 20.01.2022


Blaze
BLAZE HARMONY s.r.o.
Trnávka 37, 751 31 Lipník n.B.
Czech Republic
TIN: 27816273, VATIN: CZ27816273

Roman Tihelka Jr.

Person authorized to draw up
the original EC Declaration of Conformity


Blaze
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TIN: 27816273, VATIN: CZ27816273

Roman Tihelka – CEO

Identification of the person authorized
to sign on behalf of the manufacturer



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