

KOSTRZEWA®
Experts in heating



Twin Bio

User Manual



pellets



pellets/oats
50/50



wood

7/24

service
centre



GSM module

5 class

device class

5 years

5 years
+ 2 years
of extended
warranty



ENGLISH
EN

Dear User of KOSTRZEWA equipment!

We would like to thank you for choosing us. You have purchased a superior quality product made by a renowned Polish company.

Kostrzewa was established in 1978. From the very beginning we manufactured central heating boilers fired with bio- and fossil fuels. We have been active for over 30 years and during that time we constantly improved and modernised our equipment in order to retain the leading position among Polish manufacturers of solid fuel boilers.

We established an implementation and project department for new technologies whose aim is to constantly improve our products and to implement new technologies.

We would like to reach each and every customer through companies which will professionally represent us.

We really value your opinion about us and our partners. As we strive to constantly improve our products, please send us any remarks you may have concerning our equipment as well as services provided by our Partners.

We wish you warm and comfortable days all year round

KOSTRZEWA

Dear users of Twin Bio boilers.

Before you connect and start up your Twin Bio boiler, please check the parameters of your flue with the data in the enclosed table (flue draught, flue cross-section), as well as whether the device is fit for the heating of the given surface (the building's heat demand).

The basic principles of the safe use of the boiler!!!

1. Please read the user manual carefully before boiler start-up.
2. Before you start up the boiler check whether it is connected to the central heating system and the flue in accordance with the manufacturer's recommendations.
3. Do not open the door while the boiler is working.
4. Do not allow the fuel tank to empty completely.

For your own safety and the comfortable use of the boiler, please send us the CORRECTLY FILLED IN (I.E. ALL ENTRIES AND STAMPS) latest copy of the warranty card and the confirmation of the completeness of the boiler (the last page of this user manual) to the following address:

KOSTRZEWA SERVICE CENTRE
ul. Przemysłowa 1, 11-500 Giżycko
Warmińsko-Mazurskie Voivodeship
Tel. +48 87 428 53 51 or +48 87 428 11 34
e-mail: serwis@kostrzewa.com.pl

Sending back the warranty card will allow us to register you in our database of Twin Bio boiler users and to provide you with fast and reliable servicing.

IMPORTANT!!!

PLEASE BE AWARE THAT IF YOU DO NOT SEND OR YOU SEND AN INCORRECTLY FILLED WARRANTY CARD (INCL. CONFIRMATION OF BOILER QUALITY AND COMPLETENESS) WITHIN TWO WEEKS FROM THE BOILER INSTALLATION DATE, BUT NO LATER THAN WITHIN TWO MONTHS FROM THE PURCHASE DATE, YOUR WARRANTY FOR THE HEAT EXCHANGER AND ALL COMPONENTS OF THE BOILER WILL BE VOIDED. LOSING THE WARRANTY WILL DELAY ANY REPAIRS AND REQUIRE THE BOILER'S USER TO COVER ALL REPAIR COSTS AND THE REPAIRMAN'S TRAVEL EXPENSES.

Thank you for understanding.
Yours faithfully,
KOSTRZEWA SERVICE CENTRE

II. Twin Bio User Manual

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Foreword

The Twin Bio boiler, with maximum power of 16, 24 [kW] with automatic pellet/oats feeding, and manual wood chip feeding sets new trends in utilising biological fuel. The Twin Bio boiler can, without exaggeration, be called a 'heating system', as this one device constitutes the best quality, fully equipped and automated product. The planar boiler design with water 'tongue pipes' allows for the optimal use of the device's heating surface and does not expose the exchanger section to excessive thermal loads while maintaining compact dimensions. Our company offers reliable, durable and cost-effective solutions. The device has the capability to automatically burn biomass in the form of pellets or pellet-oats mixture. It is possible to manually load fuel in the form of wood chips - you can therefore use a variety of biomass fuel types. A simple and intuitive operation of a boiler/boiler room control system is also important to the user. The large graphic display and the ergonomic and clear interface of the boiler control system make our solutions easy to use.

1. General

The Operation and Maintenance Manual is an integral part of the boiler and must be provided to the User of this device. The device installation must conform to the manual, the relevant standards and good building practices. The boiler operation conforming to the User Manual guarantees safe and failure free operation and is a precondition for the manufacturer's warranty coverage. The specifications may change without notice. KOSTRZEWA shall not be held liable for any damages resulting from incorrect installation of the device and failure to comply with the terms and conditions of this Operation and Maintenance Manual.

2. Scope of delivery:

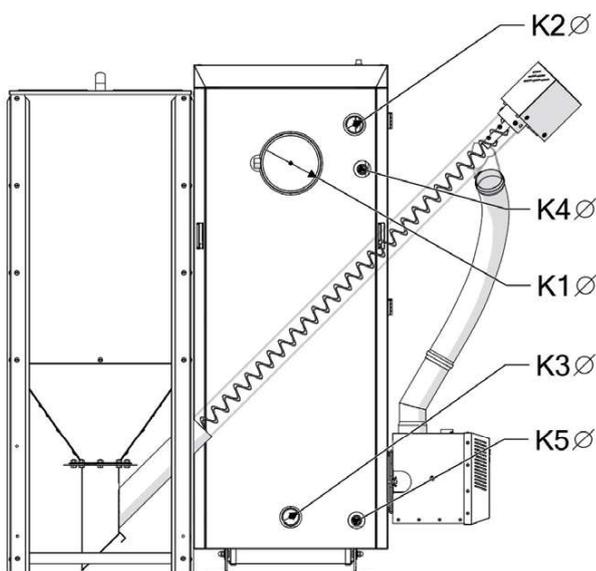
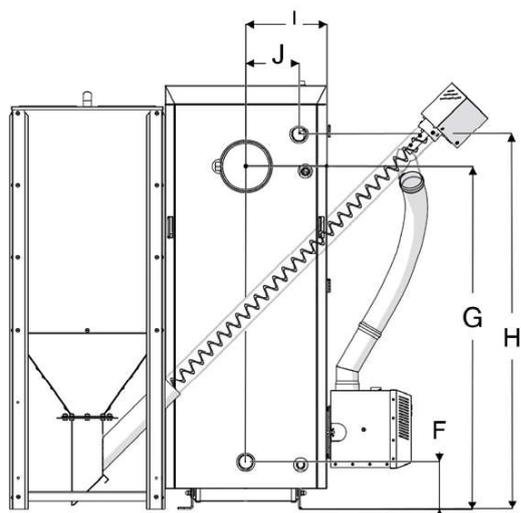
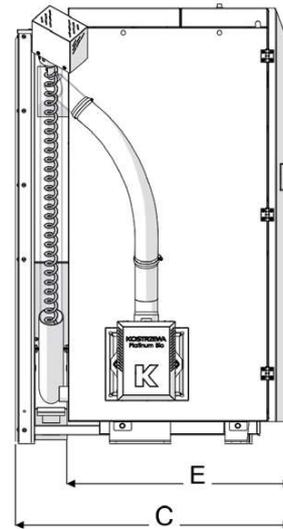
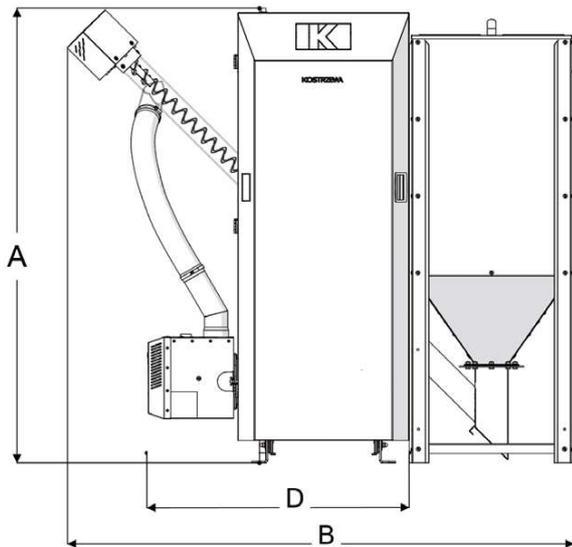
The Twin Bio boiler is provided on a wooden 1350x900 mm pallet including:

- boiler heat exchanger;
- Platinum Bio burner (flexible duct, Ø70, length 1 m);
- ceramic cover, feeder chute, optional grate for oats;
- storage hopper 286 l;
- feeder chute to the storage hopper with cap;
- fuel feeder;
- Platinum Bio control;
- cast iron grates for burning wood slabs (13 pcs. – 16 kW; 17 pcs. – 24 kW);
- cast iron grate support;
- cleaning tool kit;
- user manual.

3. Boiler specifications

The Twin Bio type boiler is a low temperature boiler with a three flue gas passes combustion circuit. Its design is characterised by an appropriate shape and length. The advantages of this solution include its lesser susceptibility to ash deposits on the exchanger's walls and baffles. The ash falls into the ash pan by gravity. This helps the boiler to achieve great operational parameters: high efficiency, long life thanks to the appropriate design of the exchanger, and low emissions of hazardous substances. The boiler was manufactured in accordance with the EN 303-5:2012 standard.

The basic dimensions of Twin Bio boiler series are showed in the following diagram (see 'Twin Bio boiler dimension diagram') and the following table (see 'Twin Bio dimension data').



Twin Bio boiler dimension data

Table: Twin Bio boiler dimension data			
SYMBOL	unit	TB 16	TB 24
A	mm	1383	1383
B	mm	1285	1385
C	mm	862	862
D	mm	789	889
E	mm	698	698
F	mm	154	154
G	mm	1106	1106
H	mm	1210	1210
I	mm	258	308
J	mm	170	222
ØK1	mm	159	159
ØK2 – power supply	cal	1 1/2"	1 1/2"
ØK3 – return	cal	1 1/2"	1 1/2"
ØK4 – thermal safety device	cal	1/2"	1/2"
ØK5 – drain	cal	1/2"	1/2"

Fig. 01. Twin Bio boiler dimension diagram

PARAMETER	SI	Twin Bio 16	Twin Bio 24
Flue draught	mbar	0,15-0,25	0,15-0,25
Water capacity	dm ³	58	65
Maximum working pressure	bar	2	2
Test pressure	bar	4	4
Flue gas temperature at nominal power	°C	113	136,2
Flue gas temperature at minimum power	°C	78,5	81,8
Flue gas mass flow at nominal power	g/s	9,42	13,14
Flue gas mass flow at minimum power	g/s	7,74	8,21
Flue connector diameter	mm	159	159
Boiler flow resistance for 10 K	mbar	1,7	3,8
Boiler flow resistance for 20 K	mbar	0,5	1,1
Max. Hot water boiler heat output	kW	16	24
Hot water boiler nominal heat output	kW	14	21
Hot water boiler power range	kW	4 – 16	6 – 24
Efficiency at nominal power	%	90.8	90.4
Boiler class as per EN 303-5:2012		5	5
Combustion time at nominal power (fuel calorific value): 18.305 kJ/kg)	h	72	48
Temperature control settings range	°C	50-80	50-80
Minimum water temperature at boiler return	°C	45	45
Fuel type	Class	Sawdust granulate (pellets) made in accordance with EN 303-5:2012 – Class C1	Sawdust granulate (pellets) made in accordance with EN 303-5:2012 – Class C1
Storage hopper capacity	L	286	286
Feed opening dimensions	mm	696x456	696x456
Nominal power input	W	90	90
Max. power input	W	430	430
Max. noise level	dB	52	52

The boiler meets Class 5 requirements for heat efficiency and gas emission as defined in PN-EN 303-5: 2012 provided that the boiler is installed in a central heating system with a buffer tank.

Minimum buffer tank capacity: $V_{Sp} = 15T_B \times Q_N (1 - 0,3 \frac{Q_H}{Q_{min}})$

- V_{Sp} – buffer tank capacity in litres;
- Q_N – nominal heat output in kW;
- T_B – fuel combustion time in hours;
- Q_H – building heat load in kW;
- Q_{min} – minimum heat output in kW.

The size of a hot water storage tank for multi-fuel boilers is selected for the fuel which requires the highest storage tank capacity. Minimum hot water storage tank capacity is 300 litres.

4. Twin Bio boiler design (as a complete heating device)

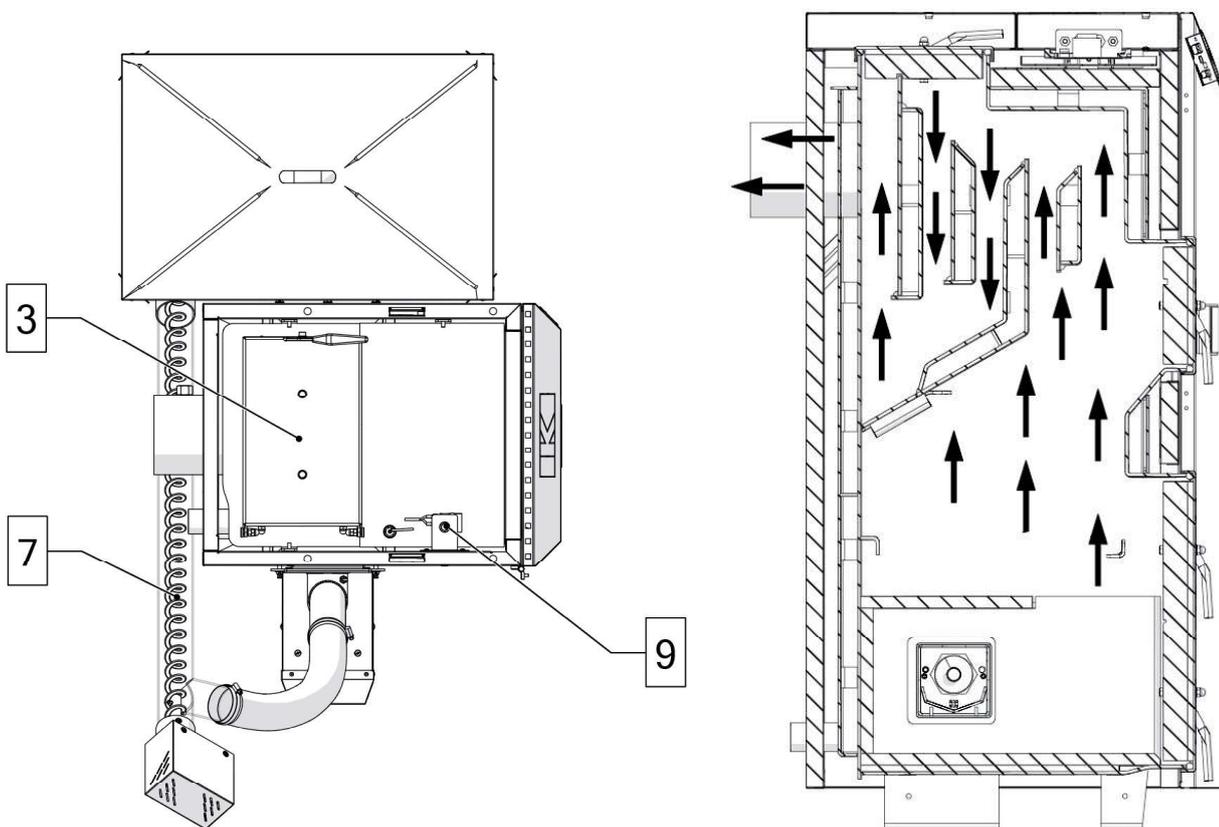
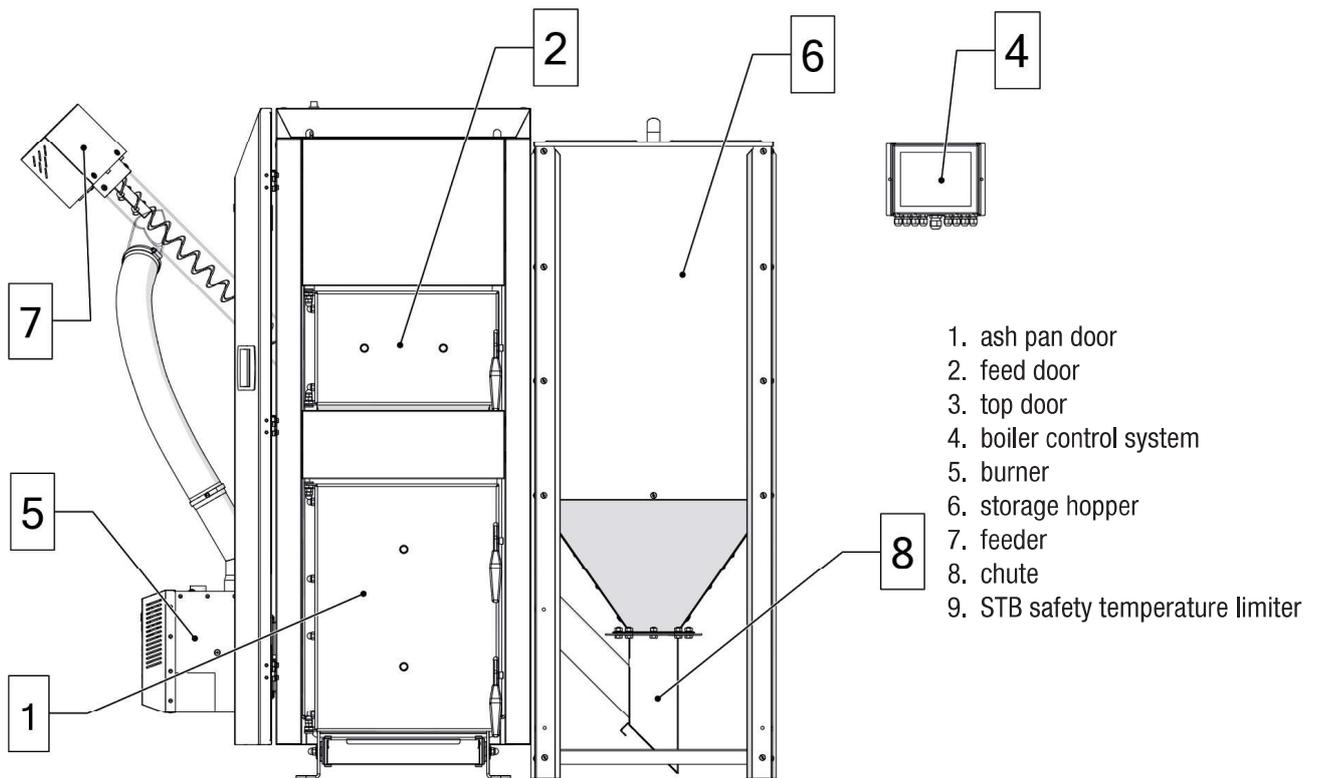


Fig. Boiler design

Fig. Flue gas circulation

4.A. Boiler body

- inner shell assembly – P265GH (as per DIN EN 10028)
 - 5 mm boiler steel for pressure tanks
- outer shell assembly – S235JR (EN 10025-2)
 - general purpose common steel, thickness 4 mm
- fire partitions – P265GH (as per DIN EN 10028)
 - thickness 5 mm
- boiler casing – DC01 – powder painted 0.8 mm steel sheets
- boiler body insulation – mineral wool

Twin Bio is a boiler with a three flue gas passes combustion circuit. All boiler components are MAG - 135 welded. Most of the boiler components are welded with fillet welds and butt welds.

4.B. Boiler door

Boiler door is made of S235JR (EN 10025-2) 3 mm thick structural steel. It is fitted as left-side door as standard (it can be fitted as right-side door as well). It has double thermal insulation.

1. thermal insulation
2. thermal insulation
3. rope seal

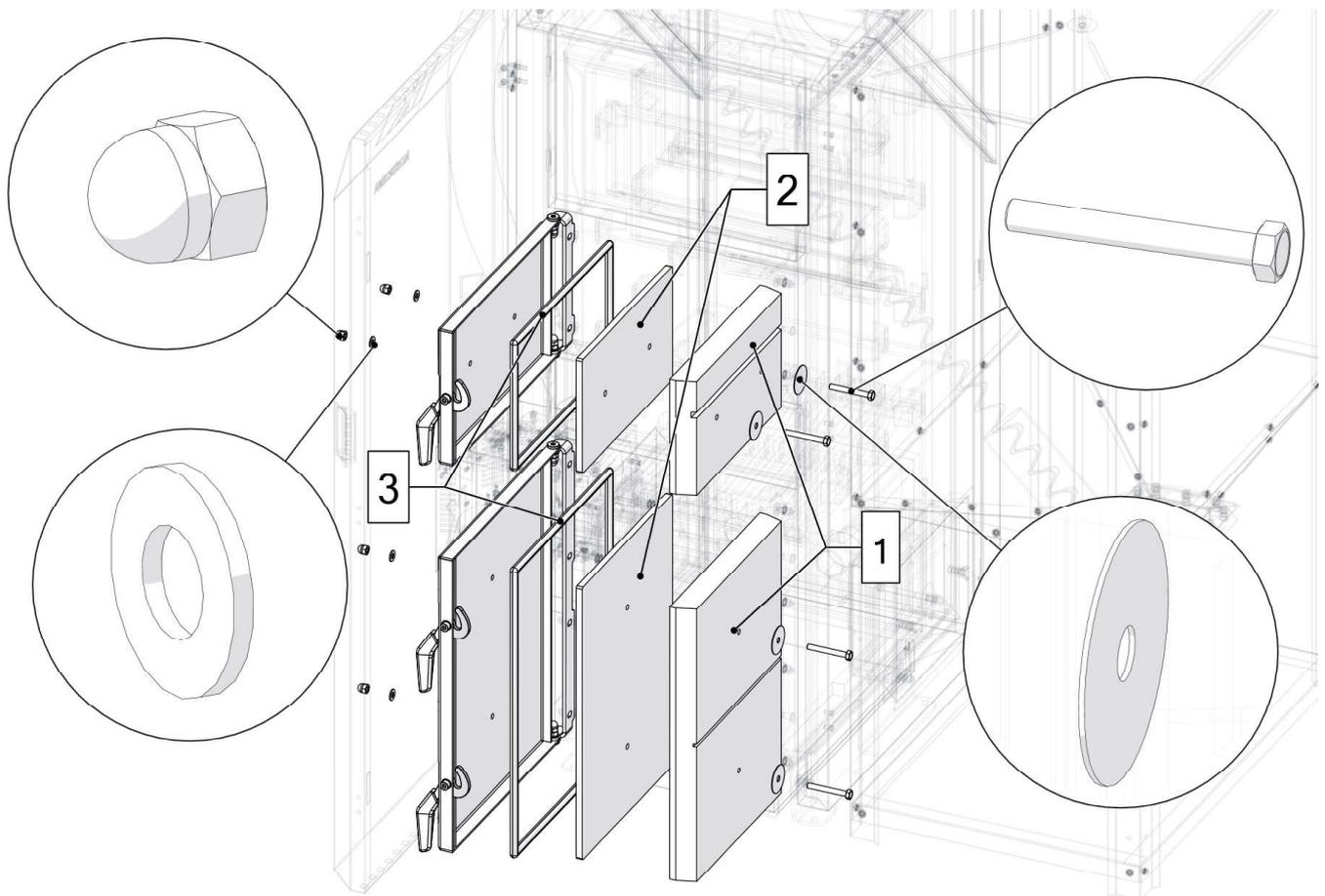


Fig. Door insulation

4.C. Top door

This door is located on the upper side of the boiler, under the cover (dismounting – see 7.C). It allows for easy cleaning of the exchanger walls and baffles. It has double thermal insulation. The exchanger's baffle is fitted into a special groove in the insulation plate, which closes the flue gas circulation.

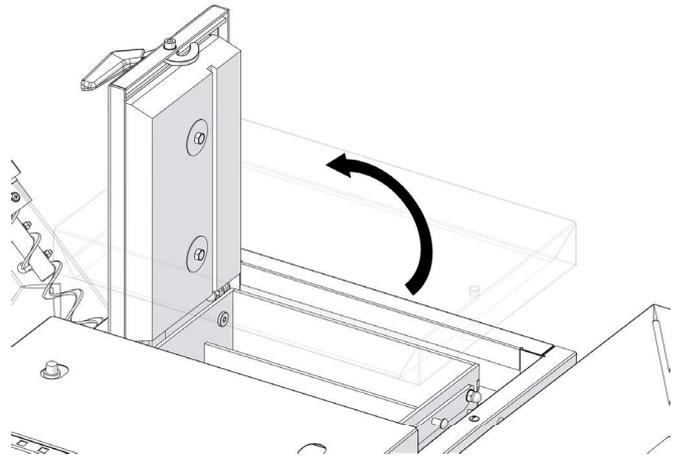


Fig. Top door

4.D. Platinum Bio pellet burner

The locally manufactured Platinum Bio burner is a dedicated device for solid fuel (wood pellets) combustion. The burner components in contact with the flame are made of heat resistant steel. Burner power must be selected on the basis of the given Twin Bio boiler unit. The following diagram (see 'Platinum Bio v02 burner dimension diagram') and the following table (see 'Platinum Bio v02 burner dimension data') show standard dimensions of the Platinum Bio v02 burner. The following table (see 'Platinum Bio v02 data sheet') shows the basic specifications of the Platinum Bio v02 burner. As standard, the Twin Bio boiler is fitted with a ceramic cover, and optionally with an additional oats grate (exchanging – see 7.J).

Burner dimension data

Table: Platinum Bio v02 burner dimension data			
SYMBOL	unit	PB-16-v02	PB-24-v02
A	mm	245	245
B	mm	222	222
B1	mm	180	180
C	mm	258	258
D	mm	497	537
E	mm	247,5	247,5
F	mm	123,5	123,5
G	mm	232	272
H	mm	119	119
I	mm	119	119

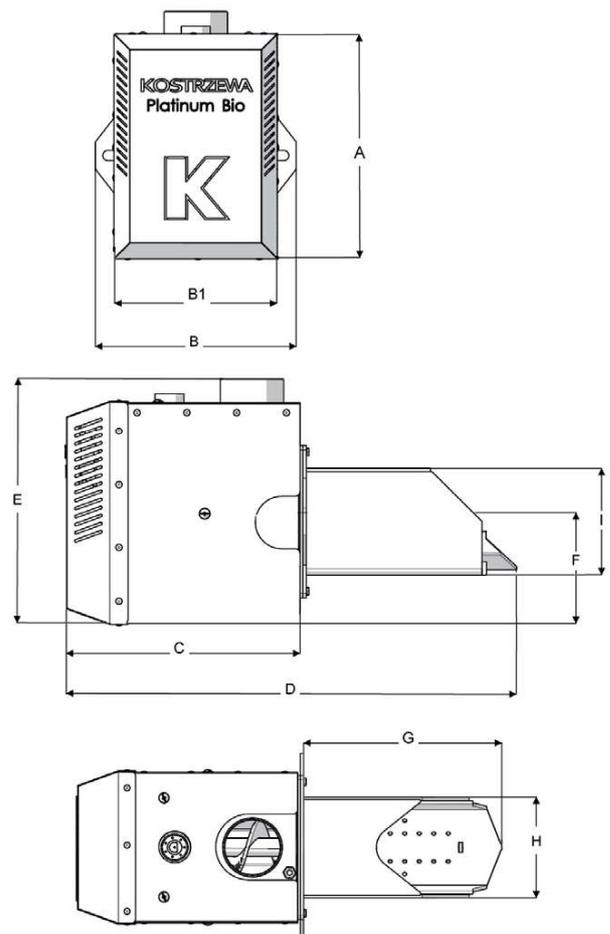


Fig. Platinum Bio v02 burner dimension diagram

4.E. Fuel feeder unit

The locally manufactured fuel feeder is a dedicated system conveying fuel from the storage hopper to the burner.

A - 1595 mm

B - 88 mm

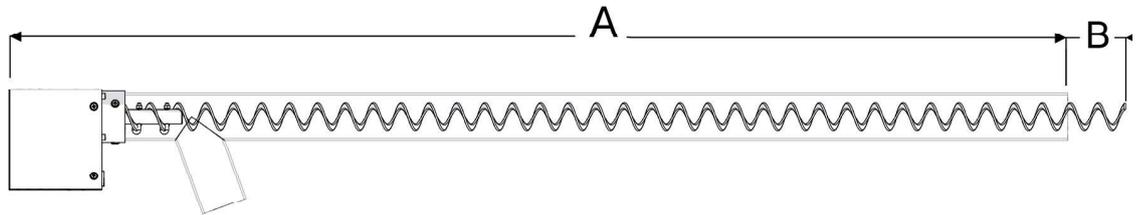


Fig. 02. Feeder dimension diagram

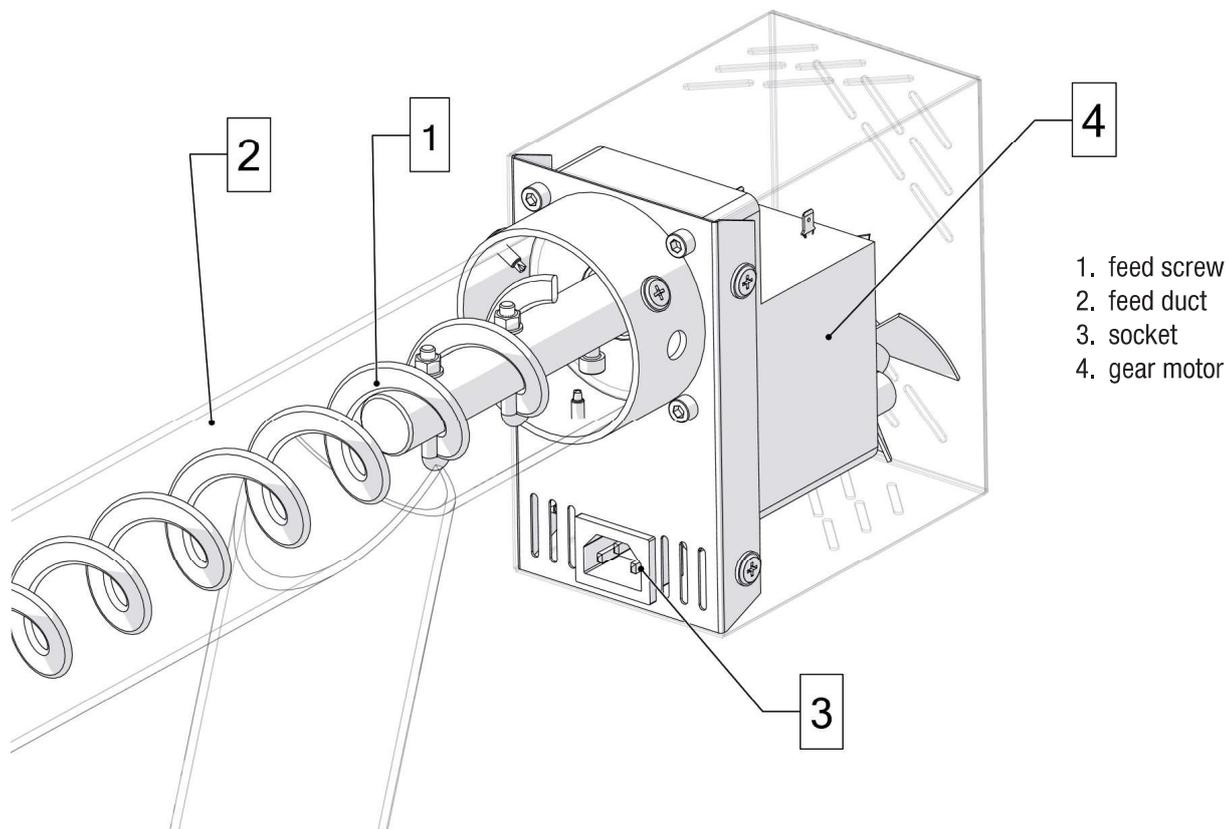


Fig. 02. Feeder construction diagram

All electrical connections must conform to the general guidelines on wiring systems, see section 4.H. 'Wiring system'.

4.F. Fuel storage hopper

KOSTRZEWA recommends a 286 l storage hopper for the efficient and effective feeding of Platinum Bio burners. It is made of DX01 galvanised sheets. The storage hopper is shipped disassembled (in a cardboard box). A swivel chute is mounted on the storage hopper base for its easy positioning by the boiler.

Hopper location possibilities:

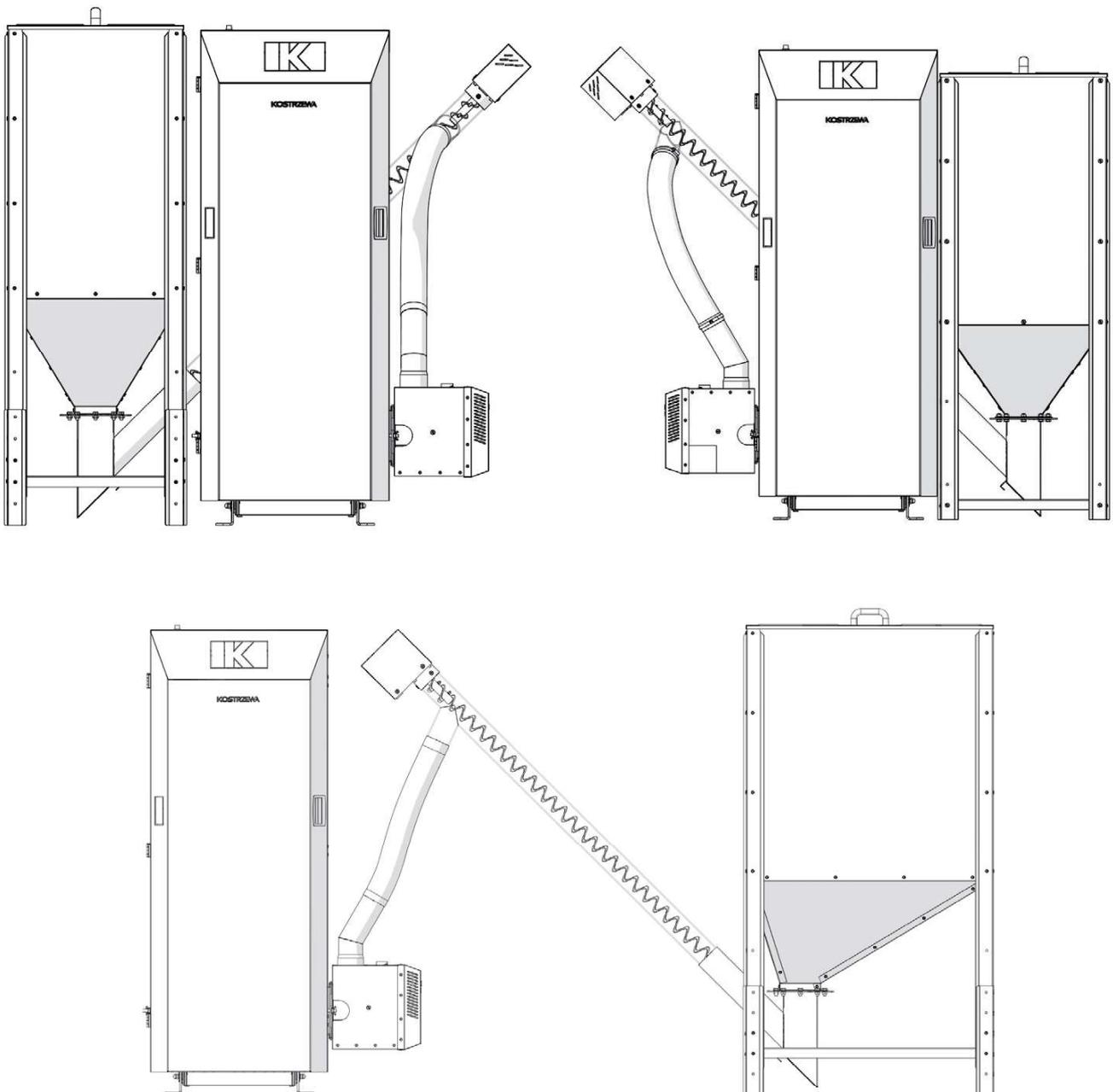


Fig. 02. Twin Bio boiler hopper location possibilities

4.G. Boiler sensor installation

The boiler is fitted with a safety temperature limiter STB factory set to 90°C. If the set temperature is exceeded the STB stops the burner and the fuel feeder operation.

Alarm is displayed. Check and remove the cause of boiler overheating. Allow the boiler to cool, remove the STB nut and press the button.

The boiler temperature sensor [3] and the STB [4] must be installed in the boiler temperature sensor casing [7]. The sensors must be fixed securely.



WARNING!!!

Incorrect boiler sensor installation may result in overheating and faulty system operation.

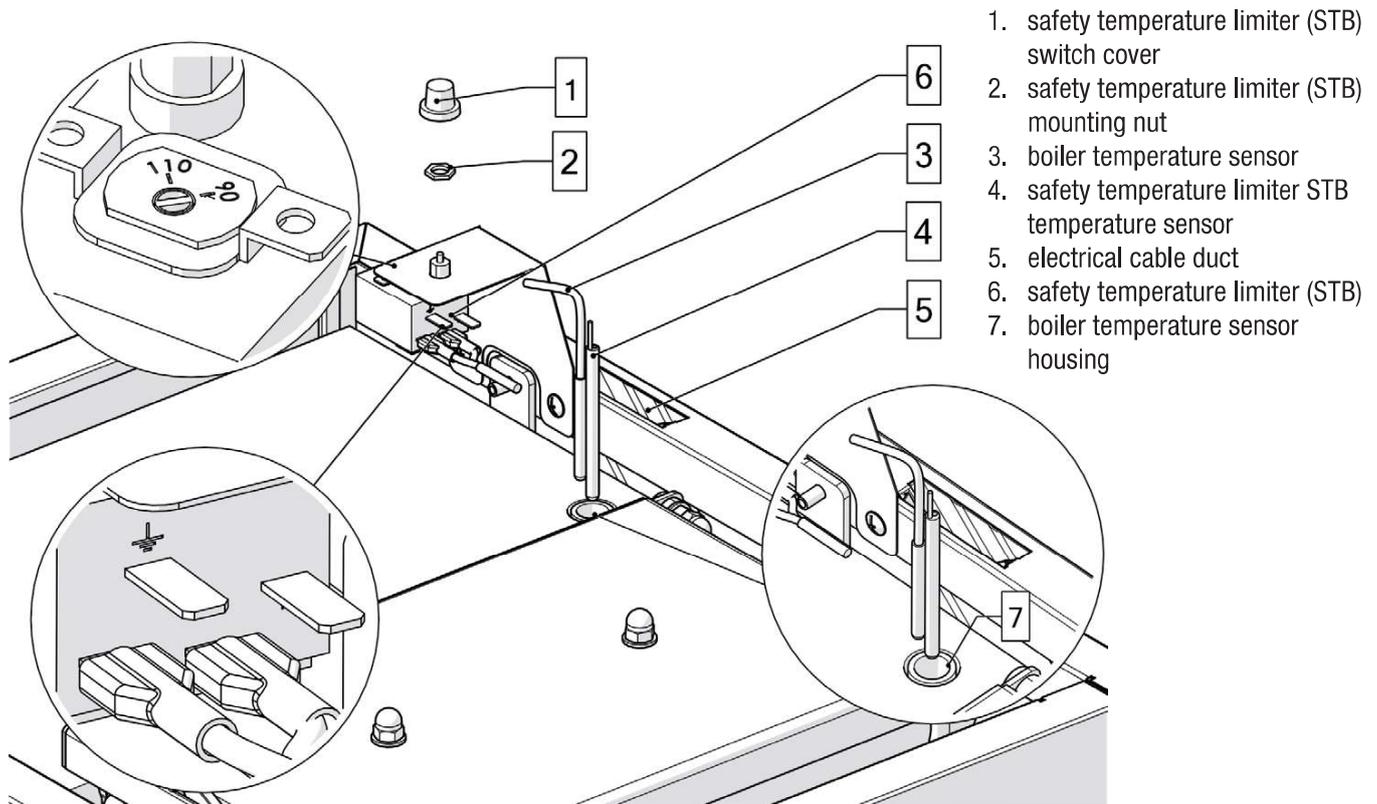


Fig. Sensors

4.H. Wiring system

General guidelines on the wiring systems of boiler control, boiler and its accessories:

1. A 230 V/50 Hz power system conforming to local standards and regulations must be available in the boiler room.
2. The wiring system must be terminated with a plug-in socket and a protective conductor contact.
3. The wiring system must be installed in accordance with the electrical diagram and local regulations concerning electrical safety.

WARNING!!!
Using the socket without a protective conductor contact may result in electric shock!

4. The device (boiler/control system) must be connected to an individual circuit with an overcurrent protection and a residual current device.
NO OTHER EQUIPMENT MAY BE CONNECTED TO THE BOILER'S ELECTRICAL LINE.
5. The wiring system may be installed and repaired by authorised personnel only.
6. Disconnect the power supply before servicing.
7. The boiler temperature sensor must be installed and secured in a submersible sleeve in the water section. The remaining cable must be coiled and laid in the external boiler casing or other safe location (secured against sliding off from the sleeve).
8. The cables must not be bent or broken and the insulation must not be damaged.
9. Do not allow water, moisture, dust and dirt inside the device, otherwise it may result in short-circuit, electric shock, fire or damage.

10. Ensure proper ventilation of the device (control) and free air flow to the vents and air circulation around the device.
11. The electrical equipment (control, distribution board, burner and sensors) are intended for indoor installation.

4.1. Twin Bio control system

A detailed description of the control system functions is included in the Platinum Bio control User Manual.



Fig. Platinum Bio control system

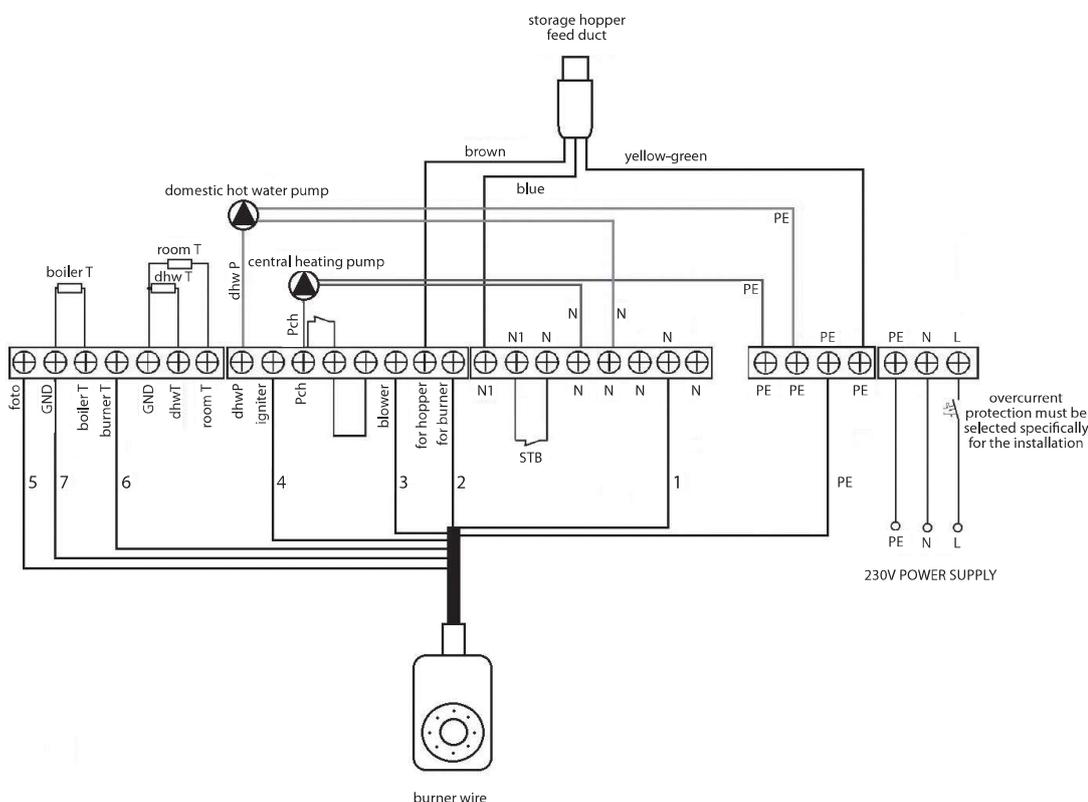


Fig. Main board from ver. L5B v10.4/10.5 Platinum Bio

5. Design guidelines

The installation and all connections must conform to the relevant standards and regulations!

5.A. Burner location requirements

The distance of boiler walls and accessories from the room walls must guarantee easy and fault free operation of the hot water boiler (boiler control system operation, efficient manual fuel feeding to the storage hopper, repairs, inspections etc.). Ensure sufficient space when planning and installing the boiler and its accessories in the distance required to open all boiler doors, clean the combustion chamber and the exchanger baffles. The following diagram (see 'Boiler location in the boiler room - dimension diagram') and the table (see 'Boiler dimension data') shows recommended installation space for the boiler and its accessories.

Table 'Boiler room dimension data'

Boiler room dimensions		
Marking	unit	Values
A1	mm	≥ 500
B1	mm	≥ 700
C1	mm	≥ 500
H1	mm	≥ 2000
g	mm	≥ 50

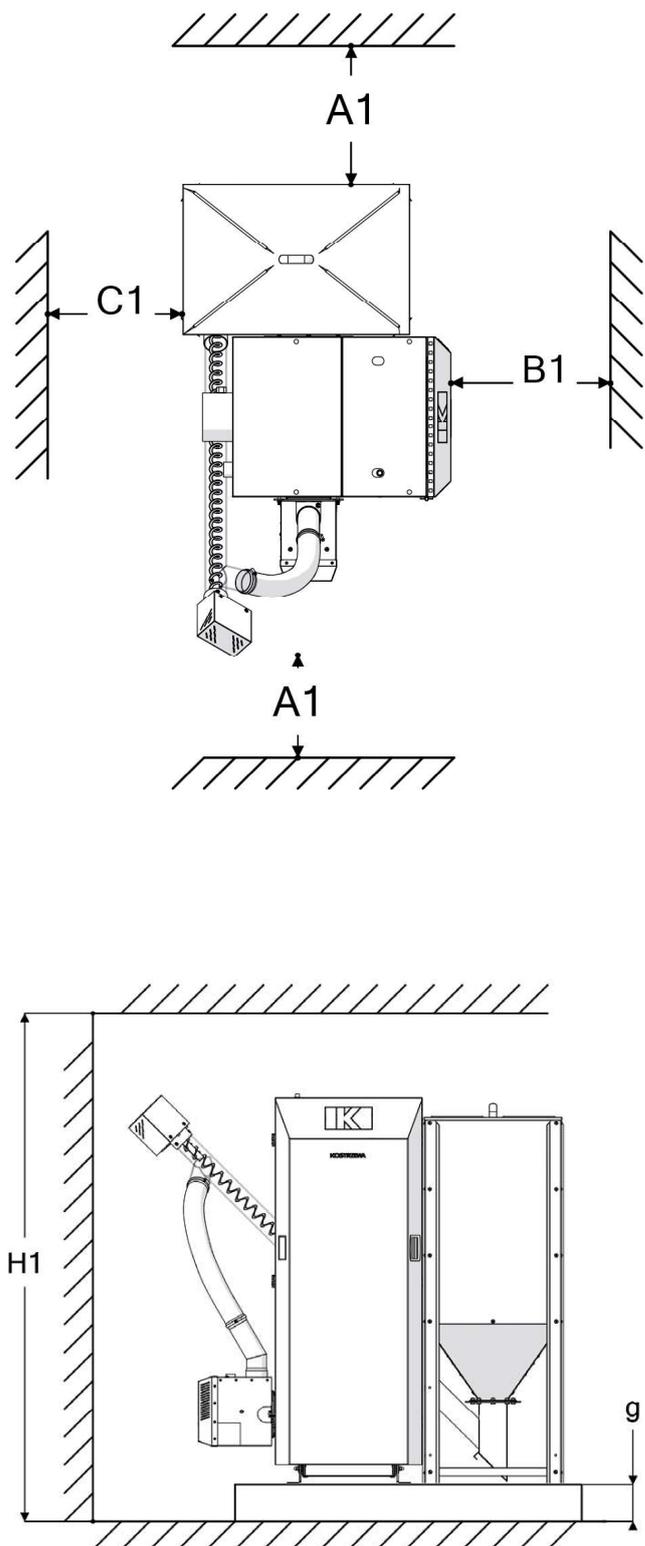


Fig. Boiler location in the boiler room – dimension diagram

5.B. Boiler room requirements

a) Boiler foundation min. 0.05 m

Boiler foundation requirements:

- the foundation must protrude over the boiler room floor;
- the foundation edges must be secured with steel angle sections.

b) Boiler room floor

Boiler room floor requirements:

- the boiler room must be made of non-flammable materials, resistant to extreme temperature changes and impact;
- the floor must descend in the well direction.

c) Boiler room ventilation

Boiler room ventilation requirements:

- do not use mechanical ventilation systems in the room with solid fuel furnace if the combustion air is supplied directly from the room and the flue gas is discharged gravitationally via a duct from the device;
- the boiler room must be fitted with a ventilation duct with a cross section of at least 50% of the flue cross sectional area, min. 20x20 cm²;
- the boiler room must be fitted with a ventilation duct with a cross section of at least 25% of the flue cross sectional area with the outlet under the boiler room ceiling;
- the outlet duct cross section must be min. 14x14 cm²;
- the vents must be made of non-flammable materials.

5.C. Hydraulic system requirements

- the hydraulic system must be made in accordance with the good building practices, relevant standards and regulations, and the design input
- the boiler may operate in a sealed heating system (sealed diaphragm tank) provided that the boiler supply and return line is fitted with a dual action relief valve
- a pressure reducer must be installed with a relief valve to avoid safety valve opening in case of a rapid increase in boiler water pressure
- an expansion tank must be installed in the highest point of the heating system and protected against frost
- the expansion tank should be installed at the boiler return
- to guarantee proper working conditions and failure free boiler operation, ensure minimum temperature at the boiler return by installing the boiler pump with a mixing valve (boiler mixing system)*

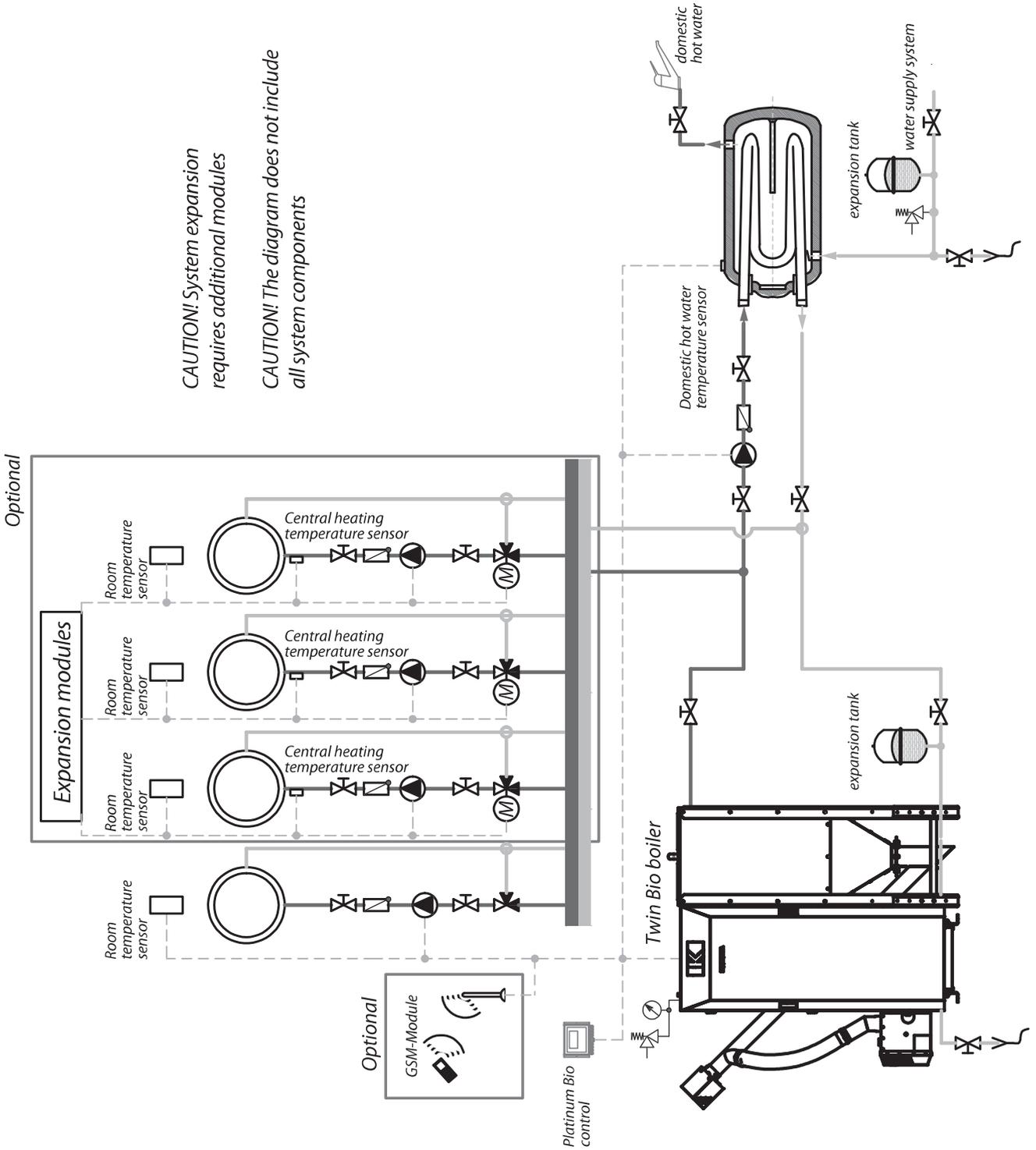
*Water temperature at the boiler return must be min. 45°C to prevent boiler corrosion as a result of undesirable and excessive flue gas condensation in the boiler. The boiler circulation pump must be fitted with a control valve. The pump output must be approx. 40÷50% of the nominal water flow through the boiler. The boiler circuit design must guarantee the difference in temperature between the supply and the return of max. 15°C.

CAUTION!

The boiler pump must be installed between two cut-off valves. To protect the pump against high pressure difference between the suction and discharge:

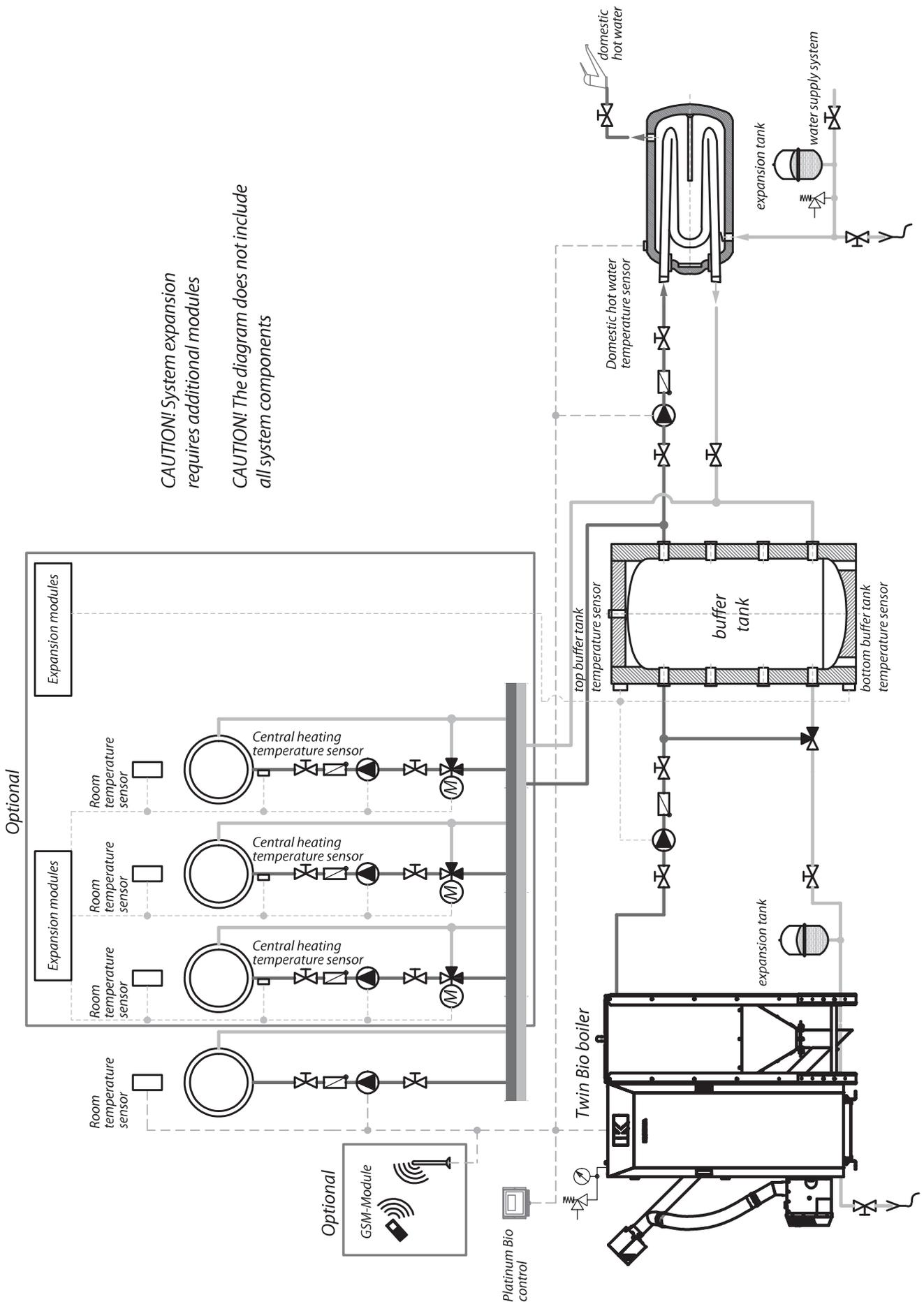
- install the boiler pump at the system return (especially in systems with high water capacity, where the discharge pressure is very high);
- protect the boiler pump at the suction against low pressure.

5. Design guidelines



CAUTION! System expansion requires additional modules

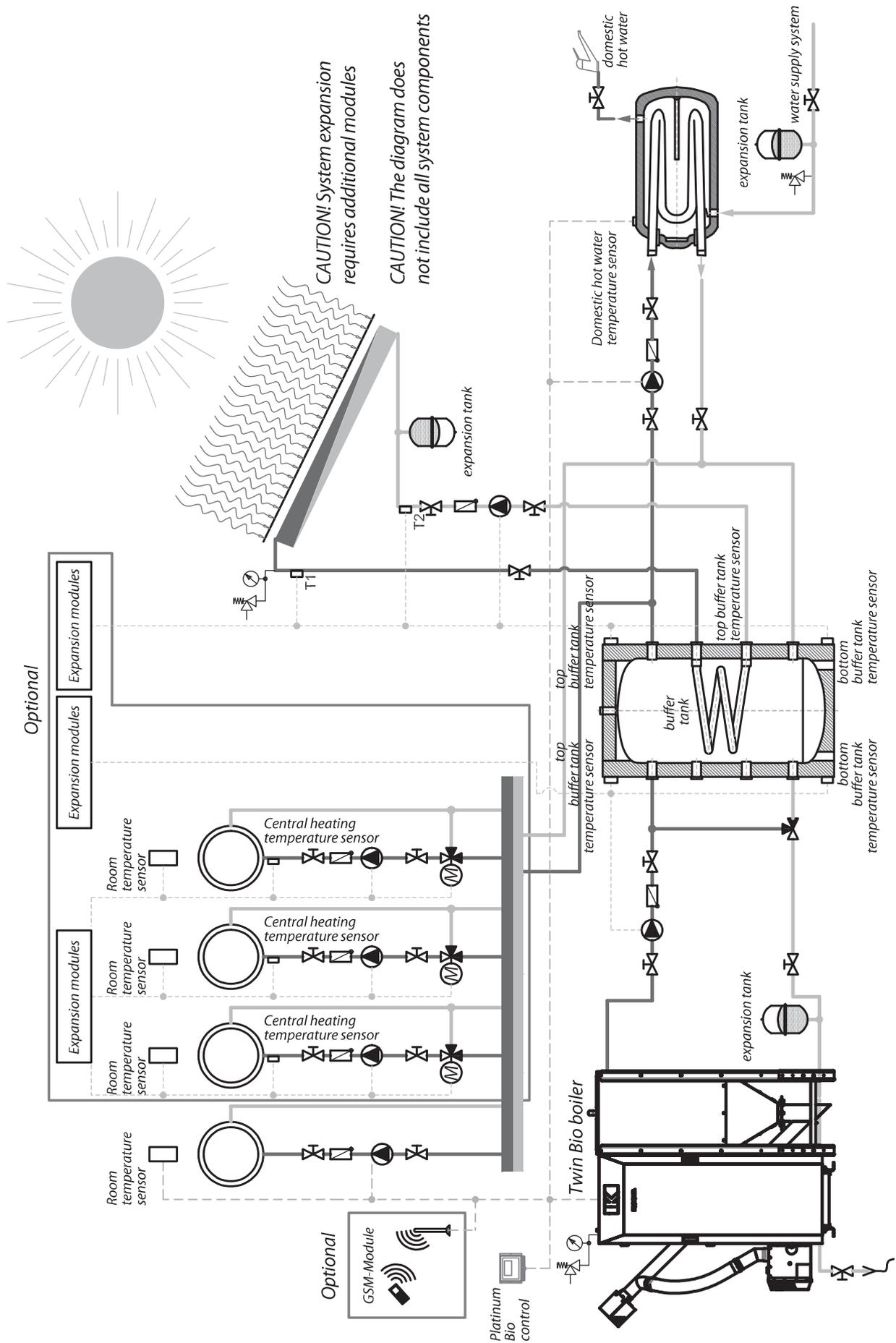
CAUTION! The diagram does not include all system components



CAUTION! System expansion requires additional modules

CAUTION! The diagram does not include all system components

5. Design guidelines



5.D. Water quality requirements

The water quality affects the life and efficiency of heating devices and the entire system. Incorrect water parameters will result in the corrosion of heating device surfaces, transport ducts or lime scale deposits. It may lead to failure or damage of the entire heating system. The warranty does not cover any damage caused by corrosion and lime scale deposits. Strict adherence to the water quality requirements is a precondition for the warranty.

Boiler water requirements:

The water for filling boilers and heating systems must meet the requirements of relevant standards and regulations.

Required boiler water parameters:

- pH >8.5
- total hardness <20°f
- free oxygen content <0.05 mg/l
- chloride content <60 mg/l

The treatment method for water used in the heating systems must meet the above requirements. Use of antifreeze additives must be consulted with the manufacturer (KOSTRZEWA). Failure to comply with the boiler water quality requirements may result in damage to the heating system components (e.g. boiler) and is not covered by the warranty. It may invalidate the warranty and result in additional charges in case an authorised service centre is involved.

5.E. Flue system guidelines

The flue system must conform to the relevant standards and regulations.

The flue system removes flue gas from the boiler room to the atmosphere. The flue system creates draught determined by:

- temperature gradient between the flue gas temperature and the ambient temperature (difference in density and pressure);
- flue length;
- flue shape (bends, inclination, draught breaker etc.);
- flue cross section;
- flue diameter (flue diameter must correspond to the boiler's flue connector diameter);
- flue internal surface roughness;
- flue cleanness;
- flue gas tightness (seals, grouts etc.);
- flue thermal insulation;
- changes in ambient conditions (temperature, pressure fluctuations due to the air flow, roof shape, flue location in relation to building envelope components etc.).

The diameter of the duct connecting the boiler with the flue must correspond to the diameter of the boiler's flue connector. Do not use any reducing couplings of the boiler's flue connector or the flue. The transition between the flue and the duct may include a tee with a correct combination of diameters. The flue design must guarantee that flue gas temperature at the entire flue length to the outlet is higher than the dew point of the flue gas from a specific boiler (dry operation). The flue and smoke ducts must be fitted with drains or inspection holes with sealed doors and in case of wet flue gas also with a condensate drain valve.

Guidelines:

- in the lower range of Twin Bio boiler, flue gas temperature below 100°C may be observed and therefore the boiler must be connected to moisture resistant flues (acid proof liners – steel sheet, vitrified clay recommended);
- if the boiler is not connected to the moisture resistant flue, perform required calculations or use the existing flue data;
- the connection between the boiler's flue connector and the flue must be insulated and as short as possible, slightly upwards without sharp bends and a minimum number of bends;
- the smallest diameter or cross section of a natural draught flue and a smoke duct must be min. 0.14 m, whereas the smallest diameter must be min. 0.12 m if the steel liners are used;
- horizontal flue duct length must not exceed the effective flue height or 7 metres.

Tip:

Connect the flue ducts without any loads and stresses

- seal the flue duct
- the flue must be opened upwards and lead horizontally at least 1 metre over the roof surface (with a rain cap)
- flue diameter must be selected in accordance with the flue liner manufacturer's requirements
- estimate cross sectional area of a circular flue is calculated using Redtenbacher's equation:

$$A = 2,6 * Q / (n * H^{0,5})$$

where:

A – flue cross section [m²]

Q – boiler heat output [kW]

n – coefficient within the following range 900 – 1880
(n = 900 for wood)

H – flue height [m]

CAUTION!

The installed flue system requires the commissioning consisting in the inspection of the following:

- flow capacity;
- gas tightness;
- draught;
- connection and conformity with the design;
- standard height above the roof;
- environmental protection standard requirements;
- installation conformity with the design and as-built documentation;
- valid certificates for structural, insulation and mounting materials used for installation.

The device has to be commissioned by an authorized personnel with a report.

5.F. Fuel quality requirements

Pellets

Sawdust granulate (pellets) made to EN 14961-2:2011

– Class A1 are the basic type of fuel used in the Twin Bio boiler

- diameter: 6 ± 1 mm; 8 ± 1 mm
- length $3,15 \leq L \leq 40$
- moisture content $\leq 10\%$
- ash content $\leq 0,7\%$
- calorific value 16,5 – 19 MJ/kg
- density ≥ 600 kg/m

Oats / Pellets

The Twin Bio boiler may be fitted with an optional burner grate for the combustion of oats and wood pellets mixture (50:50 ratio) and low quality pellets (high ash content, lower calorific value). Oats moisture content $\leq 12\%$. The burner grate replacement for the oats grate is included in section 7.J.

Wood

Additionally, the Twin Bio boiler may be fitted with cast iron grates for burning pieces of wood. Wood grate installation is described in 7.K.

In order to achieve the nominal power of the boiler, use dry wood with the max. humidity of up to 20%, which is equivalent to 18 months of drying the wood under cover. Using larger elements (chopped into thick pieces) will prolong the burning of one load to up to 8 hours.

CAUTION!

Use the fuels from reliable sources only.

The fuels must have suitable moisture content and low proportion of fines. They should not contain mechanical impurities (stones etc.) which may affect the combustion process and damage the device. Kostrzewa shall not be held liable for any damage or incorrect combustion process as a result of using unsuitable fuels.

Failure to comply with the fuel quality requirements may result in damage to the heating system components (e.g. boiler, feeder) and is not covered by the warranty. It may invalidate the warranty and result in additional charges in case an authorised service centre is involved.

5.G. Selecting the nominal heat output of a boiler

The nominal boiler heat output must correspond to the heat demand.

The heat demand for domestic hot water and central heating systems is determined in accordance with the relevant standards and regulations.

The process heat demand is calculated in accordance with the relevant requirements of the production processes for an individual plant. The nominal heat output of the boiler must be selected by an authorised person based on thorough calculations. Do not oversize the boiler

5.H. System venting

Water heating system venting must conform to the relevant standards and regulations.

6. Boiler start-up, operation and stop including emergency stop

6.A. Boiler inspection

Check the following before filling the boiler with water:

- boiler internal checks – clean and check the internal insulation (fire bricks);
- check movable parts, especially pressurised;
- check valves, especially safety valve;
- check controls, gauges, regulators (e.g. boiler control system);
- boiler external checks – external insulation, boiler casing etc.;
- check connected systems.

Remove any defects and faults in the boiler operation. Perform a water test after major repairs, pressurised part replacement and long downtimes.

6.B. Filling boiler and system

System and boiler feed water must meet the design requirement, see section 5.D. 'Water quality requirements'. The difference between the feed water temperature and the boiler shell temperature (ambient temperature) must be as low as possible – a threshold difference of 30°C is recommended. If this condition cannot be met, extend the boiler filling time.

Filling procedure:

- open feed valve;
- open return valve;
- open filling valve;
- check boiler and system condition and pressure device integrity.

6.C. Start-up preparation

Check the following before boiler start-up:

- check if all the safety and fire regulations and guidelines in the quick guide to the safety and fire regulations for fuel systems and all components including ducts, valves, controls, pumps etc. regarding gas tightness are followed;
- check system pressure – if the system pressure is too low, increase the pressure (with a low flow rate to reduce the volume of air introduced to the system);
- check fuel level in the storage hopper (refill if necessary to allow installation of the storage hopper cover);
- check fuel level – check if the storage hopper is free from foreign material (stones, steel parts etc.) which may affect fuel conveying, burner operation or cause damage to feeder components;
- check flue system – check if all fire regulations are followed;
- check wiring system;
- check auxiliary equipment (e.g. swirl vanes, if installed);
- check boiler room ventilation system;
- check boiler condition (closed door side, cleanouts, pipe stoppers, etc. and gas tightness).

6.D. Boiler start-up

The boiler (system) has to be started by an authorized installer (valid authorized service technician certificate issued by Kostrzewa is required – source: www.kostrzewa.com.pl 'Service' tab). Installation and trial run must be recorded in the Warranty Card.

The user must notify the relevant authorities of a new boiler installation. The relevant authorities will inform the user on any further procedures required (e.g. scheduled inspections, cleaning).

Start-up procedure:

- check system pressure;
- open flue gas valve or throttle (if installed);
- check fuel level in the storage hopper (refill as required);
- check fuel condition and quality (fuel must not contain foreign material to avoid damage to the boiler and its accessories);
- make sure the grate type in the burner is compatible with the fuel used;
- connect the power supply, set boiler control system in service mode;
- feed fuel from the storage hopper until it flows through the flexible duct;
- press the main switch to activate the boiler control system – Platinum Bio 2 control system operates in automatic mode;
- when starting from cold (also restarting after maintenance and cleaning) close the heat transfer to the heating equipment to reach the dew point faster (see boiler control system User Manual);
- at operating temperature connect the heating equipment in sequence;
- visually check the system after a few days of operation (door and access door, flue gas tightness);
- check boiler room ventilation;
- check boiler room lighting (suitable for boiler operation and repair);
- check access to places which require periodical maintenance (cleanout, control, storage hopper, burner);
- check leak tightness of hydraulic connection between the boiler and the central heating system;
- check gas tightness between the boiler and the flue
- check if the electrical cables were not damaged in transit.

Installation restrictions

Do not start the boiler if one of the following applies:

- no commissioning of the boiler by relevant authorities was scheduled (if required);
- incorrect boiler or fuel feed system operation;
- flue ducts not vented;
- no water in the boiler;
- incorrect safety valve operation;
- flue ducts blocked;
- boiler insulation damaged;
- safety devices and gauges performance issues;
- auxiliary equipment performance issues;
- fire hazard near the boiler.

6.E. Long boiler downtime and emergency stop

In the case of long downtime:

- press the main switch, disconnect the boiler pump, the circulating pump and the burner;
- disconnect the power supply;

CAUTION!

Freeze protection function is not working with disconnected power supply.

- close all valves;
- drain the boiler and the heating system via a drain valve, open all cut-off, control and vent valves to avoid freezing;
- bottom door must be open to avoid condensation.

The emergency stop procedure is performed when the boiler condition or any auxiliary device may cause boiler damage or hazard to the personnel.

CAUTION!

Rapid boiler cooling may increase the extent of damage.

Emergency stop may be caused by:

- no safety valve operation at exceeded allowable pressure;
- pressure section leakage;
- pressure section deformation;
- boiler room or auxiliary equipment explosion or fire;
- drain valve leakage;
- safety or control device failure;
- pressure gauge failure;
- circulating pump failure;
- flue gas explosion;
- leakage in installation connection or welded connections of the pressurised part;
- drain pipe blockage;
- auxiliary equipment failure;
- other faults which cannot be removed during boiler operation due to safety or technical reasons.

Emergency procedure:

- stop the boiler immediately (use the main power switch outside the boiler room, if required);
- use suitable fire-fighting measures (extinguishers) in case of a fire.

7. Installation



CAUTION!!!

Install and remove boiler components if:

- boiler is stopped and cooled down;
- wiring system is disconnected;
- fuel feed system is disconnected;
- boiler control system is removed (if installed on the side wall);
- transport and storage of boiler components was scheduled in advance due to safety reasons.

7.A. Insulation door installation and removal

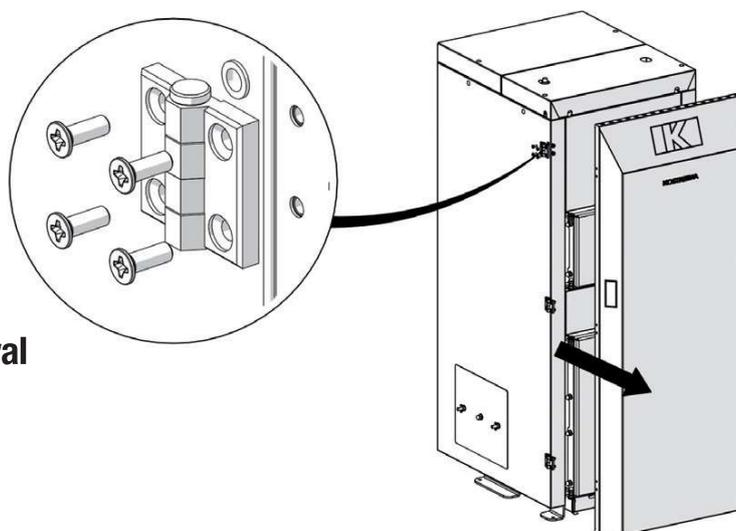
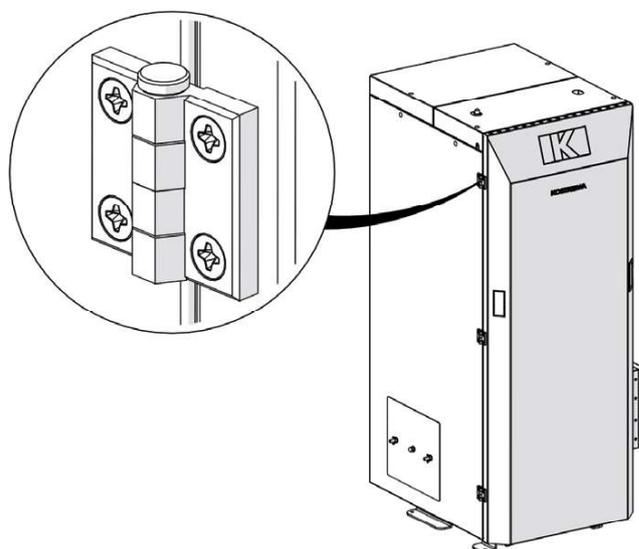
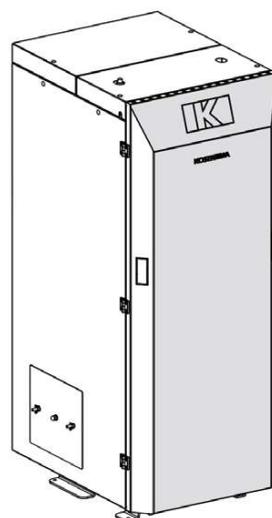
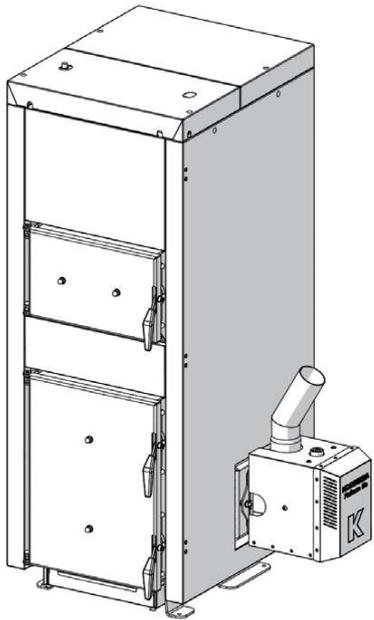


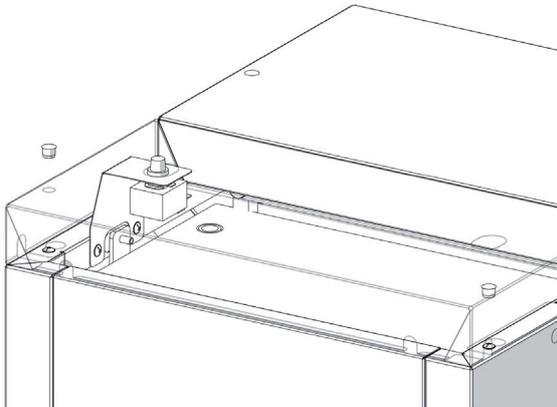
Fig. Insulation door installation and removal

7.B. Top insulation installation and removal

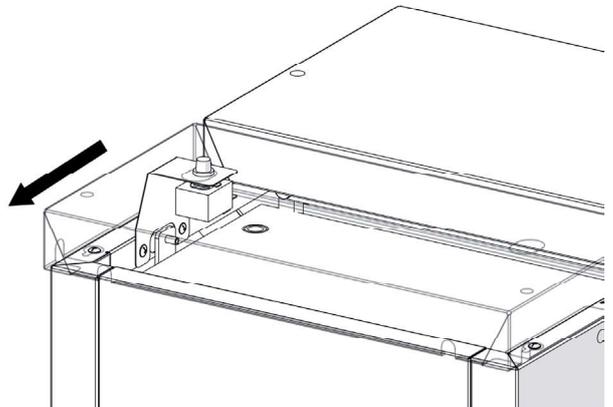
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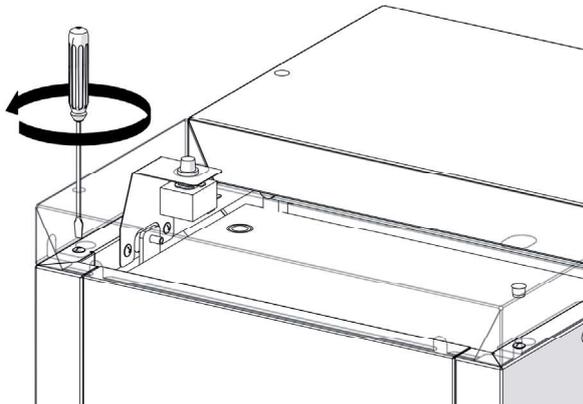
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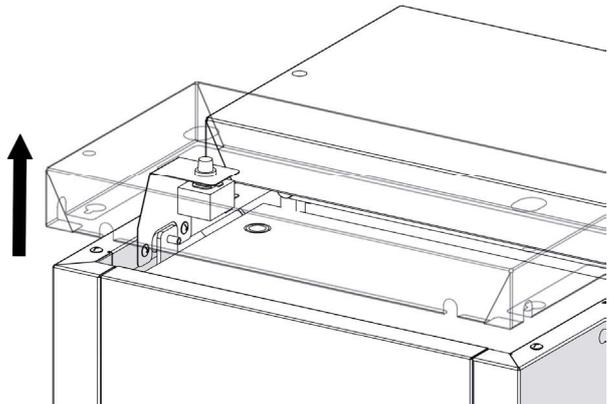
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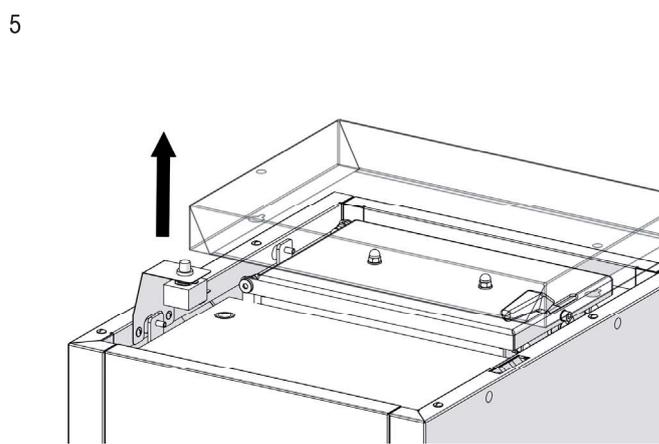
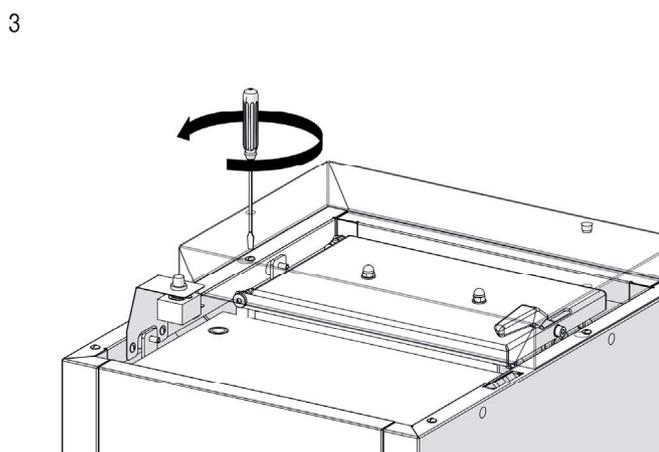
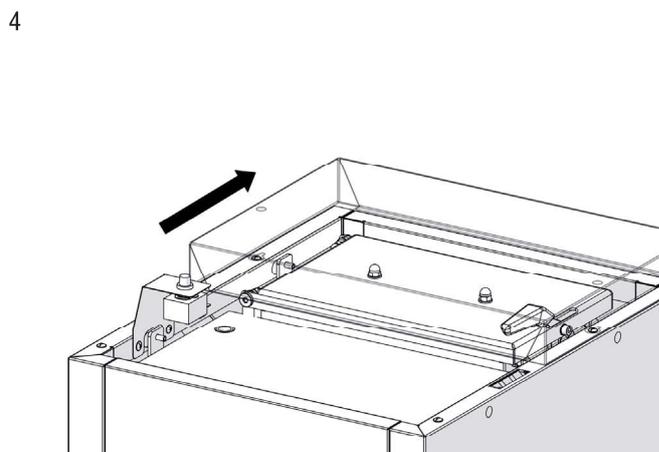
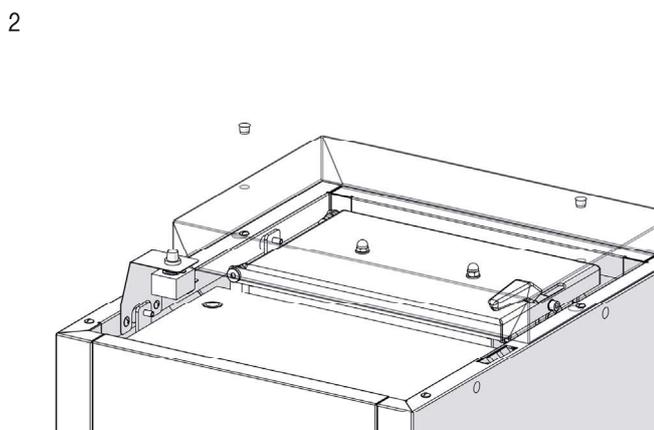
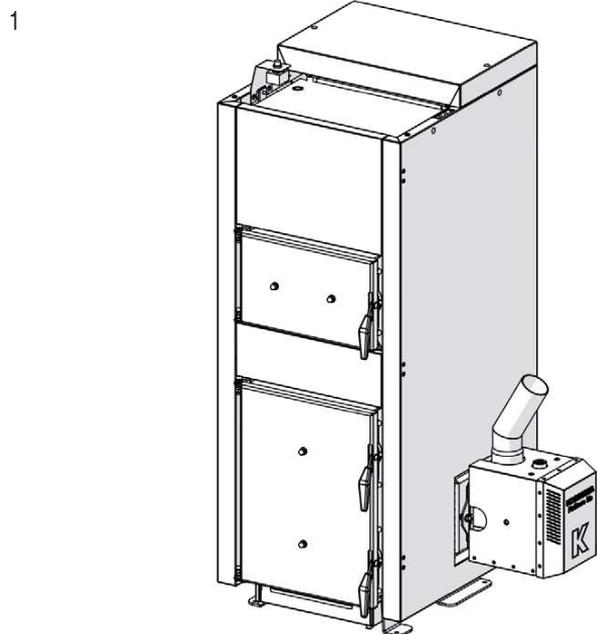
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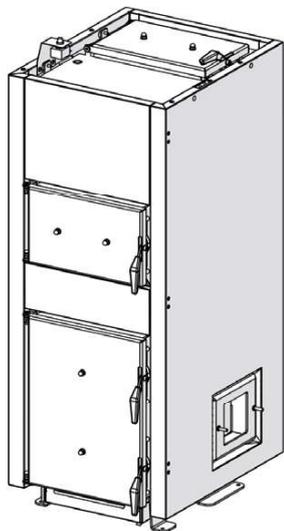


7.C. Top cover insulation installation and removal

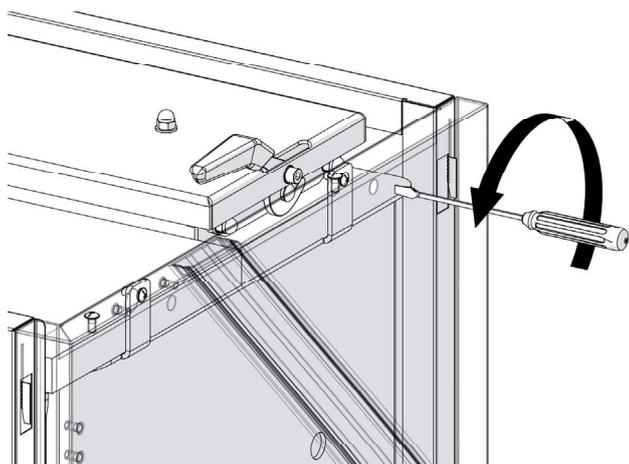


7.D. Block insulation installation and removal

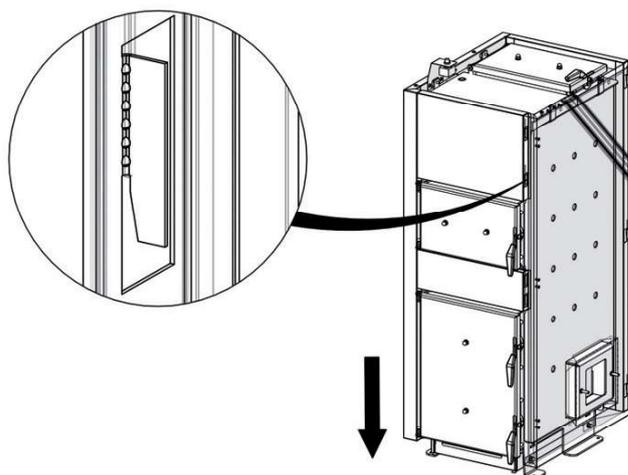
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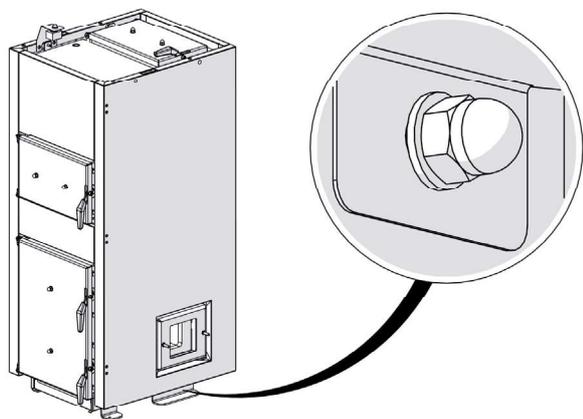
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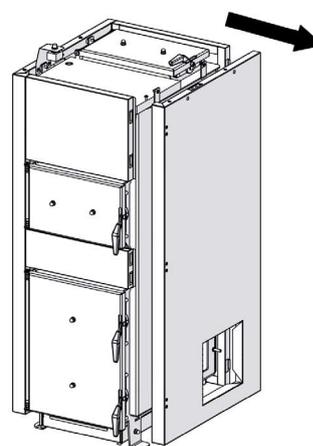
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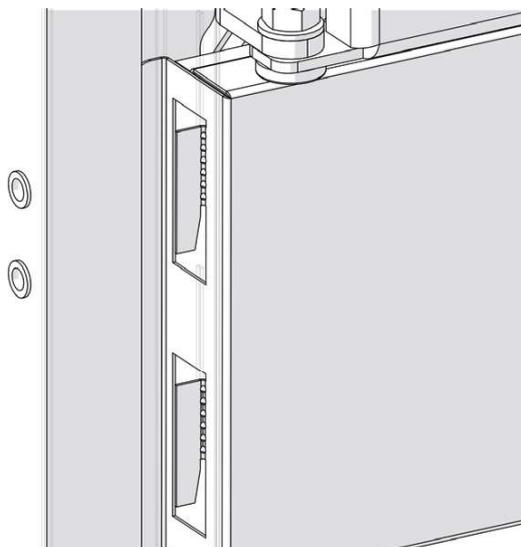


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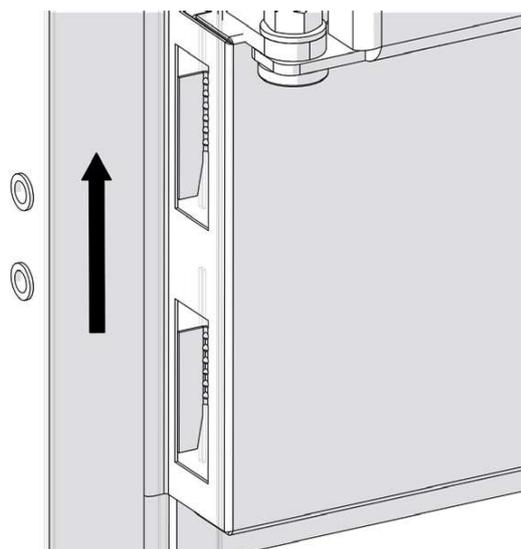


7.E. Front insulation installation and removal

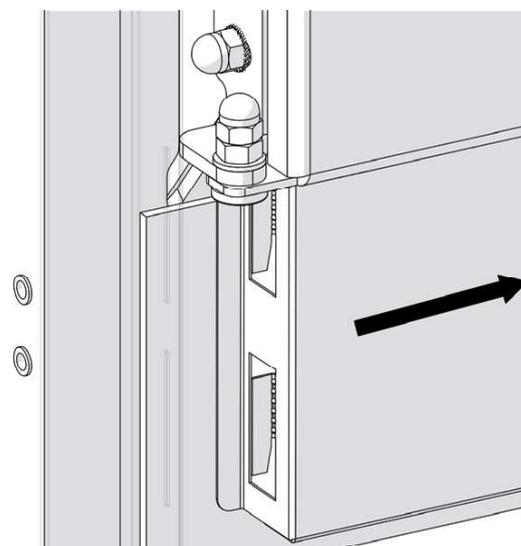
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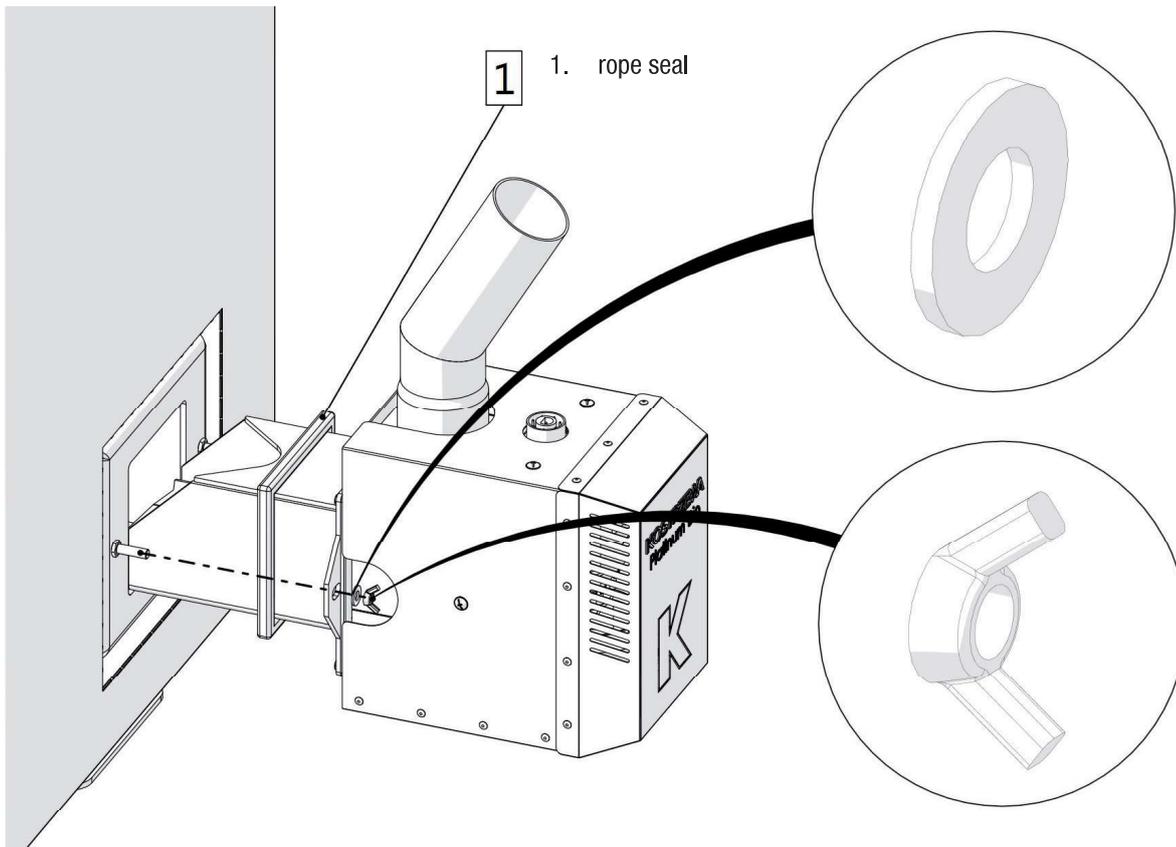
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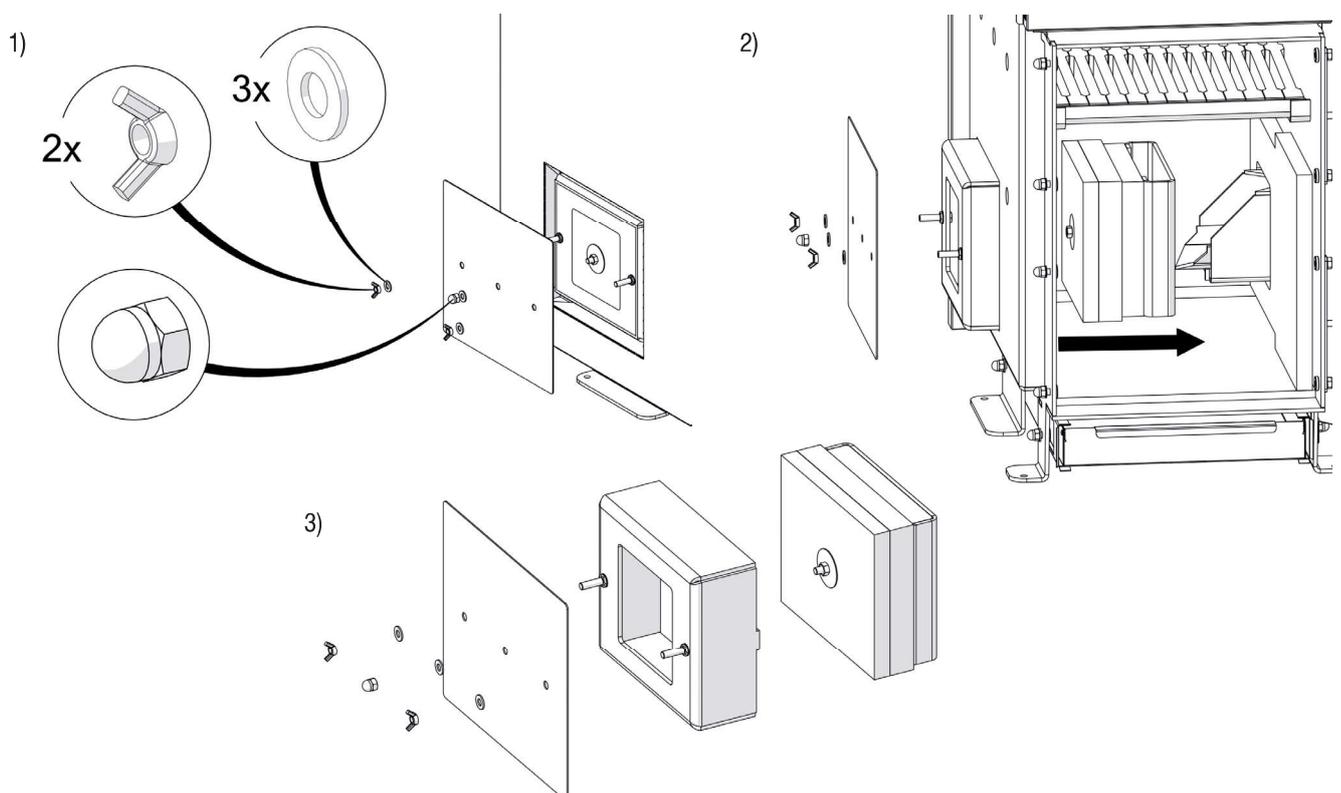
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7.F. Twin Bio boiler burner installation and removal



7.G. Burner cap installation and removal

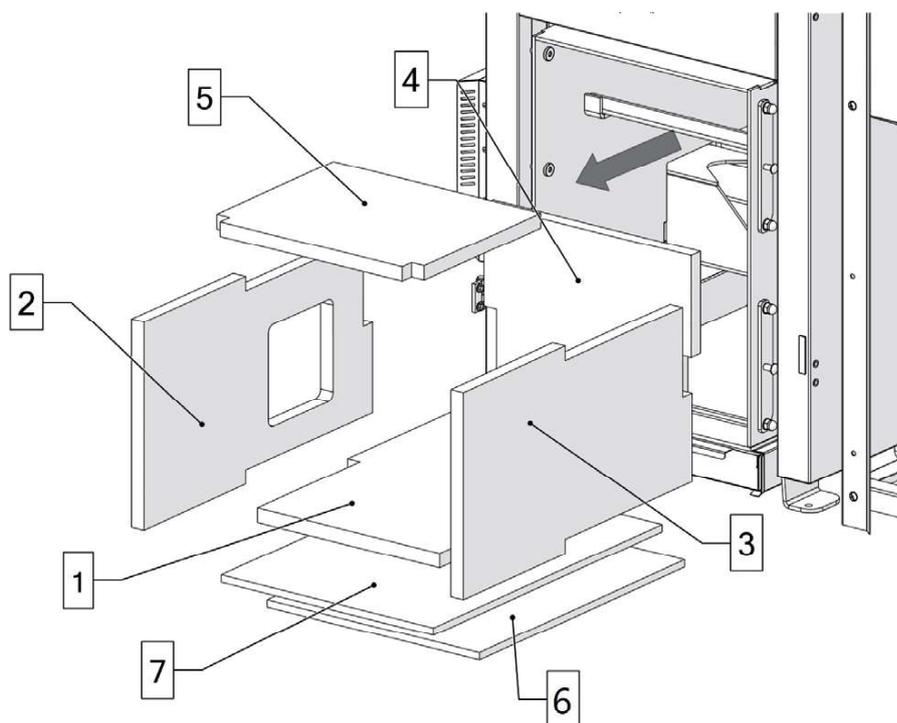


7.H. Ceramic chamber installation and removal

The Twin Bio boiler is equipped with a ceramic chamber which enhances its efficiency and reduces its emissions.

List of ceramic chamber elements:

1. ceramic chamber bottom cover
2. ceramic chamber burner side cover
3. ceramic chamber cap side cover
4. ceramic chamber rear cover
5. ceramic chamber top cover
6. ceramic chamber thermal insulation
7. ceramic chamber thermal insulation



Start the removal of the ceramic chamber by taking out the Platinum Bio burner. Then remove elements in the following order: 5; 2; 3; 4; 1; 7; 6. For installation reverse the procedure.

7.I. Boiler control system installation

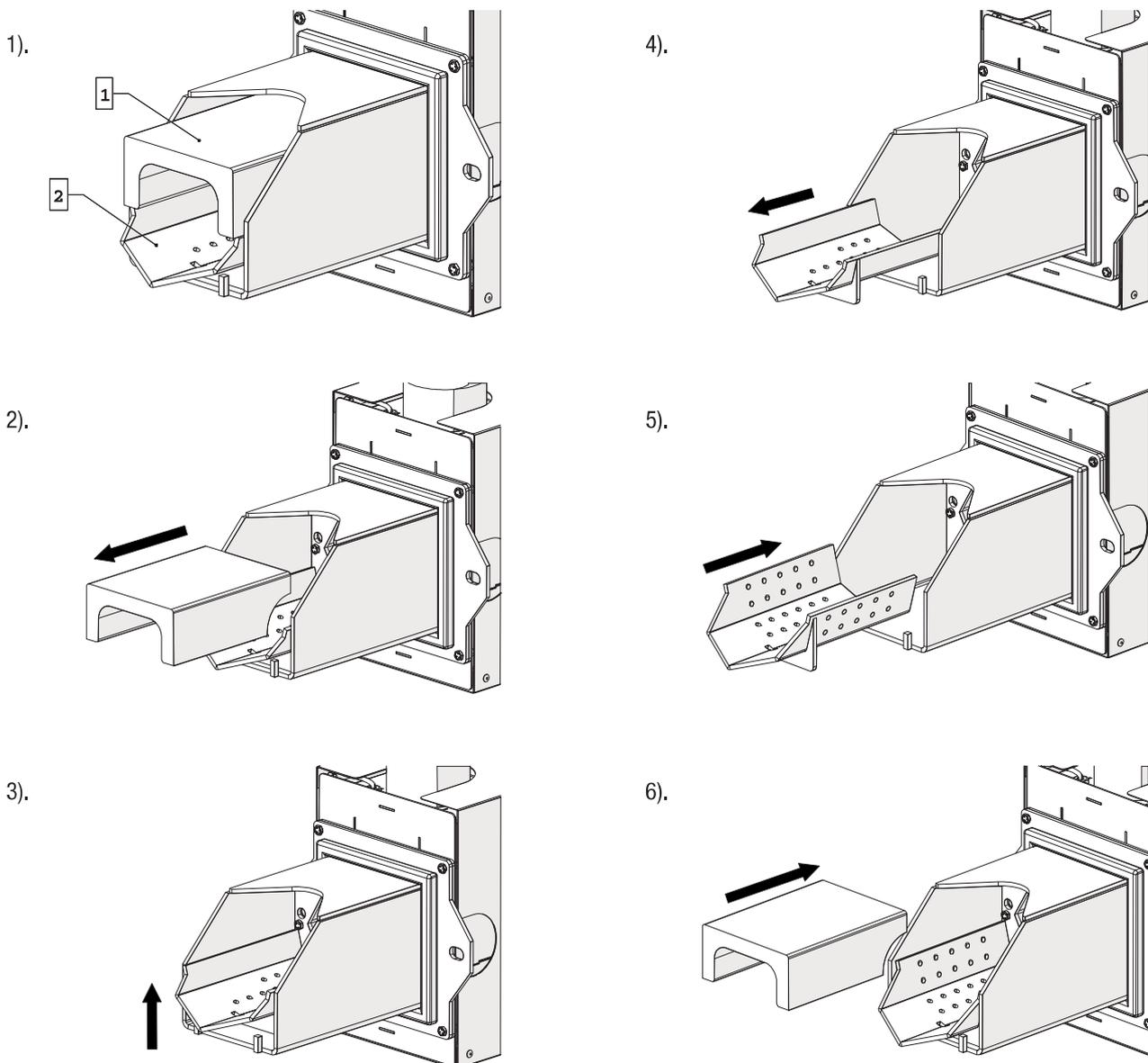
The Twin Bio boiler control system includes a Platinum Bio control. The control is a wall mounted device, secured with bolts.

CAUTION!
Platinum Bio control system installation method must guarantee rigid installation.

Position of control system must correspond to the conditions of the ergonomic use (e.g. by providing suitable installation height for easy installation) and easy access.

The electrical system connecting Platinum Bio control system and the Twin Bio boiler must be protected against damage caused by the use of a device (boiler) by installation on the flat surface (wall) with cable mounting brackets – avoid hanging cables which may obstruct control system access and cause health hazard.

7.J. Oats grate installation



7.K. Cast iron grates (wood firing option)

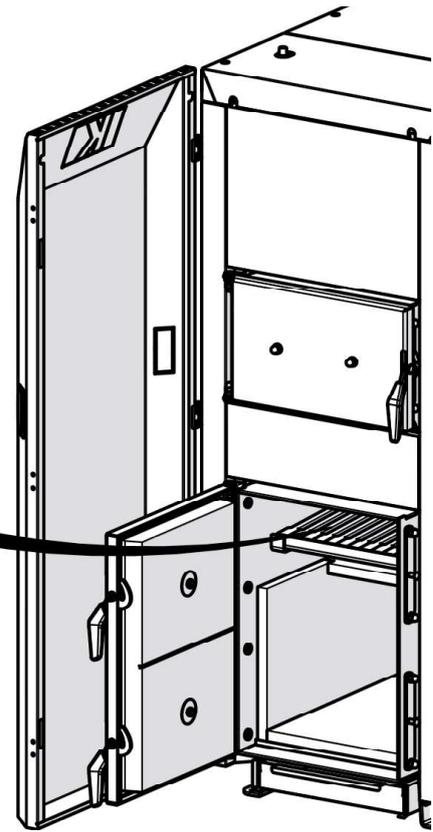
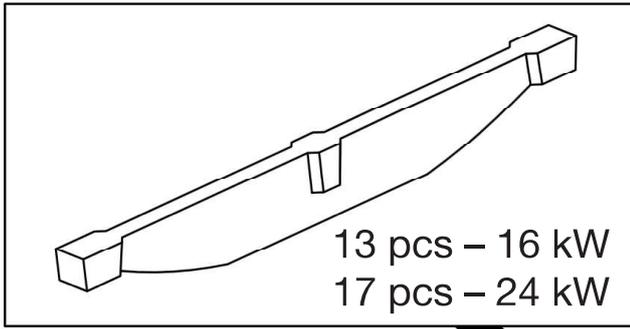
Starting the boiler in wood fired configuration

WARNING!!!

When using wood as fuel in the hopper you must ensure that the flue gas temperature does not exceed 200°C.

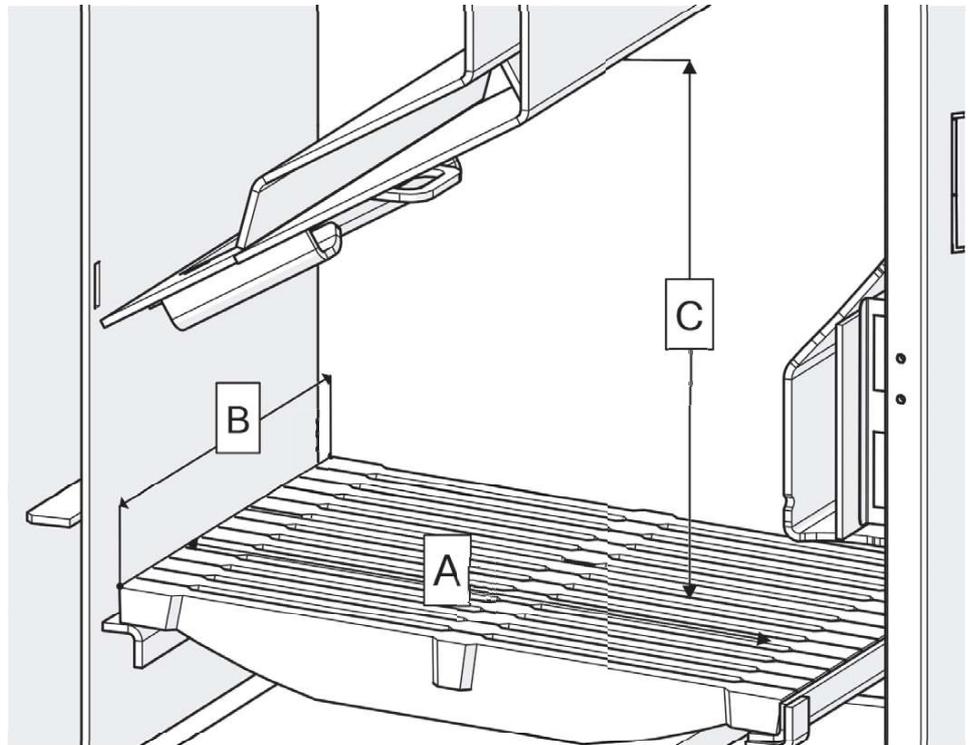
Do not start the boiler if one of the following applies:

1. Set the OFF mode on the control panel – wait for the boiler to cool
2. Choose fuel type – feed chamber
3. Place additional grates in the boiler
4. Place pieces of paper on the grates
5. Set dry wood pieces on the grates (size M is maximum fuel level)
6. Set the paper on fire with matches
7. Close boiler door
8. Set the boiler's panel into ON mode
9. Set the boiler's temperature to 70°C
10. Add more dry wood after a few hours



Combustion chamber dimensions

Table: Dimensions of the combustion chamber for the Twin Bio Boiler		
Twin Bio	TB 16	TB 24
A	440	440
B	338	438
C	310	310



8. Boiler operation and maintenance

Use the main switch to deactivate the boiler and wait until the boiler cools down – min. 1 hour before maintenance (boiler cleaning).

8.A. Boiler operation guidelines

Normal daily boiler operation:

- check correct operation of system components: burner, control system;
- check water level on a pressure gauge;
- check fuel level and quality and fuel feed system operation;
- check hydraulic joints leak tightness;
- keep the boiler room clean and tidy.

In case of any performance issues, remove the faulty devices or contact an Authorised Service Centre to arrange a repair or an adjustment.

8.B. Inspection scope and schedule:

a) Monthly

- check system water pressure
- check safety valve operation
- check control and safety device operation
- check tightness of all connectors and joints
- check balanced ventilation system

b) Minor inspection (every 6 months)

- check rope seal and gaskets,
- check boiler door thermal insulation,
- check safety devices (safety valve, safety temperature limiter STB etc.),
- flue gas analysis (if a sudden increase in flue gas temperature is identified, the combustion part of the boiler must be cleaned)

c) Major inspection (every 12 months)

- check rope seal and gaskets
- check boiler door and cleanout cover thermal insulation
- check safety devices (safety valve, safety temperature limiter STB etc.)
- analyse flue gas
- clean combustion section of the boiler
- check thermal insulation of the boiler
- check and adjust burner, adjust control system settings

After a long boiler/burner downtime, the residual oxygen in boiler water and the oxygen from the air mixed with carbonic acid have highly corrosive properties. Take any precautions necessary after if the boiler downtime lasted over a week.

Periodically remove the soot, sludge and ash from the combustion chamber, the flue tubes and the grate. Clean the boiler as necessary, but at least every 2 weeks. Remove ash as required.

8.C. Maintenance

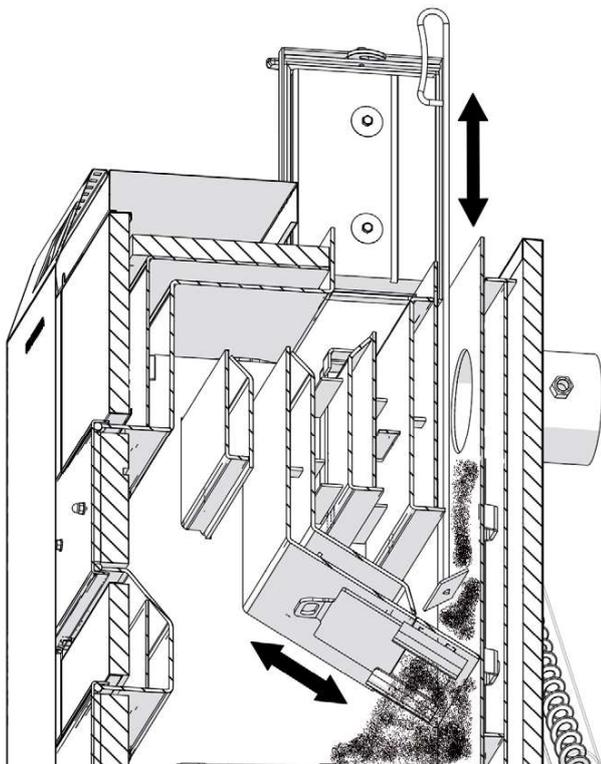
a) Boiler, burner, fuel feed system – mechanical

The regular and correct maintenance of the boiler is a precondition of a correct and reliable operation and low fuel consumption of the system. Contact an Authorised Service Centre at least once a year and after every boiler downtime to arrange an inspection.

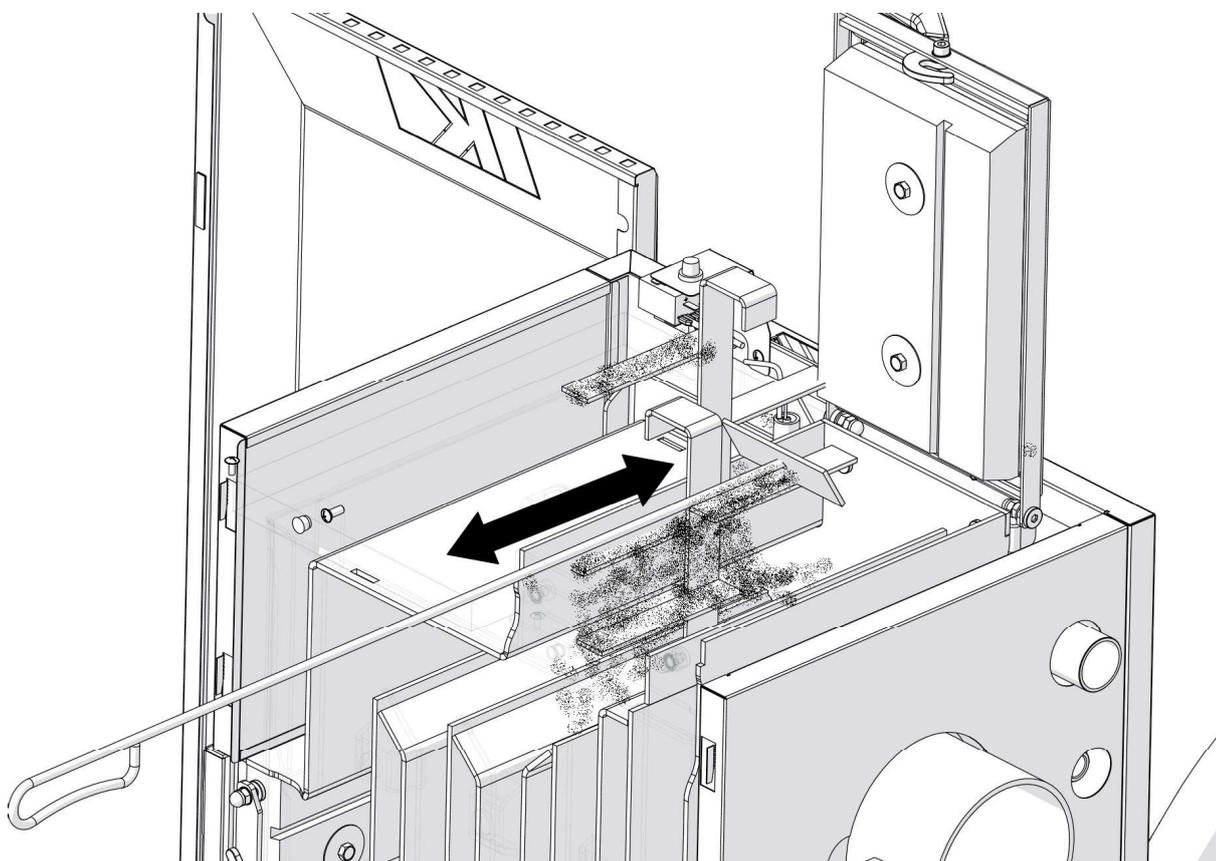
Heating system maintenance procedure:

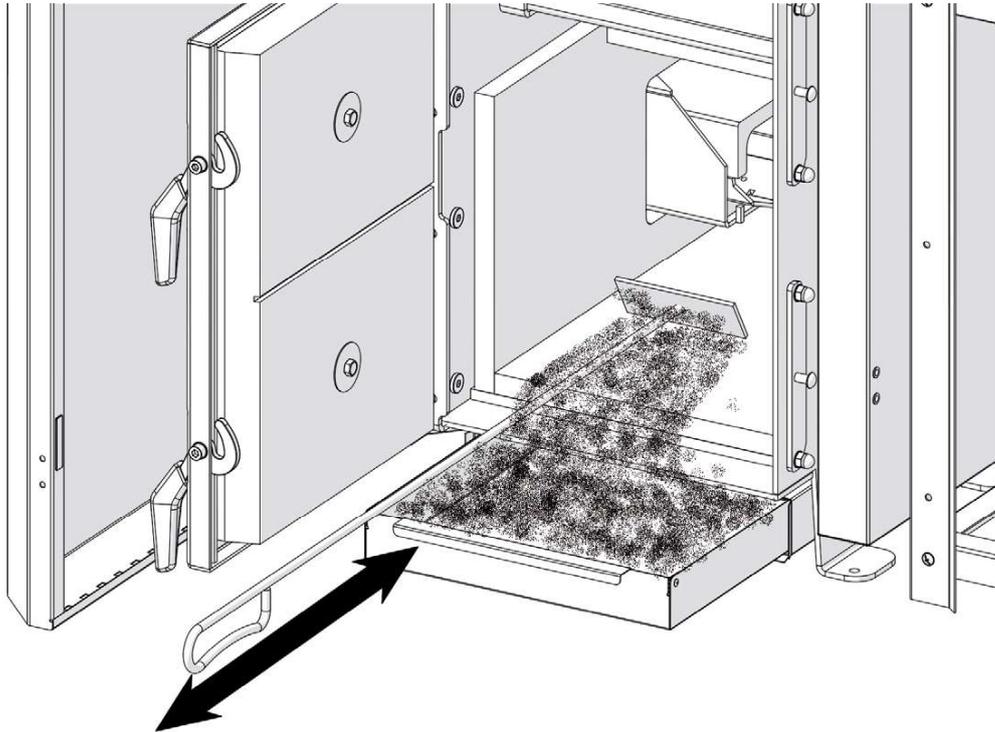
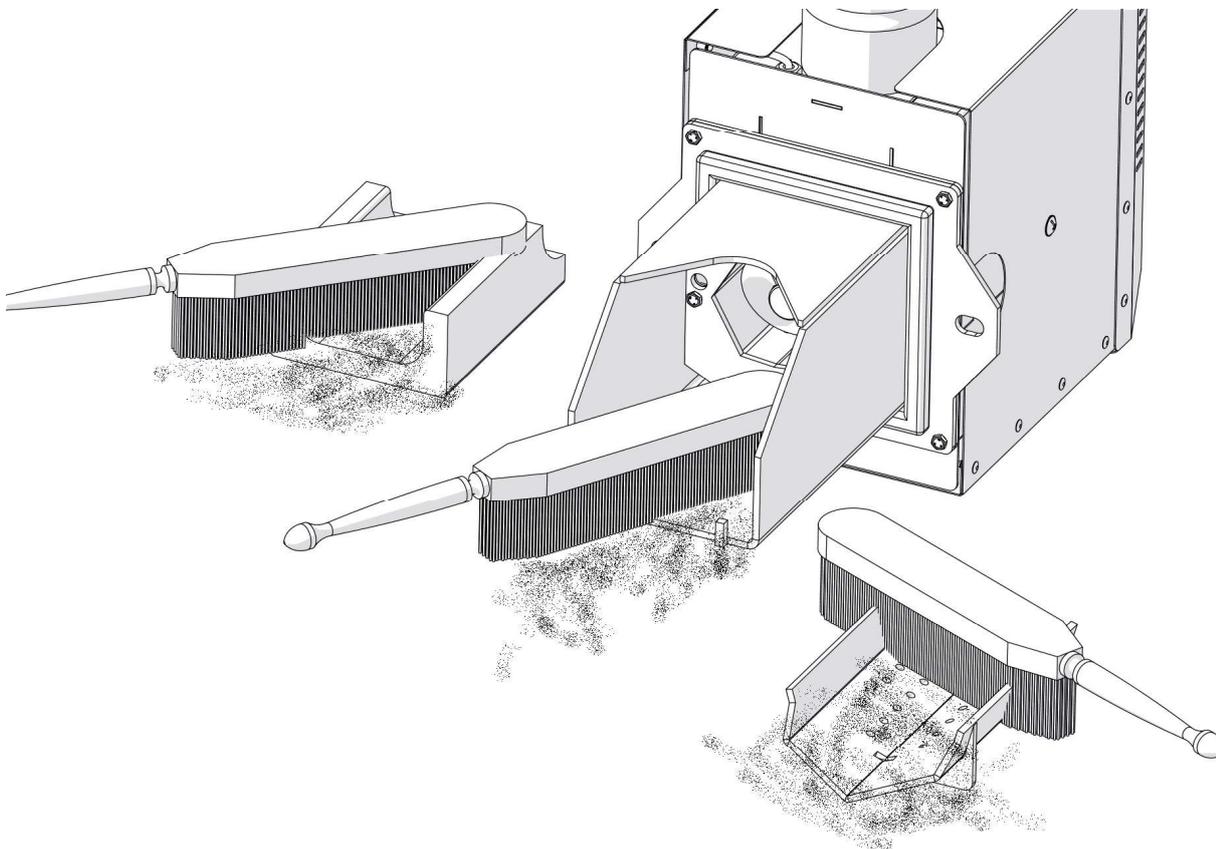
- deactivate the boiler (system) (stop mode);
- wait for a complete stop and allow to cool;
- reduce the boiler temperature to the level allowing safe maintenance;
- open boiler door;
- clean combustion chamber and all flues and check the rope seals in the boiler doors (replace if necessary);
- check and clean the burner (remove if necessary) – also, clean the motor and fan (especially vanes) from the outside;
- close the boiler door with burner;
- remove the cover;
- clean the combustion products from the rear section of the boiler;
- check cover gasket quality (rope seals) and remove as required;
- close the rear boiler cleanout;
- check smoke duct condition and gas tightness;
- check installation and operation of the boiler sensors;
- check installation and operation of the fuel feed system;
- feeder gear motor;
- fuel feed ducts leak tightness and flow capacity.

1) Exchanger baffle cleaning



2) Swirl vane cleaning



3) Ceramic chamber cleaning**4) Burner grate cleaning**

CAUTION!

The flue and ventilation ducts require periodical inspection and cleaning (at least once a year) by an authorised company.

An efficient ventilation and flue system is required for the correct and safe boiler (heating system) operation. The maintenance and operation of the flue ducts are covered by the following regulations:

- Act of 24 August 1991 on fire safety (Polish Journal of Laws Dz. U. No. 81 as amended);
- Act of 11 June 2006 on fire safety of buildings, other facilities and land (Dz. U. No. 80/06).

b) Boiler and accessories wiring system

- check wiring system in accordance with good engineering practices
- check cables, plugs and connections
- check boiler control system connections and functions
- check boiler pump and mixing valve operation
- check operation of other devices in the boiler room (circulation pumps, filters, sludge filters, valve etc.)

c) Storage hopper

Empty the storage hopper before maintenance and inspections.

- check the condition and functioning of the Platinum Bio swivel chute with fuel storage hopper
- check storage hopper for rigidity and leak tightness
- check storage hopper top cover tightness
- check storage hopper outlet for blockage

d) Final boiler room inspection

- fill the storage hopper with fuel
- start the boiler
- check correct operation of the entire heating system
- check (flue gas analysis) and adjust the heating system (control system settings, burner settings etc.)

9. Important notes, guidelines and tips

Before burner start-up check water level in the heating system. Fuel storage hopper must be filled with fuel to a required level to guarantee reliable boiler operation.

CAUTION!

Using fuel with different specifications may affect device operation and cause damage. Fuel with foreign material (e.g. stones) is treated as unsuitable for pellet burners. The manufacturer shall not be held liable for any damage caused by using fuel with different specifications.

Use safety gloves as a protection against burns and follow safe operation guidelines to ensure safe maintenance.

The heat exchanging surfaces are contaminated during operation resulting in an increase in temperature at the flue gas outlet and reduced efficiency.



CAUTION!

The device has to be installed and commissioned by a company authorized by the manufacturer, otherwise it may invalidate the warranty.

Do not open the doors and covers while the boiler is operating (burn hazard). Do not open the doors during fuel ignition (explosion hazard). Do not use starters and flammable materials to light a fire. Do not store flammable materials near the boiler or the burner.

Keep the minimum return temperature (60°C) to ensure correct boiler operation – risk of flue gas water condensation. Some condensate may occur during start-up (heating).

After the heating season, thoroughly clean the boiler and the flue ducts.

Keep the boiler room clean and dry.

10. Boiler decommissioning

Most of the boiler components are made of steel and can be disposed of by returning to an authorised scrap yard. Other components must be disposed of in accordance with the relevant regulations.

11. Quick reference guide – Fire and safety

1. Please read the Operation and Maintenance Manual before boiler start-up.
2. Do not use solvents, petrol etc. to light a fire.
3. Do not open live electrical devices to avoid electric shock.
4. Place the required fire fighting equipment in the fuel store and the boiler room.
5. Prevent unauthorised access.
6. The heating system equipment may be operated by an authorised and trained personnel only.
7. Check the wiring system and the flue system periodically.
8. Do not block the vents.
9. Check the burner operation and the flue gas quality, adjust the burner or analyse flue gas as required.
10. Disconnect the power supply (main switch) before maintenance.
11. Notify your supervisor of any faults.
12. Keep the boiler room clean and tidy.
13. The device may be repaired by trained and authorised personnel or an authorised service centre only.
14. Use carbon dioxide or dry powder extinguisher only.

12. End notes for installers – SERVICE

- Connect the boiler to the hydraulic system by installing a mixing valve with a boiler circulation pump which ensure the return water temperature of at least 45°C.
- Before connecting the boiler to the flue system, contact the relevant authorities for approval.
- The compression tank must be connected with the boiler via a supply duct without any cut-off devices.

13. Example equipment failures and remedies

Failure	Probable cause	Remedy
The display shows 'burner sensor short-circuit' message	<ul style="list-style-type: none"> • Incorrect burner plate sensor installation • Burner plate outlet damage • Burner duct damage 	<ul style="list-style-type: none"> • Check sensor installation • Check plate outlet • Check burner duct
The display shows 'heat exchanger overheating' or 'STB open' message	<ul style="list-style-type: none"> • Incorrect boiler temperature sensor installation • Boiler temperature sensor failure • No heat removal • Safety temperature limiter (STB) failure 	<ul style="list-style-type: none"> • Check correct sensor position • Check the sensor connection in the control • Boiler pump failure • Control replacement / repair
The display shows 'burner overheating' message	<ul style="list-style-type: none"> • Incorrect sensor installation • Feeder sensor failure • Fouled burner grate – sinter on the grate 	<ul style="list-style-type: none"> • Check sensor installation • Replace feeder sensor • Clean burner grate
No indications on the display	<ul style="list-style-type: none"> • No power supply • Incorrect connection of control system plugs and cables • High control humidity • Display failure 	<ul style="list-style-type: none"> • Check power supply connections • Check control plugs and connectors • Control replacement / repair
Control system button(s) not working	<ul style="list-style-type: none"> • Control panel failure 	<ul style="list-style-type: none"> • Control system repair
The feed screw does not turn, despite being signalled as functioning	<ul style="list-style-type: none"> • No power to gear motor • Wrong wiring of power cables • The feeder is blocked • Gear motor is faulty • Control module is faulty 	<ul style="list-style-type: none"> • Check control plugs and connectors • Check the connection of the gear motor to the screw shaft • Check if the feeder duct is not blocked and that the screw shaft can rotate freely in the duct
No air intake despite the fan being signalled as functioning	<ul style="list-style-type: none"> • No power to the fan • Fan is faulty • Control module is faulty 	<ul style="list-style-type: none"> • Check fan plugs and cables (with connectors) • Replace fan • Replace control module

13. Example equipment failures and remedies

Failure	Probable cause	Remedy
Automatic fuel ignition not working – ‘No fire/fuel’ message	<ul style="list-style-type: none"> • Incorrect settings of heating element heating time and fire test • Incorrect heating element connection • Heating element hot air outlet blocked • Heating element failure • Flame sensor contamination/failure • Flame sensor opening at the rear grate wall contaminated 	<ul style="list-style-type: none"> • Change settings • Check heating element plugs and cables (with connectors) • Clean igniter opening • High fuel moisture content • Replace heating element • Replace or clean the flame sensor • Clean flame sensor opening
Black smoke in the combustion chamber. Not combusted fuel in the ash pan	<ul style="list-style-type: none"> • Incorrect air volume • Incorrect feed and pause time for specific power 	<ul style="list-style-type: none"> • Reduce air volume, check feed and pause time (burner power too high)
Flying fuel particles in combustion chamber. Not combusted fuel in the ash pan	<ul style="list-style-type: none"> • Incorrect air volume • Incorrect feed and pause time for specific power 	<ul style="list-style-type: none"> • Reduce air volume, check feed and pause time (burner power too high)
Set temperature not reached	<ul style="list-style-type: none"> • Incorrect boiler size • Sensor failure • Incorrect location of the return water temperature sensor • Set boiler power too low 	<ul style="list-style-type: none"> • Check correct boiler selection • Check sensors • Check return sensor location (water circulation required) • Check burner feed and pause times
Smoke coming from the boiler	<ul style="list-style-type: none"> • Blocked flue • Boiler extension duct blocked • Heat exchanger channels blocked 	<ul style="list-style-type: none"> • Clean the ducts and channels