



Moderator

Biomaster 15, 23, 30

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INSTRUCTION MANUAL

Manufacturer:

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Due to ongoing research and development, the manufacturer reserves the right to implement changes in the design and documentation of the boiler.

To the User

Thank you for choosing one of our boilers and congratulations on the great purchase. Moderator Sp. z o.o. produces devices based on original forms of constructions developed by an engineer Kazimierz Kubacki at the end of the '70s in the Hajnówka. Since last 30 years our boilers have undergone major technical changes and improvements. These days they are high quality products, the effect of research & development which is supported by great efficiency with the average of 93 %. Our boilers are ecological and they meet the required standards.

This manual is based on the recent manufacturer's information. As process of design changes is constant, this instruction can be applied only to the boiler with which it was bought. Moderator Biomaster set is designed to boil the water up to the 90°C in the central heating systems and storage water heaters, as well as in the technological installations (wood drying kilns etc.), residential and public buildings, commercial-service facilities, workshops, village farms and industrial plants. The instruction was created as a guidance during installation, operation and maintenance of boilers. You must read it before you attempt to take any actions.



Biomaster set contains devices with separate manuals. You have to follow these instructions during installation, operations and maintenance.

1. Introduction

1.1. Safety instructions

In order for this unit to operate safely is proper installation to central heating system. The producer made every effort to have this boiler safe during operation but it will possible only if you follow this instruction.

Omission of any of the following steps in order to reduce the costs of installation will affect safety standards or result in higher costs of operation in the future.

The following set can be used by children aged at least 8 years and persons with compromised physical, intellectual capacity or those without experience/knowledge unless they are supervised by a person responsible for safety or receive instructions on how the appliance is to be used. Children should not play with the appliance. Children should not clean and conduct maintenance of appliance without the supervision or guidance of a responsible person.

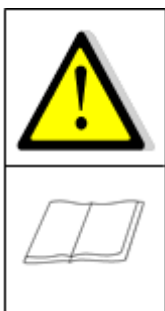
All quality and performance tests were conducted with the usage of carefully selected accessories (safety valves, thermal protection) and devices (venting). Only the use of equipment which is recommended by the producer will guarantee claimed high performed parameters of the boiler and its whole set.

We warn against applying alternative solutions, not tested with this boiler and not having proper authorisations (such as the Polish Technical Supervision Office) and certificates (declaration of conformity, EC Certificate). We also warn against conducting any unauthorized changes in the boiler's structure.

To prevent injury, death, or property damage, read and follow all instructions and warnings

In case of any doubts you may contact our Sales Department or Client Service.

Symbols and Warnings



Only a person that has read the manual can use and make operations on the boiler.



Warning. The cleaning hatch under its cover may be hot. Be careful at the boiler room, other elements of the boiler can be hot as well.



This sign, which appears in the instruction, stands for danger. Please read the following carefully in order to prevent hazardous situation.



Remember that at the boiler location different surfaces may be at different temperature. You must pay attention to the temperature of the door, which will be higher than of other surfaces. It applies also to the flue pipes as well as feed and return pipes. You must be extremely careful when entering the boiler room.



Remember that ash and fuel may cause allergic reactions. We recommend using protective gloves and dust masks.



Remember to keep clean the boiler room. Fuel spread on the floor may be the cause of a fire.

1.2. Warranty

The producer provides 3-years boiler warranty, which covers both material and manufacturing defects. The producer provides 1-year warranty on all components bought with the boiler: controller, ventilator, reducer, motor with wiring. The warranty does not cover the elements highlighted in the list of equipment (Chapter 2.1), as well as other operational components, e.g. gasket.

Warranty does not cover defects or damage resulting from improper use or normal wear and tear, reimbursement of installation expenses, reimbursement of travel expenses, damage resulting from adjustments or service not approved by the producer, consequential damages, losses resulting from days without production, and any other economic damages.

Bought product as well as the additional equipment should be installed by an authorized MODERATOR service.

The user is obliged to obey the following guidelines, otherwise the warranty is invalidated:

1. The first start up must be done by the manufacturer's authorised representative.

2. The first start up should be conducted not longer than 30 days from the date of invoice.
3. After first year of using the boiler there should be carried a mandatory maintenance service – it is a condition that must be required in order to extend the warranty.

All complaints should be delivered to the boiler's seller. While reporting complaints, you should prepare the following data:

- model and heat output (kW)
- product key, manufacture data of the boiler and burner
- place and date of purchase

Deklaracja zgodności

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oświadczamy na własną i wyłączną odpowiedzialność, że wyrób kocioł c.o. typu **MODERATOR Biomaster 15, 23, 30** rozpoczynający się od numeru seryjnego 0100/2017, do którego odnosi się niniejsze oświadczenie spełnia wymagania następujących zaleceń i norm, jeśli mają one zastosowanie:

Dyrektywy

MAD 2006/42/WE
2014/68/UE

Hajnówka 2017.09.04

Normy

PN-EN ISO 12100
PN-EN 303-5
PN-EN 60335-1

PREZES ZARZADU
mgr Mariusz Kubacki

1.3. Fuel

Biomaster boiler is adapted to use as its basic fuels wood pellets (C1, PN-EN 303-5: 2012):

- grit size 6÷8mm
- ash content up to 1%

* the accurate data on fuel parameters are in the pellet burner MODERATOR manual, which is delivered with the unit



The use of wet content fuel will result in shorter operation of the boiler and its premature wear.

1.4. General technical description

MODERATOR pellet burner (Fig. 1.4.1) is capable of burning only wood pellets after mounting it onto door. Burner should be screwed onto door with torque wrenches. Maximum tightening torque is 10Nm.



Figure 1.4.1 Pellet burner MODERATOR (30kW)

More detailed technical description of the pellet burner is contained in the separate instruction manual of the pellet burner.

The following instruction refers to the boiler with the following power: 15, 20, 25, 30 kW. Boiler is a device that transmits energy from exhaust gases, which are produced by pellet burner, into water in the central heating installation. It is made from boiler sheets (steel type P265GH). Walls inside the boiler are cooled with water. The main part of the heat exchange surface are pipes (smoke tubes), inside of which are spiral-shaped turbulator. They significantly improve heat exchange efficiency and allow for automatic cleaning of the heating surfaces. The following process involves regular reciprocating motion of the turbulators, which remove a layer of the ash on the exchange surface. Typically, boiler consists of the smoke tubes' cleaning device as well as ash remover. Boiler is presented below, along with its parts description.

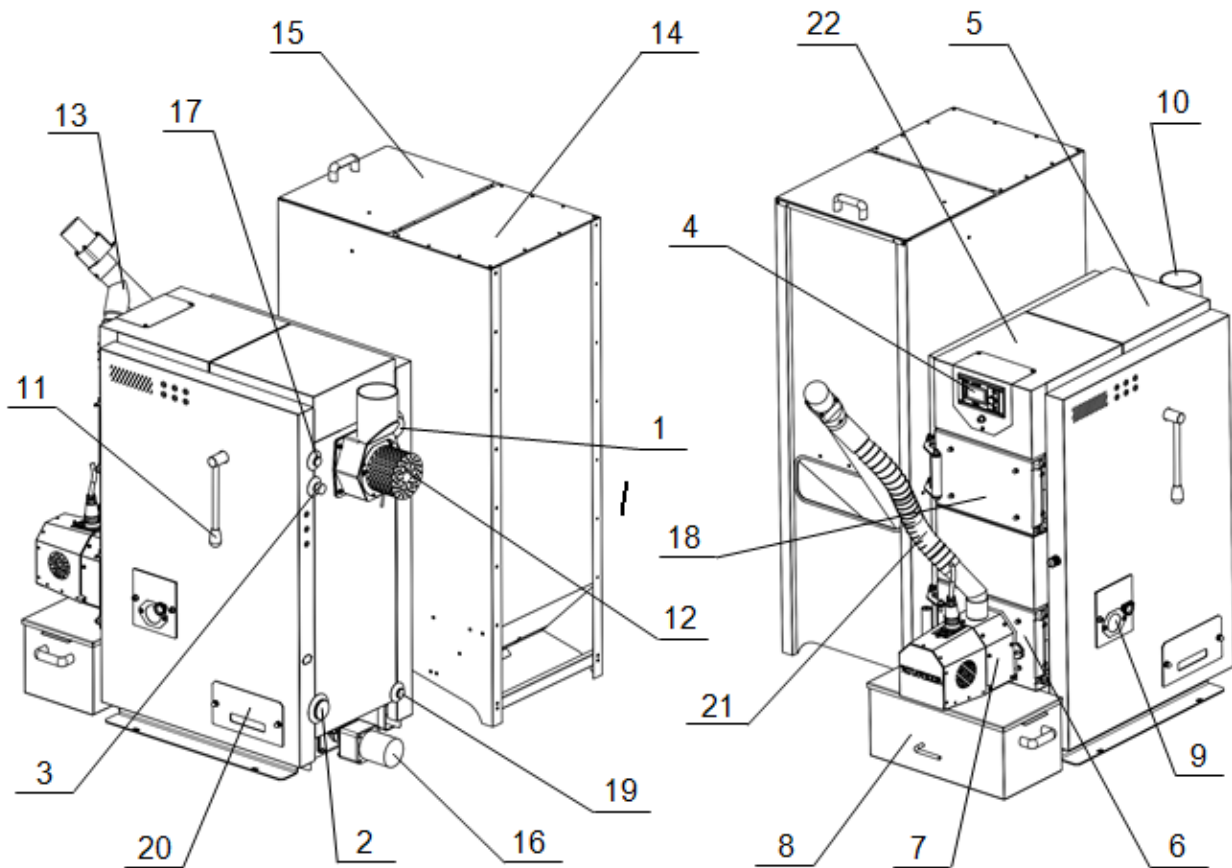


Figure 1.4.2 Boiler Biomaster – a general description of construction

1. Supply 1½" screw-in stub
2. Return 1½" screw-in stub
3. Safety valve ½" screw-out stub
4. ecoMAX Controller Panel
5. Upper cleaning hatch cover
6. Lower door (with burner)
7. Pellet burner Moderator
8. Ash container (optionally)
9. Viewfinder
10. Flue
11. Cleaning device's handle
12. Exhaust ventilator
13. Upper feeder
14. Fuel tank
15. Tank cover
16. Ash disposal gearmotor
17. Thermal protection probe 1½" screw-in stub
18. Upper door
19. Draining 1½" screw-in stub
20. Cleaning hatch cover
21. Elastic connection "spiro"
22. Controller chamber's cover

1.4.1. Pellet combustion

The purchased boiler is capable of burning only wood pellets as its primary fuel. In order to switch to pellets, the following actions must be done:

- mount the burner in the boiler, fix the feed tube in the container and mount the feeding pipe in the burner
- change the controller settings (it is set to factory settings by default)(burner manual).



Combustion of other types of fuel in Biomaster, which are not recommended by the manufacturer, is forbidden. There are automated sets and feeders designed by Moderator Sp. z o.o. for this type of combustion (in case of any doubts please contact our sales department, tel. 085-682-75-20). Attempting to burn cereal-grain, large pieces of coal, sawdust, briquette etc., in the pellet burner may cause serious damage of device and is dangerous. Combustion of any types of plastics is forbidden.

1.5. General parameters

Maximum supply temperature - 90⁰ C

Maximum return temperature - 70⁰ C

Minimum return temperature - 55⁰ C

Working pressure – 1,5 Bar

Thermal efficiency - 93 %

Minimum exhaust temperature - 65⁰ C

[mm]	BM15	BM23	BM30
A	1440	1440	1520
B	1035*	1035*	1185*
C	1442	1442	1442
D	582	630	707
E	477*	477*	477*
F	1137	1137	1100**
G(∟)	114,3	114,3	133
Weight	361	405	490
Fuel container volume (m ³)	0,3 (in elements), 0,37 or 0,6		
Water volume (l)	53	74	114
* container 370dm ³ (the smallest size)			
** horizontal flue, facing backwards, extent from the base of the boiler to the flue's axis tube			

Table 1.5. Base measurements of the Biomaster boiler

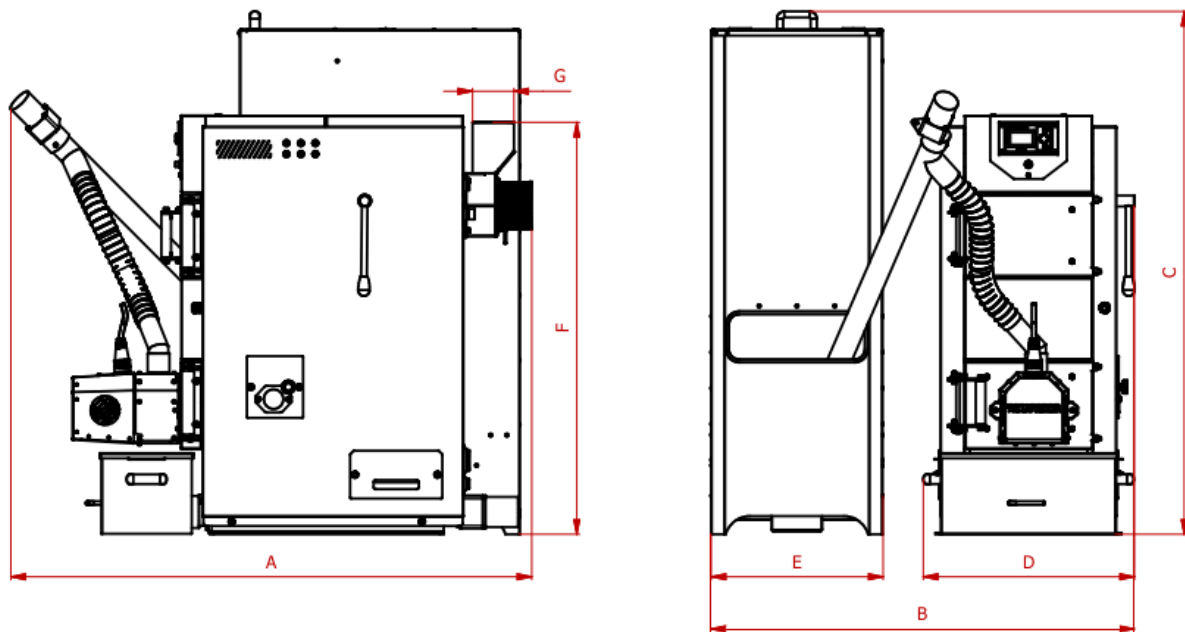


Figure 1.5. Base measurements of the Biomaster boiler

1.6. Pellet burner feeder

Each Moderator Pellet burner is supplied with a separate instruction manual (MODERATOR burner manual) and controller manual (ecoMax).

2. Installation

2.1. Equipment

Moderator boilers are shipped assembled.
The basic equipment supplied with the boiler:

- thermometer
- the manual of Biomaster 15, 23, 30
- the manual of MODERATOR pellet burner
- the manual of ecoMax 850 P2-M controller by PLUM

2.2. Boiler room

Boiler room should comply with requirements set out in PN-87/B-02411.
The most important are:

- steel door or tin covered wooden door, opened to the outside
- fire resistant floor
- a 21x21 cm air supply opening in the lower part of the boiler room
- a 14x14 cm minimum exhaust opening in the upper part of the boiler room
- boiler placement should allow comfortable operation and cleaning.

Equipment:

- discharge valve
- drain
- sink



Use of mechanical ventilation is prohibited.



Keep the boiler room clean all the time, combustible materials (spread fuel, paper etc.) spread around the device may be cause a fire.

2.3. Boiler placement



Boiler should be placed at the non-combustible floor.

The installation of the boiler should be conducted by a qualified and experienced installer (we recommend contacting our representatives, whose installers were trained at Moderator Sp. z o.o.). Improper installation may be the cause of premature wear of the boiler, may cause fire hazard or explosion.

The Moderator boiler is delivered assembled and there is a possibility of seating it directly on the floor.

When placing the boiler, make sure that it is accessible and that the walls of the boiler room do not obstruct fuel load or cleaning the boiler.

Ceramic tiles delivered with the boiler should be placed according to the figure below.

2.4. Connecting with the chimney

The flue of the boiler should be settled directly in the chimney or via an adapter (available from the producer), after placement the connection of the steel of the flue and the brick of the chimney should be sealed. The outlet of the chimney should be 75 cm above the ridge of the roof. Square or rectangular chimneys must be made of fired brick; round (usually steel) chimneys should be insulated with 5 cm mineral wool on the whole of its length.

Recommended flue diameters for 15÷23 kW boilers are:

- square chimney: 16 cm x 16 cm
- round chimney: Φ 16 cm

Recommended flue diameters for 30 kW boilers are:

- square chimney: 18 cm x 18 cm
- round chimney: Φ 18 cm

When settling the flue in the chimney special attention should be paid to the free access to the boiler's exhaust ventilator.



Remember that the flue gas discharged from the chimney is hot and the lever will heat up.



Due to the high efficiency of the boiler, flue gases have a temperature below 100°C, which may be the cause of moisture gathered in the chimney. It is recommended to use stainless steel chimneys or stainless steel chimney inserts.

2.5. Connecting the boiler to the installation

The boiler will function properly when the temperature inside the boiler chamber is high enough, which means that feed water (leaving the boiler) should be at 70÷80° C, and return water should not be colder than 55° C. These parameters prevent the boiler from low temperature corrosion of material. To ensure proper boiler function the manufacturer recommends installing a mixing valve and a heat accumulator.

The boiler has a G1½ thread connection. The boiler should be connected with the installation using appropriate couplings.



If the boiler is equipped with a thermal safety valve sensor should be mounted in a G1½ coupler (17 Fig.1.4.2).
Install a safety valve.

Connect the water line using a G ½ valve (in the back of the boiler) with an elastic hose, which should be disconnected after loading the water. During filling, all air releases should be opened along the whole installation and gradually be closed until the water flows from the overflow pipe in the expansion tank.

Lossless installations can be loaded with raw water, unless its hardness does not exceed 10n. Otherwise the water should be treated. Mount the boiler equipment (handles and grips).

Connection of the boiler to the power supply should comply with the PN-891E-05012 norm (see chap. 2.7).



In case of any welding works when connecting the boiler to the central heating installation, the power supply to the controller should be disconnected and the controller itself should be covered. Temperature sensors should be removed from their couplings and isolated from any surges and damage resulting from welding. Disconnect the burner from the boiler.



To increase the utilization efficiency of the boiler, it is recommended to install a central heating circulation pump.

2.6. Securing the installation

2.6.1. Open vented system

Moderator boilers working in open vented central heating systems must be connected according to the requirements outlined in PN-91/B-02413, where the excess heat in the form of steam should be discharged through an open connection (overflow pipe OP) to the atmosphere.

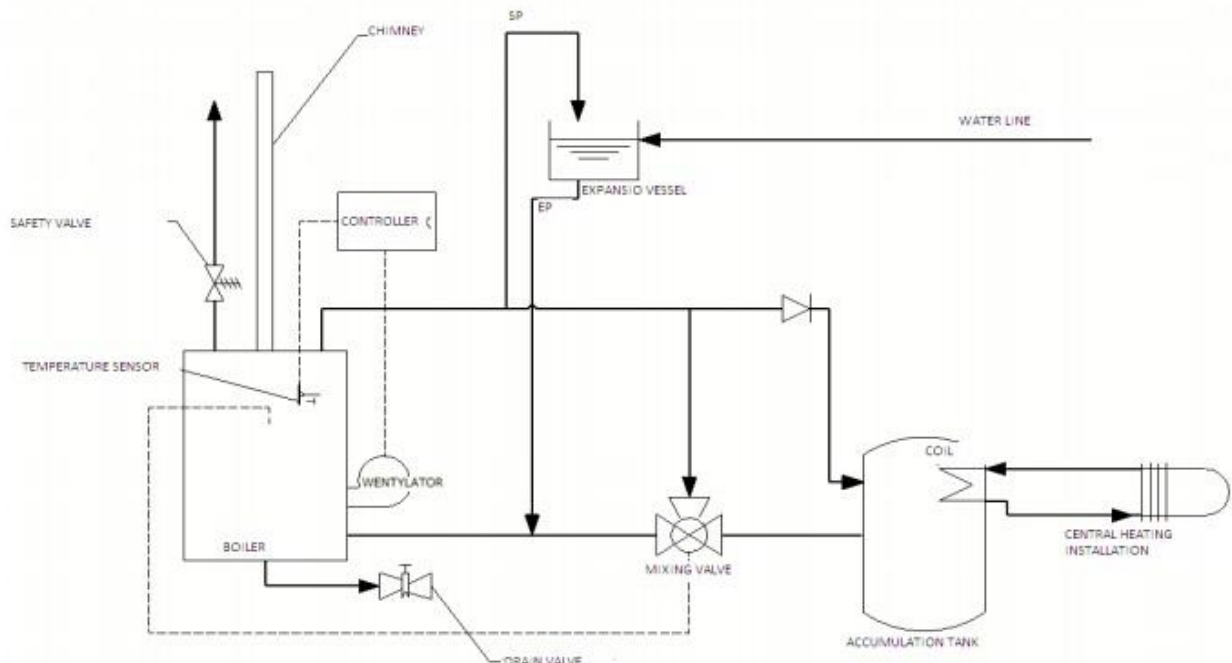


Figure 2.6.1. Safety schematics for boilers working in open central heating systems

Requirements concerning the installation:

- expansion tank, volume at least 4% of the water load, shape: cylindrical A type according to PN-91-02413-1-2, rectangular B type according to PN-91-02413-1-3,
- rising safety pipe (SP) with internal diameter of 25 mm for boilers up to 50 kW,
- expansion pipe (EP) with internal diameter of 25 mm,
- overflow pipe (OP) – internal diameters as in SP and EP,
- circulation pipe (CP) with internal diameter of 20 mm,
- air escape pipe (AP) and signalling pipe (SgP) with internal diameters of 15 mm.



It is forbidden to mount any fittings on SP, EP, and AP which would allow a complete or partial closing of the flow. Safety equipment and pipes should be protected from freezing.

2.6.2. Sealed system

When installing the boiler in a sealed system there must be applied elements ensuring protection against overheating and excess pressure (PN-EN 12828). Biomaster boiler contains cooling coil and thermostatic valve BVT5 or JBV1.



Figure 2.6.2. Cooling coil

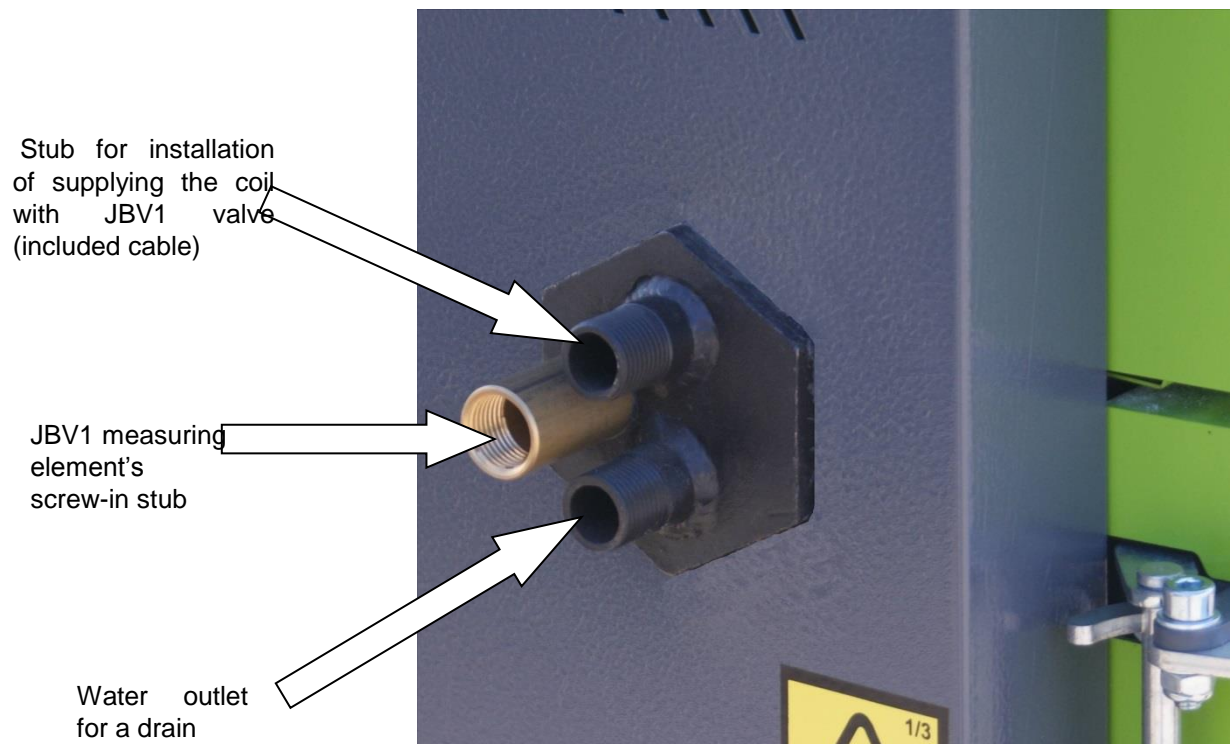


Figure 2.6.3. Mounted cooling coil, instruction of installing thermostatic valve JBV1

Valve's probe should be connected to screw-in stub G 1/2 " in case of boiler equipped with BVTs valve (17, Fig. 1.4.2).



Figure 2.6.4. Thermostatic safety valves a) JBV1, b) BVTs



Proposed by the manufacturer thermal protection with coil and thermostatic valve is efficient only when there is provided pressure of min. 2.3 bar in the water supply network and safety valve is installed.



Safety valve should be mounted in such a way as to eliminate the risk of being burned by hot water (3, Fig.1.4.2). Draining stub should be directed into, e.g. wall, or install outlet pipe into drain.

It means the system may not work when using water drawn from an own well (e.g. lack of electricity prevents launching of a hydrophore), or in places with frequent breaks in the supply of water. In this case the boiler should not be installed in sealed system.

Controller of the device contains protection which shuts down the running of the boiler at the temperature of 95 °C.



Installation of the boiler without reliable device draining an excess of thermal input is forbidden!



Base and the most important element providing safe work of electric devices controlling boiler's work is connecting it to the electrical installation, conducted according to the requirements and regulations for boiler rooms.



Electrical installation must be conducted by a qualified person.



Electrical cables should not be installed to a boiler cover or a tank.

2.7. Electrical installation and connection rules

1. Before connecting the device please read the manual for the boiler, controller, and burner.
2. Before commencing installation, repairs or maintenance, or during any connection works, the device should be disconnected from the power supply. Ensure that the clamps and leads are not charged.
3. The boiler room should be equipped with a 230V/50Hz electrical installation, according to the rules regulating this matter.
4. Electrical installation (of any kind) should end in an electrical socket with a zero contact. **Using a socket without a connected zero contact may result in electrocution!!!**
5. The boiler should be connected separately to a lead line protected with an appropriate quick fuse and a residual current circuit breaker. The value and type of the fuse is outlined in the documentation of the controller. **No other devices should be connected to this line.**
6. The housing with the electrical equipment can only be opened by a competent electrician, who is familiar with the how the device functions.
7. The electrical socket for connecting the boiler should be located so that the plug is readily accessible and the boiler can be disconnected in emergency situations.
8. The wires should be connected away from the elements of the boiler which heat up, especially the hot parts of the flue.
9. The regulator cannot be susceptible to flooding and other conditions which would endanger it with condensation, like sudden temperature changes.
10. The regulator cannot be used when the chassis is damaged.
11. Children should not be allowed access to the regulator.
12. The controller should be disconnected during a storm.

2.8. Controller – description, functioning, operation

The boiler is equipped with ecoMAX 850 P2-M controller. It can control directly central heating installation, work of hot water circuit and mixer heating cycles. Controller can work with additional controller panel in residential buildings.

The control process takes place by steering the temperature of the water in the boiler. The power of boiler's work depends on it. During its work flame's brightness and burner's temperature is controlled.

Fig. 2.8.1 presents the elements of the control system. *Regulator panel (1)* is used for entering the parameter settings. Detailed information about the basic parameters, button functions, parameter settings, lead capacities, etc. are contained in the regulator manual supplied with the boiler. A heat limiter **(2)** is installed next to the controller. It displays the temperature and pressure in the central heating system, also in the case of a power outage (when reaching 95°C).

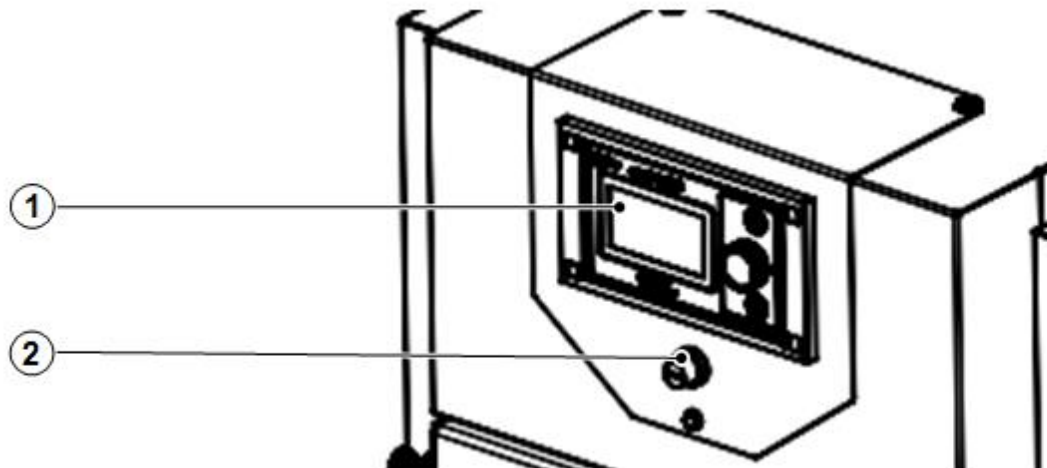


Figure 2.8.1. Elements of the controller – front view

For the boiler to start functioning once again, unscrew the black screw on the temperature limiter and press the button beneath it. The button can be pressed with, for example, a match. When pressed, a characteristic “click” is heard.



The button should be pressed after the temperature on the boiler drops to about 50°C.

Burner connection

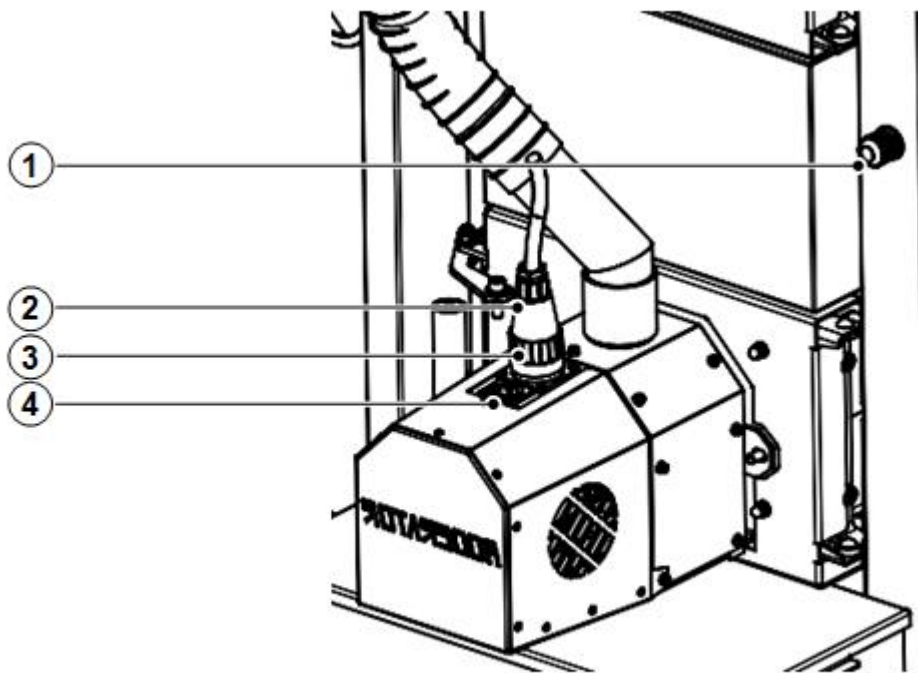
Cable connecting the boiler with the burner is placed inside the boiler casing (1, Fig. 2.8.2). At the end of the cable there is a multiple socket. The socket at the end of the cable must be connected to the plug on the burner chassis. Connecting to the plug is possible only in one particular position. During installation socket must be inserted into the plug, and find the appropriate position in order to insert it. To avoid accidental disconnection, turn the ring 1/4 of a turn clockwise until you hear a characteristic snap. In this moment socket is connected properly. Dismantling should be conducted in the opposite sequence.

Connecting the feeder container

First, mount the container feeder. Then, connect the cable by the feeder engine to the socket on the burner chassis (4, Fig. 2.8.2).



After connecting the cables, they must be placed in such a way as to prevent the contact with a metal loading pipe and flexible “spiro” pipe. The risk of melting insulation of cables.



Rys. 2.8.2. Podłączenie palnika do kotła.

Connecting the exhaust ventilator

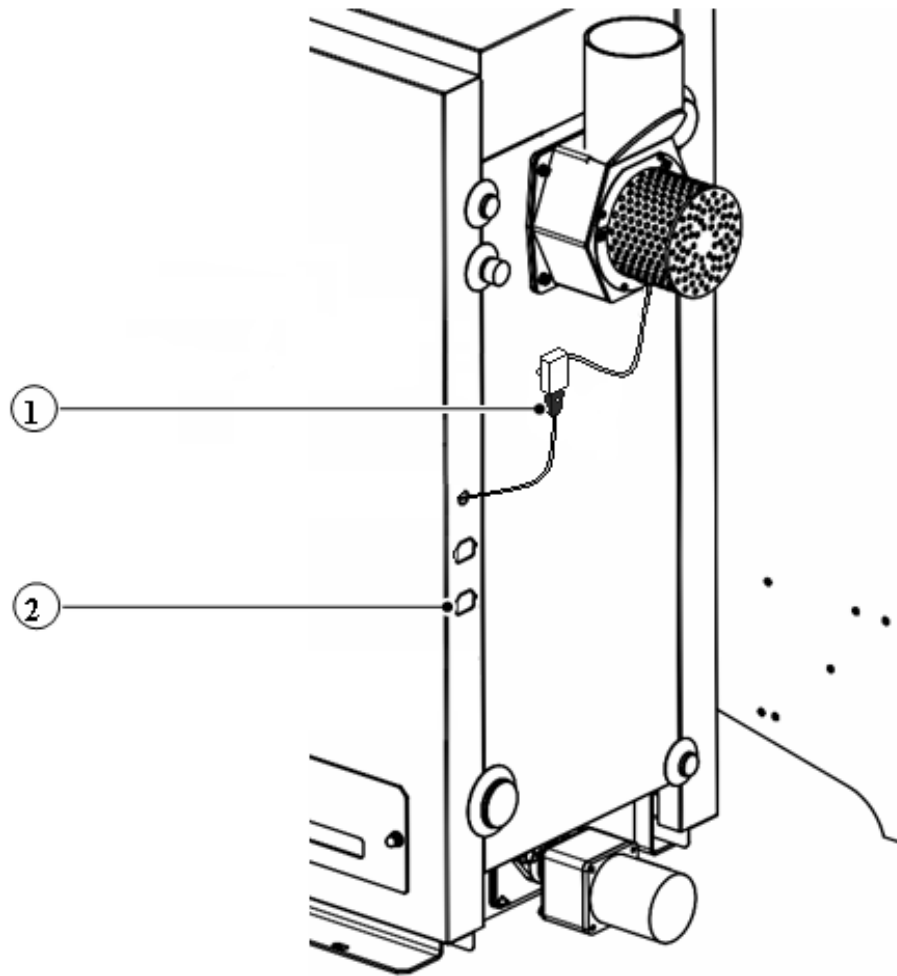
Cable of the exhaust ventilator should be connected to the upper computer socket at the back of the boiler (1, Fig. 2.8.3).

Connecting the ash removal system

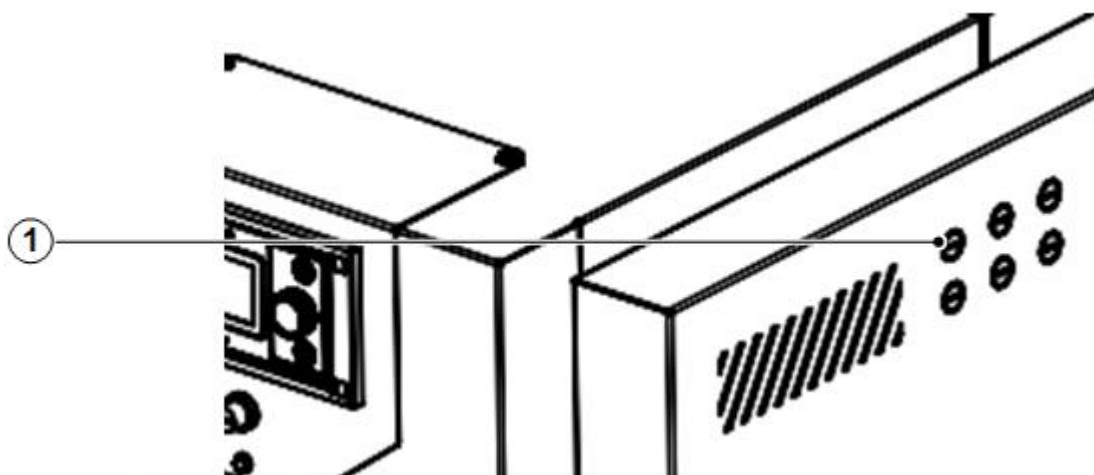
The ash removal motor must be connected to the computer socket (2, Fig. 2.8.3).

Connecting other devices

The boiler's controller makes it possible to connect other devices, such as a central heating pump, domestic hot water pump, and other, as listed in the controller's manual. In order to do that the cleaning hatch cover must be taken off (5, Fig. 1.4.2). Then, loosen the bolts connecting controller's chamber cover and take it off (22, Fig. 1.4.2). Under the cover there is a boiler's controller. Cover with the panel should be set aside. Additional cables should go through cable glands. Holes can be made by removing it with a flathead screwdriver (1, Fig. 2.8.4). Other devices are connected to the electrical box on the back of the boiler.



Rys. 2.8.3. Podłączenie systemu usuwania popiołu oraz wentylatora ciągu.



Rys. 2.8.4. Elementy układu sterowania – panel boczny.

Notes on periodic maintenance

Maintenance consists in periodic inspections of the conditions of electrical wires which are accessible outside to the boiler. In case of any mechanical or thermal damage (melted insulation) the device must be deactivated, disconnected from the electrical line, and the defect removed. When in doubt please contact the

manufacturer of the boiler. The controller panel should be kept clean and protected from flooding.

EcoMAX 850 P2-M controller does contain its own manual. Any information concerning functioning and operation are included there.

3. Fuel burning

3.1. Igniting the boiler

Before activating the boiler, it must be checked whether the boiler and the central heating installation are filled with water, and whether all the valves are open.

Before first activation the instruction manual of the controller must be read. First activation is conducted by a service.

Ignition

First, fill the fuel container with appropriate pellets. Then, follow the burner instructions provided with the set. The ignition process is automatic.

3.2. Fuel burning

After igniting and reaching the set temperature, the fuel feeder and air bower will turn on only for short periods of time in order to sustain combustion (according to regulator settings), until the temperature decreases enough for the automatics to reactivate the feeder and blower. The automatic controller has a detailed instruction manual which allows it to be programmed at will in terms of set temperature. The controller also prevents the boiler from overheating and deactivates the whole system in case of lack of fuel or ember return. Only one trained person is needed for operation. The boiler is operated only once per 24h. The operation time does not exceed 15 minutes/day.

It is recommended to burn out the boiler at feed water temperature of 70-80°C for the first 3-4 days. Next ignitions can take place based on the programming of boiler operation in the controller, according to the guidelines in the controller manual.

During automated operation, the fuel in the boiler is combusted totally when it reaches the edge of the furnace, and the ash and slag fall down to the ash tray. The furnace is therefore self-cleaning, and the boiler only needs the ash removed every one to four days, depending on the amount of fuel burned daily. In normal operation, inspect and refill the fuel container periodically, so that the fuel level is always at minimum in the least for the flame not to die out. Minimum amount of pellet in the container is approximately 20 cm from the bottom of the container. At lower fuel levels, the container may start scattering dust.



The minimum level of fuel in the tank must be maintained. Do not leave it empty completely!

3.3. Cleaning

Internal construction of Biomaster boiler allows separation of combustion chamber and exchanger part. The main part of a heat exchange surface are pipes (smoke tubes), inside of which are located spiral-shaped turbulators. They improve the efficiency of heat exchange and allows to conduct automatic process of cleaning exchange surface. The process includes regular back-and-forth motion of turbulators, which remove a layer of ash on exchange surfaces (11, Fig. 1.4.2). Typically, boiler is equipped with smoke tubes cleaning device and ash container. Ash should be removed when the flame is low and the blower is deactivated. To save fuel, the inside chambers of the boiler and the spaces between the elements of the combustion chamber should be kept clean.

The ash drawer cannot be fully filled.

The boiler should be cleaned at least once a month with the use of publicly available sanitation equipment like brushes and scraper.

Decrease in the chimney draught signals necessary cleaning. Lack of air makes the boiler to return smoke. During cleaning, ventilate the boiler room well.



Sweep the boiler only when it is extinguished.

In the case of large dirt residue it is allowed to use chemicals which remove exhaust carbon, but only those which are regular commercial products (those which have safety signs).



The flue gases from a clogged chimney are dangerous. The chimney and flue should be kept clean; they should be cleaned before every heating season.



It is forbidden to turn on a device without ash container.

3.4. Programmed boiler shut down

Shutdown occurs by stopping the fuel supply to the boiler that is by turning off the controller. The cool down time is roughly the same as the ignition time. After the heating season is over, the boiler must be cleaned and all doors opened. Remove the ash, clean the boiler. Do not drain the circulation water.

3.5. Emergency boiler shut down

In emergency situations, such as: temperature exceeding 100 degrees, cracks in the installation components, water leaks, failures of sensors or controllers, or safety devices, sudden rise in pressure, you should:

- Turn off the controller
- Remove the embers from the burner
- Open all doors of the boiler

In the case of sealed system boilers, the emergency can be caused by a power outage (stopping the pumps) or leaving the boiler door open. The central heating installation should be protected with a safety valve set to 2.0 bars, however, in emergency situations these measures may prove insufficient. The boiler must be protected with a thermal safety valve which in an emergency will remove the hot water from the boiler and refill the system with cold water from the water supply line, cooling down the boiler and lowering the pressure (Section. 2.6) Such situations are especially dangerous when the boiler is working in manual load mode with the automated cycles turned off. Please remember that reaching an emergency state is especially probable in the summer, when only domestic water is heated. Anticipating such situations, it is worth considering to install a heat accumulator which would take over excess heat power.



It is forbidden to pour water on hot fuel.

4. Boiler malfunction

Type of malfunction	Cause	Solution
The boiler smokes, black liquid in the boiler chamber*	No draught	Tightly wall up the connection between the flue and the chimney duct
	Chimney diameter too small	Expand the chimney diameter, for example by demolishing the wall between a ventilation duct (at least 2 m from the base of the "Moderator"), remove flue gas turbulators.
	Another boiler (for example, in the kitchen) connected to the same chimney	Seal the connection between the other boiler and the chimney to prevent sucking up of cold air.
	Blocked chimney duct	Clean the chimney duct
	Frequent use of wet fuel	Burn some dry fuel, remove flue gas turbulators.
	Dirty exchanger	Clean the internal surfaces of the boiler, clean the flue gas turbulators.

Too rapid fuel combustion, although the feeder is working correctly	Ash tray not tight	Tighten the ash tray, close the door more tightly
	Too large chimney diameter	Decrease the chimney diameter, install a damper
	Low quality fuel	Use pellets in accordance to ch. 1.3
The boiler does not reach the proper working temperature	Dirty exchanger	Clean the internal surfaces of the boiler, clean the flue gas turbulators.
	Low quality or too moist fuel	Use pellets in accordance to ch. 1.3
	Blower system or controller not functioning	Check connection of all plugs
	Improper settings of controller parameters – flame returns	Adjust the controller - increase the fuel feeding time, decrease the time between feeds - see the controller manual
The feeder discards not fully burnt fuel	Improper settings of controller parameters – too much fuel	Adjust the controller - decrease the fuel feeding time, increase the time between feeds - see controller manual
	Improper settings of controller parameters - too little air	Adjust the controller - increase the blower RPMs - see controller manual
The feeder jams, pulls the safety pin	Low quality, improper granulation of fuel	Use pellets in accordance to ch. 1.3
	Foreign object in the feeder	Remove the feeder, dismantle and clean it, put in new pin
Ash removal system not working	Blocked screw	Remove the foreign material, clean the ash container, replace pin

*this is a normal situation on start-up. During regular use, this will not reoccur

In the case of finding “leakages” in the boiler, if the water collects in the lower part of the boiler, the tightness of the couplings connected with the installation must be inspected first. In case of actual leaking, contact the producer.

4.1. Maintenance and repairs

In the heating season, maintenance on the boiler consists in regular clean ups. It is recommended to clean up the boiler at least once a month.

The interior of the boiler must be cleaned of deposits, and the ash container should be cleaned of ash. Special care must be paid on the burner connection area - do not allow for any dust or as accumulations. Take notice of the electrical cables. During longer periods of inactivity, unplug them from the power supply.

Once a year before heating season it is recommended to conduct a chargeable review and maintenance of Biomaster set by an authorized Moderator service (tel. 506 368 455).

5. Safe operation conditions

The basic condition for safe operation is the preparation of the installation and safety measures in accordance to Polish norms.

To preserve safe operating conditions, please abide to the following rules:

- use protective gloves and eyewear
- do not block the covers and doors
- avoid opening the doors when the fan is activated
- use 24V portable lamps
- keep the boiler room clean
- maintain the boiler and its installation in a good technical condition
- pay attention to the tightness of the installation
- electrical installation can be serviced only by a qualified electrician
- in the winter season avoid intervals in heating



If you suspect freezing of water in the installation, check the water flow in the safety pipes. Water added to the installation should flow from the overflow pipe from the expansion tank. In case of obstruction, do not ignite the boiler follow the instructions for emergency shutdown (ch. 3.5).



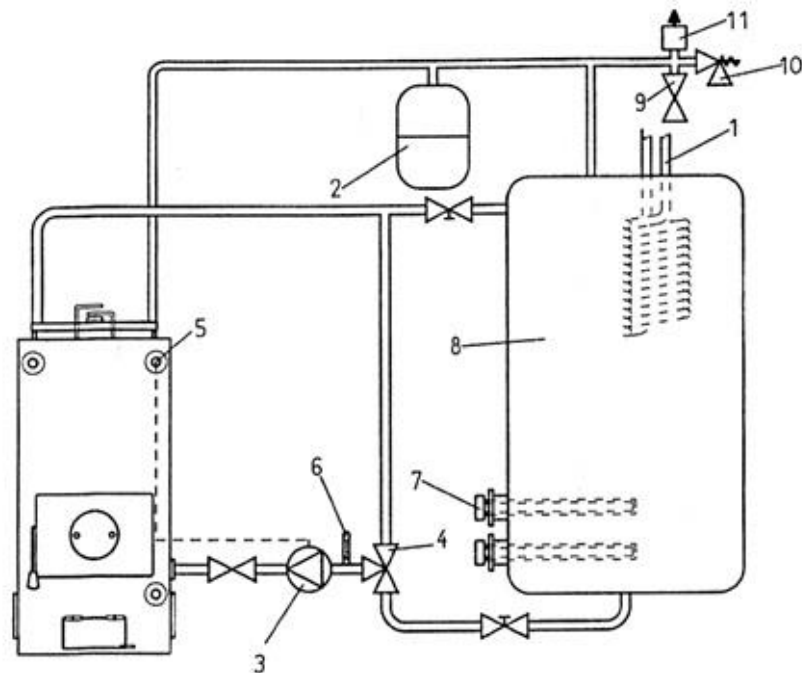
It is forbidden to:

- pour water on the boiler
- ignite the boiler with flammable liquids

6. Storage and boiler transport

The boilers can be stored in unheated buildings, necessarily with roofing and ventilation. The boilers must be transported in an upright position. Lifting and lowering of the boilers should be done with mechanical lifts, for example, a forklift. When elevating the boiler, it is forbidden to lift it with straps connected to any protruding elements such as doors, handles, screws, etc., as it may result in an accident and damage the boiler.

7. Three-way valve connection



1. Coil
2. Expansion vessel
3. Water pump
4. Three-way mixing valve
5. Pump sensor
6. Thermometer
7. Electrical heater
8. Accumulation tank (domestic water tank)
9. Safety valve
10. Air valve
11. Automatic air vent

Figure 7. Three-way valve connection schematics

8. Recycling

With appropriate operating conditions the boiler will work faultlessly for approximately 15 years. After such time its further utilization may prove economically unsound. The boiler is made of materials which can be fully recycled. It is best to hand it over to a company specialising in recycling or machine dismantling, to a waste disposal centre providing proper utilization of steel, plastics etc.



Boiler does not contain asbestos or other hazardous material.

9. Technical specification

	BM	15	23	30
Nominal power (kW)		15	23	30
Range of power		4,5-15	7-23	8,5-30
Required draught (mbar) (according to PN-EN 303-5:1999)		0,25	0,27	0,31
Water volume (l)		53	74	114
Flue gas temperature (°C)				
Nominal power Q		95	95	95
- Wood pellet				
Nominal power Q _{min}		70	70	70
- Wood pellet				
Flue gas mass flow (kg/s)				
Nominal power Q		0,020	0,024	0,038
- wood pellet				
Nominal power Q _{min}		0,007	0,009	0,014
- wood pellet				
Water resistance (mbar)		11	12,5	14
Boiler class (according to PN-EN 303-5:2002)		5	5	5
Required water pressure for thermal protection (bar)		>1,2	>1,2	>1,2
Recommended minimal volume of accumulation tank (l)*		400	500	600
Protection marking IP		20		
Ampacity (A) **		1		
Electric power for	rated thermal input [W]	57	80	
	minimum heat power [W]	32	46	
Range of regulator's set up temperature (°C)		40-85		
Minimum flow temperature (°C)		60		
Fuel bin capacity (dm ³)		300-600		
Thermal efficiency %		93		

*The accumulation tank is not necessary if the required volume is below 300 litres.

**total current of all devices installed in the boiler (does not concern e.g. current of equipment which is a part of heating system and connected to the boiler regulator).

10. Representatives of “Moderator service”

The current list of authorized service representatives of Moderator is available online at www.moderator.com.pl in the SERVICE → SERVICE REPRESENTATIVES tab.

Link below: <http://www.moderator.com.pl/pl/serwis/serwis/przedstawiciele-serwisu.html>