



SOLID FUEL BOILER

# **ECOWOOD STANDARD/PLUS**

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## ***INSTALLATION AND SERVICE MANUAL***



VERSION: 1.2  
UPDATE: 28.04.2016

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# 1. GENERAL INFORMATION

## 1.1. Proper use of the appliance

Before you make use of this appliance make sure you have read and fully understood the instructions included in this manual.

The installation and use of the appliance must be performed according to the instructions indicated in this manual in combination with the current national safety regulations.

The appliance is designed for use in pumped hot water central heating systems. Any other use is considered improper and is prohibited. THERMOSTAHL ROMANIA declines any responsibility for damages or injuries caused by improper use; in this case the risk is completely at the user's responsibility.

To ensure an efficient and flawless function of the appliance, it is strongly recommended that you have performed an annual service by a qualified technician.

## 1.2. Safety warnings

All installation and maintenance procedures must be carried out by professional and authorized personnel, in compliance with the indications in the present manual and national regulations. Any failure to correctly install this appliance could cause damage or injuries!

Do not make modifications to parts of the appliance, unless you have contacted the company and an authorized service contractor.

Only original accessories and spare parts must be used to ensure correct and safe function.

Make sure you respect the cleaning and maintenance procedures on the corresponding intervals. Failure to do so can cause malfunction to the appliance and possible damages.

The boiler is design to function on the fuels indicated in the corresponding paragraph. Any other fuel is prohibited. Do not use explosive or flammable substances! Do not store such substances inside the boiler room.

The working pressure varies according to the model. Make sure you use the appropriate water pressure.



**Working in a pressure higher than the one indicated in this manual is strictly prohibited and dangerous!**

## 1.3. Data label

The data label of the appliance is placed on the boiler's side cover, on the external part. Make sure that it is properly placed and readable.

On the label it is indicated the serial number and the manufacturing year of the appliance.

## 1.4. Document information

This document is an integral and indispensable part of the product and must be retained in good condition by the user. Keep it in a safe place for future reference.

If the appliance is sold or transferred to another person, this manual has to always follow the appliance and handed to the new user or installer.

## **2. TECHNICAL FEATURES AND DIMENSIONS**

### **2.1. Technical features**

The ECOWOOD boiler series is designed for function on any type of solid fuel: wood, agricultural residues, carbon, briquettes, with a minimum diameter of 15mm. The boiler is equipped with two doors: one upper for fuel loading and a lower door for ash removal. There is also an inner door for access to the heat exchanger.

ECOWOOD STANDARD is equipped with a thermometer and chain thermostat regulator.

ECOWOOD PLUS version is equipped with a modulating fan and a digital controller. The boiler can also control the heating pump and the hot water pump, as well as being connected with an exhaust gas temperature sensor for full fan modulation and maximum fuel savings.

ECOWOOD boiler is designed to operate in economy mode, providing a constant heating of houses or small industrial premises.

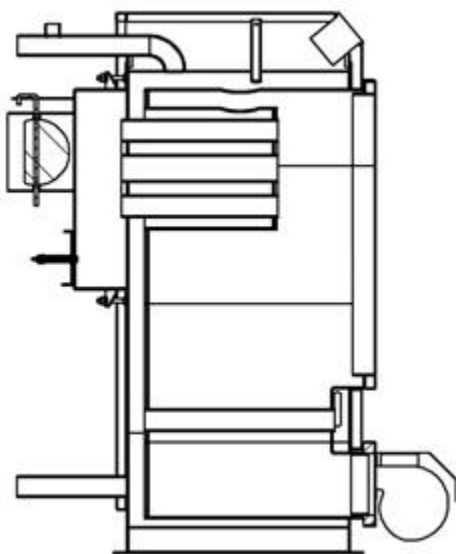
The boiler is made of steel, ideal material for thermal fluctuations, resistant to expansion and contraction. Monobloc construction, with no other welded structures is an advantage of ECOWOOD boiler. Also this boiler is protected against thermal shock.

ECOWOOD boiler is designed so that all surfaces that are in contact with the flame are cooled by water, including the grate where the ash and combustion residues fall. The two roads flue at the top, the large number of flue pipes, large volume of the furnace and boiler water as well, and symmetrical construction causes a high yield.

#### **DESCRIPTION OF COMPONENTS**

- Steel boiler body with cylindrical heat exchanger
- Removable rear smoke box with inspection cleaning door
- Upper door for ignition, fuel loading and cleaning access
- Lower door for ash removal
- Ash box positioned on the lower part of the fire chamber
- Combustion fan positioned on the lower door
- Rockwool body insulation of 80 mm thickness
- Electrostatically painted external covers
- Control panel for electromechanical operation (PLUS version)

### **2.2. Function principle**



The function of the ECOWOOD boiler is based on natural gas evacuation through the chimney. The fuel is positioned on the grate. The combustion takes place in the fire chamber. During the combustion the flame comes in contact with the side walls of the fire chamber, which are surrounded by water. The fire chamber is of big volume in order to receive big dimension logs and to ensure a long autonomy.

The combustion air is supplied by the fan and distributed through an air distributor, positioned below the fuel grate. The combustion is regulated through the fan, controlled by the control panel.

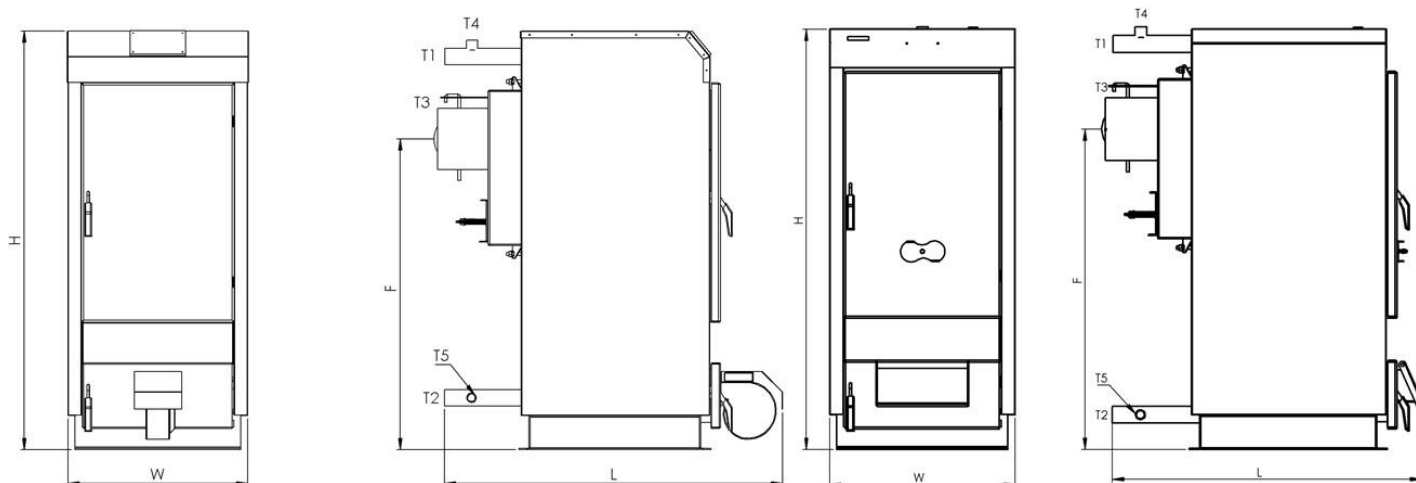
*Fig 1. Boiler function*

## TECHNICAL FEATURES AND DIMENSIONS

The exhaust gases are guided through the heat exchanger to the smoke box, and afterwards evacuated to the chimney. The smoke box is equipped with an inspection and cleaning door, which also actions as an explosion relief.

The doors have an insulation cord to ensure air-tight closing. Each door is equipped with a screwed handle, which must always be well tightened during the combustion.

### 2.3. Dimensions



a) PLUS

b) STANDARD

Boiler Type	Feeding door	H		W	F	L		T1-T2	T3	T4	T5
		PLUS	STAN			PLUS	STAN				
		mm				mm					
ECW 15	340x360	1235	1205	540	915	1050	890	1½"	Ø180	¾"	½"
ECW 20	340x360	1235	1205	540	915	1150	990	1½"	Ø180	¾"	½"
ECW 25	340x360	1235	1205	540	915	1250	1090	1½"	Ø180	¾"	½"
ECW 30	340x360	1235	1205	540	915	1350	1190	1½"	Ø180	¾"	½"
ECW 40	345x475	1380	1320	650	1015	1200	1090	2"	Ø220	¾"	½"
ECW 50	345x475	1380	1320	650	1015	1300	1190	2"	Ø220	¾"	½"
ECW 60	345x475	1380	1320	650	1015	1400	1290	2"	Ø220	¾"	½"

### TECHNICAL DATA

Boiler Type	Nominal Output*	T <sub>max</sub>	P <sub>max</sub>	Efficiency	Water contents	Fire chamber length	Max. wood length	Fire chamber volume	Weight	
									P	S
									kg	
ECW 15	15	95	2	83	65	450	400	0,14	200	190
ECW 20	20			83	80	550	500	0,17	220	210
ECW 25	25			83	95	650	600	0,20	245	235
ECW 30	30			83	115	750	700	0,23	270	260
ECW 40	40			83	135	650	600	0,32	330	320
ECW 50	50			83	155	750	700	0,36	355	345
ECW 60	60			83	175	850	800	0,41	400	390

\*Nominal output is obtained with good quality wood, with 15% humidity.

## 2.4. Fuel

The ECOWOOD series is designed for use with solid fuel of biogenic or fossil nature. This means different types of natural wood, solid residues of organic nature coming from trees or agricultural plants, wood briquettes of various types. Carbon or other similar fossil fuels are allowed, but only in combination with wood and maximum 20% volume ratio at every load. If you want to use solely carbon as fuel, please contact the manufacturer.

Good quality wood is oak, ash, beech, maple, olive tree and fruit trees, except cherry. Medium quality wood is chestnut and birch. Low quality wood is poplar and willow.

**The nominal characteristics of the boiler are calculated for use on wood!**

Fuel		Calorific power	
		kWh/kg	kcal/kg
Oak		4,2	3.600
Beech		4,0	3.450
Birch		4,3	3.700
Poplar		4,1	3.500
Pine		4,4	3.800
Spruce, Fir		4,5	3.900
Wood briquettes		4,0 - 4,9	3.600 - 4.200
Carbon	Anthracite	5,6 - 6,5	4.800 - 5.600
	Coal	4,5 - 6,4	3.900 - 5.500
	Brown carbon	2,7 - 4,2	2.300 - 3.600
	Lignite	1,6 - 3,8	1.400 - 3.300

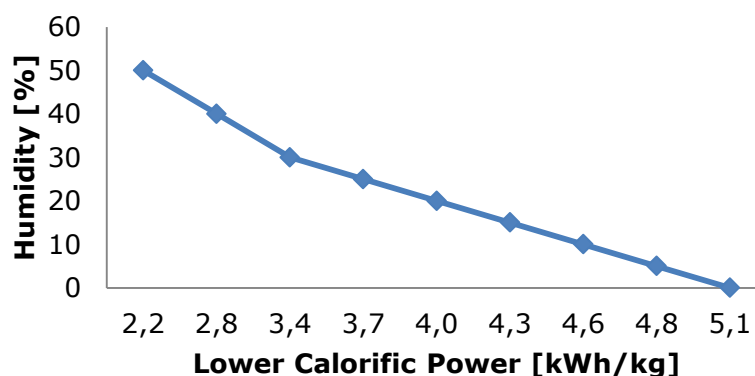
Table 1. Calorific power of different types of wood

Every type of wood contains a significant amount of humidity, which highly affects its combustion behavior and calorific value. Boiler output, efficiency and autonomy will significantly diminish as the humidity increases. The nominal data presented in this manual are calculated for humidity content 15%.

For proper and efficient function and a long lifespan, it is strictly recommended that only dry wood is used, with a humidity content of 15%. Practically, this means at least one year dry wood. Maximum humidity content allowed is 25%.

As understood, wood is an extremely heterogeneous fuel, due to different essences, different humidity contents, shapes and dimensions. This is why the combustion behavior highly varies through time and average data as fuel consumption, autonomy, and output are very difficult to forecast.

### Calorific power in relation to humidity



**It is prohibited the use of laminated wood, or other chemically treated wood.**  
**It is prohibited the use of explosive, inflammable materials, plastic, domestic residues, etc.**

### 3. BOILER MOUNTING

#### 3.1. Transportation and delivery

The boiler is delivered on wood pallet, well positioned with metal plates. Remove them carefully by unscrewing the screws holding them in place.

The loading and unloading of the boiler must be performed with a forklift or a crane.



**The boiler is very heavy. Do not try to lift by hands or other unsuitable equipment. Danger of injury! Perform all moves with extreme caution.**

Remove the boiler packaging with attention. **Keep the packaging material away from children since it can be dangerous.** After having unpacked everything, make sure that the appliance is intact and undamaged. In case of doubt do not use the appliance and inform the supplier.

The ECOWOOD boiler is delivered with the following equipment already fitted and mounted:

- Boiler steel body
- Rockwool insulation mounted on the boiler body and tightened with plastic tapes
- Metal covers mounted on the boiler body
- Turbinators positioned inside the fire tubes
- Digital control panel (PLUS version)

The following accessories are positioned inside the boiler body. Remove them carefully by opening the upper door.

- Cleaning tools
- Chain regulator (STANDARD version)
- Fan and fan cover (PLUS version)

In the documentation folder you will find:

- Technical manual
- Warranty leaflet
- Declaration of conformity

#### 3.2. Boiler room

##### 3.2.1. General requirements

The boiler must be installed in a special and separate room. This room must be chosen so that it offers easy access for fuel transport, air supply and exhaust gas evacuation. The doors of the boiler room must be metallic, open outwards, and have at least 0,9 m width.



**The boiler installation is prohibited in rooms with extensive dust, dangerous gases, and moist spaces.**

For the correct boiler function it is necessary that the boiler room has openings for natural ventilation and combustion air supply. It is recommended that two different openings are used for this purpose, positioned on opposite walls and diagonally to ensure good air circulation. The total surface of the openings must be at least 1/12 of the boiler room surface. Forced ventilation is prohibited in the boiler room.

The boiler room must be provided with a drainage channel. All safety devices must be connected to this channel.

The boiler room must have an appropriate fire extinguishing system, according to the regulations in force. In case that the building is designed with a fire alarm system, a smoke detector must be positioned on top of every boiler.

## BOILER MOUNTING

The fuel storage is prohibited in the boiler room. If so, the storage must be separated from the boiler with a non-flammable wall, and proper distanced from the boiler.

### 3.2.2. Boiler room dimensions

The boiler must be placed on a horizontal plane, with adequate mechanical resistance to support the boiler's weight. The boiler must be positioned in the room in such a way so that it is easily accessible from all the sides. The following dimensions are recommended (see Fig 2):

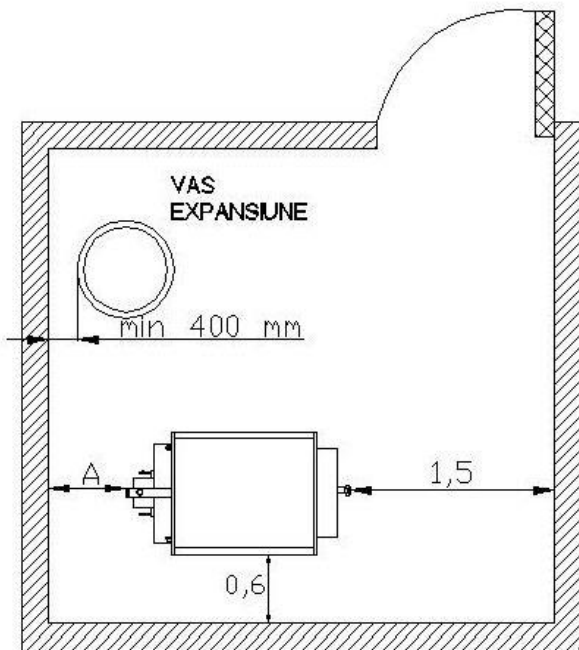


Fig 2. Boiler room dimensions

The distance between the boiler and the back wall - is the proper distance that allows easy access for inspection and maintenance.

The distance between the boiler and side wall - at least 0.6 m.

The height of the boiler room - at least 2 m.

Access and service spaces of boiler room and hall doors paths will always be free.

In the boiler room will be displayed operating instructions, taking into account the specificities of the boilers mounted. Also, you will see internal instructions of staff and service duties.

### 3.3. Chimney

The chimney installation must supply sufficient draught, air tightness and protection against condensation.



**The appropriate chimney installation is very important for the boiler's efficient and safe function!**

The chimney must be positioned if possible in the interior of the building. It must be vertical, with no changes in the direction. The cross-section of the chimney can be round or rectangular. If the chimney is installed in the exterior, it must be insulated.

The horizontal part connecting the boiler's chimney pipe with the vertical chimney must have maximum length 2 m. If this distance is bigger, it is recommended to have a 15-30° inclination upwards. The connection with the boiler's chimney pipe must be air-tight.

The chimney must be equipped with a cleaning door at its base. Also cleaning doors are recommended where there are changes in direction and ash can be accumulated. Tactical cleaning is recommended (every 3 months) for efficient boiler function.

A chimney terminal must be installed at the end of the chimney for protection against weather effects and foreign objects entrance. In areas with strong winds a special anti-downdraught terminal is recommended.



## BOILER MOUNTING

The chimney height must exceed the roofline by at least 1 m. If there are other obstacles positioned on the roof, the chimney height must exceed them by at least 1 m. If there are multiple chimneys, minimum distance between them is 0,3m.

**Each boiler should be connected to an independent chimney. Connection of multiple boilers to the same chimney is not recommended.**

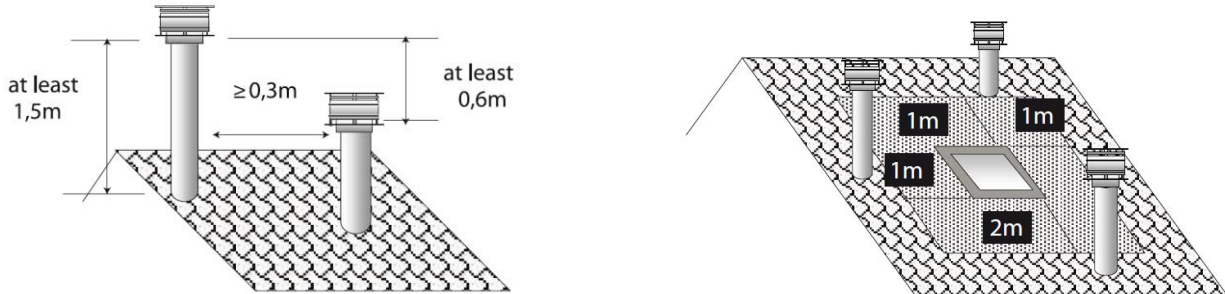


Fig 3. Chimney distances

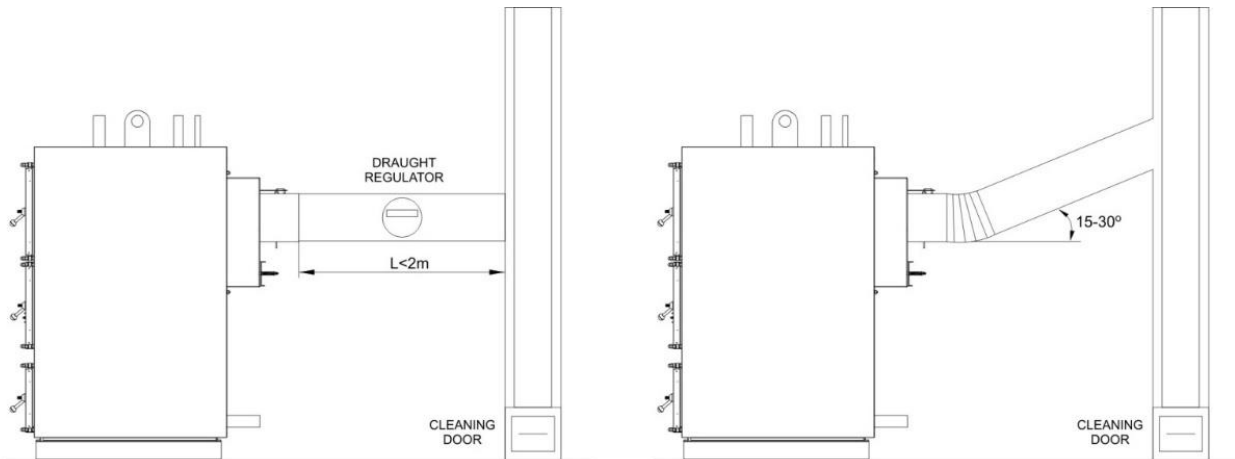


Fig 4. Chimney connection

## 4. INSTALLATION

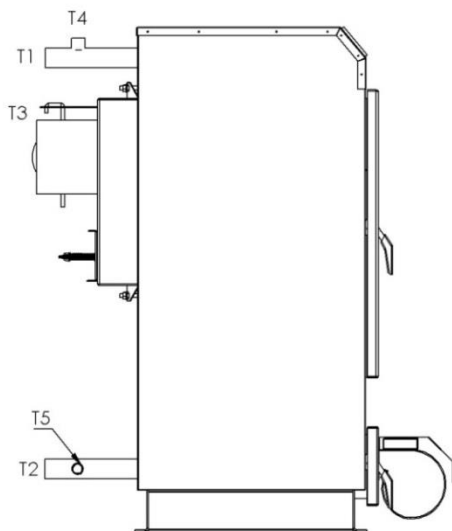
### 4.1. Hydraulic connections

The boiler is intended for connection with an open expansion vessel network. The boiler can be connected also with closed expansion vessel, if it is equipped with an overheating serpentine (optional).

The boiler is intended for maximum working temperature 90°C and maximum pressure 2 bars. When connected with a closed expansion vessel, its volume must be chosen double to a similar installation on liquid or gas fuel.



**If a connection pipe is not used, it must be sealed before water fill!**



#### Legend

- T1 Outlet
- T2 Return
- T3 Chimney pipe
- T4 Safety kit connection
- T5 Discharge valve connection

### 4.2. Return temperature protection

For the correct function of the boiler and for protection against corrosion it is very important to ensure steady temperature at the return of the boiler of at least 55°C.

This can be ensured by installing a recirculation pump between the boiler outlet and return (see connection diagrams).

An alternative variation is by installing at the return of the boiler a three-way thermostatic valve.



**Having a return temperature less than 55°C is very dangerous for the boiler long-life and can cause warranty loss!**

## 4.3. Filling the system

After completing all the hydraulic connections, the circuit may be filled with water. After filling the system, open the radiators air valves to get rid of the air in the installation.

Verify that the installation pressure is according to the technical feature of the boiler. The pressure must be verified through the boiler's manometer. An additional manometer should be installed on the cold water inlet to verify the cold pressure, at the lowest point of the installation, at a point close to the boiler.

The whole installation must remain under nominal pressure for at least 10 minutes. During this period, check that all the connections are tight and there are no water leakages. Make sure that during this period no pressure drop appears.

After firing the boiler, make sure the network functions properly at working temperature and pressure.

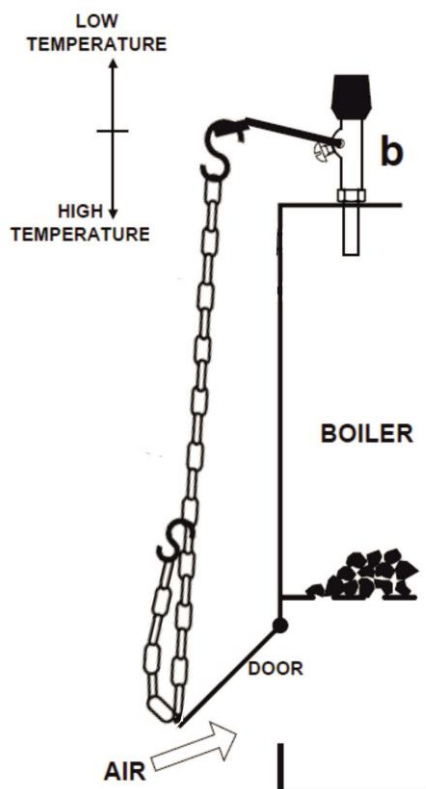


**The hardness of the mains water supply affects the boiler's life span. It is recommended to use a water softener if water hardness exceeds 15°f.**



**Do not fill the system at the working pressure! When the boiler will be heated, the water pressure will raise. Filling pressure must be at least 1 bar lower than working pressure!**

## 4.4. Chain thermostat installation (STANDARD VERSION)



ECOWOOD STANDARD is equipped with air door on the lower part and is delivered with chain thermostatic regulator.

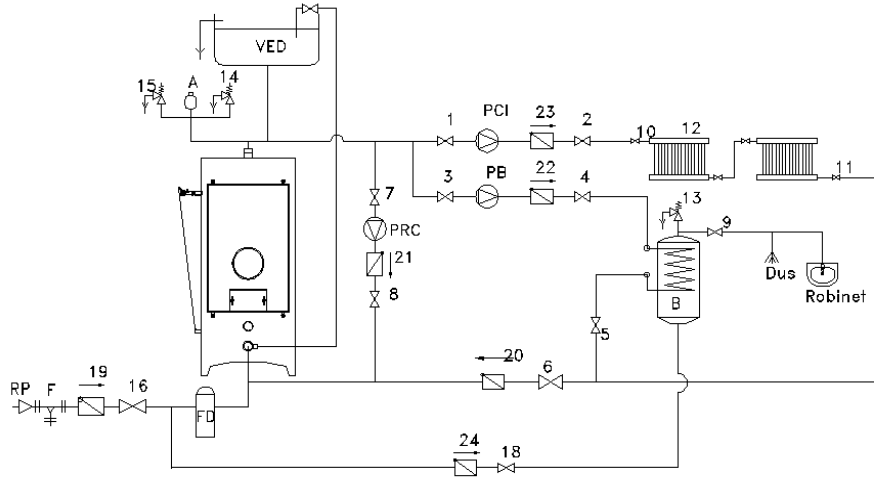
Install the regulator at the connection pipe on the upper side of the boiler and pass the chain through the hook provided on the air door.

Choose the desired boiler temperature from the thermostat head (red scale is valid).

The thermostatic regulator controls the boiler temperature by controlling the supply of combustion air. The chain length must be adjusted so that when the set temperature is reached the air door is in closed position and no air is supplied.

**4.5. Connection diagrams**

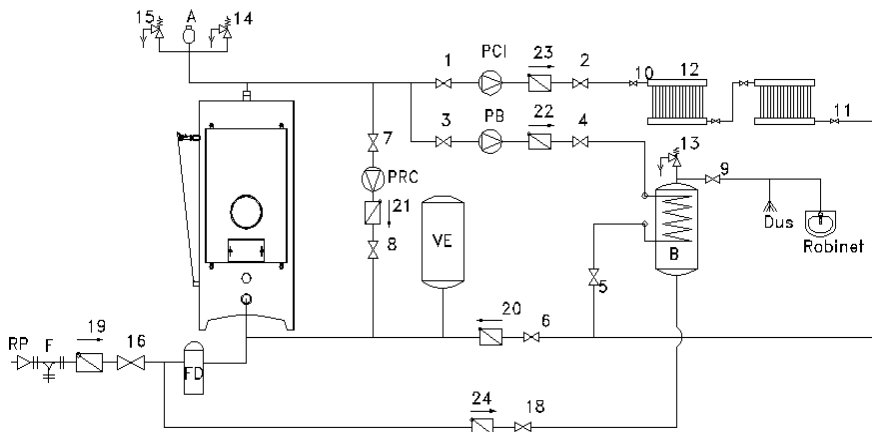
**4.5.1. Open expansion vessel connection**



**Legend**

- |        |                   |     |                       |
|--------|-------------------|-----|-----------------------|
| 1-9.   | Separation valves | B   | Hot water boiler      |
| 10,11. | Radiator valves   | VED | Open expansion vessel |
| 12.    | Radiators         | PCI | Central heating pump  |
| 13-15. | Safety valves     | PRC | Recirculation pump    |
| 16.    | Filling valve     | RP  | Pressure reducer      |
| 17.    | Drainage valve    | F   | Filter                |
| 18.    | Cold water valve  | A   | Air relief valve      |
| 19-24. | One-way valves    | FD  | Water softener        |

**4.5.2. Closed expansion vessel connection**



**Legend**

- |        |                   |     |                         |
|--------|-------------------|-----|-------------------------|
| 1-9.   | Separation valves | B   | Hot water boiler        |
| 10,11. | Radiator valves   | VE  | Closed expansion vessel |
| 12.    | Radiators         | PCI | Central heating pump    |
| 13-15. | Safety valves     | PRC | Recirculation pump      |
| 16.    | Filling valve     | RP  | Pressure reducer        |

## INSTALLATION

17.	Drainage valve	F	Filter
18.	Cold water valve	A	Air relief valve
19-24.	One-way valves	FD	Water softener

## 5. ELECTRICAL CONNECTIONS

### 5.1. General instructions

All electrical connection must be performed by an authorized professional, in conformity with the local regulations and the indications of this manual. Connections must be done according to norms EN 60529 and EN 60335-1, and protection norms IP 40 and IP 44.

All wiring must be waterproof insulated. Exposed cables should be protected within plastic channel. The main electrical supply of the boiler must be connected to an independent safety of max 16A. The boiler room lighting must be on a separate circuit.

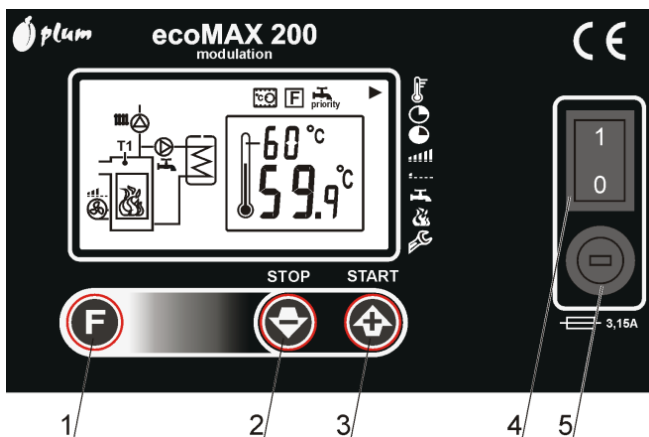
The user is obliged to connect the boiler to an efficient grounding system.



**THERMOSTAHL ROMANIA SRL declines any liability for damage caused to people, animals and goods, due to defects caused by faulty electrical connections or lack of connecting the boiler to an efficient grounding system.**

### 5.2. Control panel functions (PLUS VERSION)

#### 5.2.1. Description of buttons and display



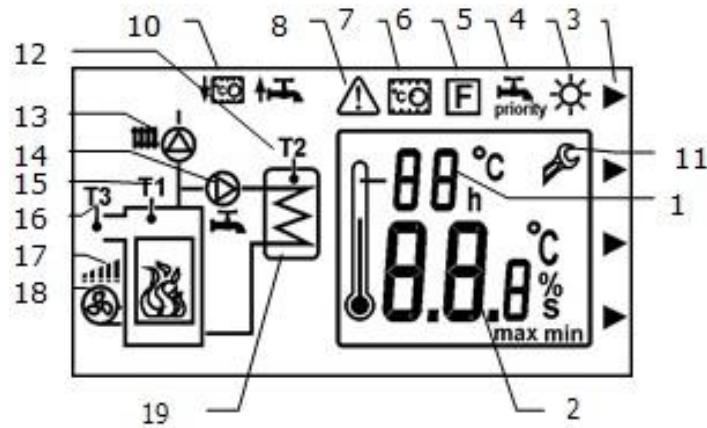
#### Legend

1. "F" button:  
-short press – access the menu;  
-long press – exit submenu.
2. STOP button, value decrease
4. START button, value increase
5. Mains switch
6. Fuse holder

After turning the regulator on, the START and STOP buttons are used to enable and disable airflow respectively.

ECOWOOD PLUS version is equipped with a safety thermostat (STB). If the boiler reach a temperature of 95°C safety thermostat interrupts power fan. Restarting the boiler can only be done by detecting and removing the cause that produced overheating, or waiting for the boiler to cool down below 90°C.









## 5.2.2. Description of the main display screen



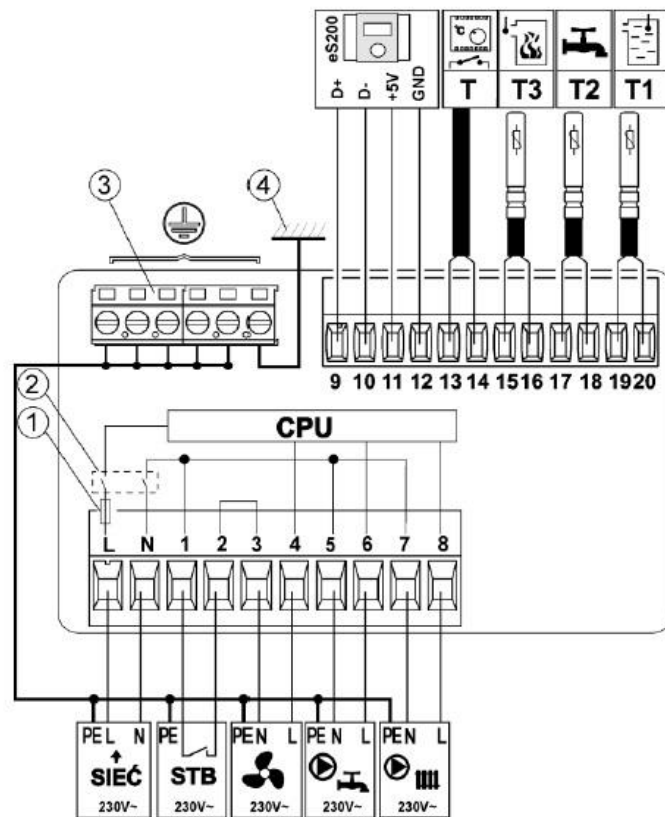
### Legend:

- |   |   |
|---|---|
| <ol style="list-style-type: none"> <li>1. Preset boiler temperature.</li> <li>2. Measured temperature of boiler.</li> <li>3. Signal arrow.</li> <li>4. SUMMER – hot utility water mode symbol.</li> <li>5. PRIORITY - hot utility water mode symbol.</li> <li>6. Boiler regulation mode.</li> <li>7. Room thermostat - this symbol lights up when the temperature inside the room reaches the preset value contacts are disconnected.</li> <li>8. Alarm symbol.</li> <li>9. Signal of increasing the preset boiler temperature due to hot utility water heating.</li> </ol> | <ol style="list-style-type: none"> <li>10. Signal decreasing the preset boiler temperature due to operation of the room thermostat.</li> <li>11. Service menu symbol.</li> <li>12. Hot utility water temperature sensor.</li> <li>13. Boiler pump symbol.</li> <li>14. Hot utility water pump symbol (HUW).</li> <li>15. Boiler temperature sensor.</li> <li>16. Exhaust temperature sensor.</li> <li>17. Airflow power.</li> <li>18. Fan operation symbol: <b>not visible</b> – regulation is off; <b>visible</b> regulation is on; <b>flashes</b> -the regulator is in the SUPERVISION mode.</li> <li>19. Hot utility water tank symbol.</li> </ol> |
|---|---|

### Icons:

- |  |   |
|--|---|
|  Temperature settings<br>1 – preset boiler temperature<br>2 – measured boiler temperature |  Settings for hot utility water<br>01- Hot water priority<br>02- Simultaneous operation of heating pump an hot water pump<br>03- SUMMER mode<br>04- Disable the hot water filling pump |
|  Blow-off time  |  Blow-off interval   |
|  Maximum fan speed  |  Boiler regulation mode<br>01- CLASSIC<br>02- PID<br>03- PID-S   |
|  Minimum fan speed  |  Service menu  |


## 5.3. Electrical connections



### Legend

- T1. Boiler temperature sensor (type CT4)
- T2. Hot utility water temperature sensors (type CT4)
- T3. Emission temperature sensors (type CT2s)
- T. Room thermostat
- DZT-1. Additional thermal safeguard (type DZT-1 85°C or 90°C)
- 1. Mains fuse in the regulator
- 2. Mains switch in the regulator
- 3. Protective terminals PE
- 4. Metal enclosure of the regulator
- MAINS Mains lead
- STB. Safety temperature limiter

**Note: Do not use the ecoSTER room panel and room thermostat at the same time!**

The regulator is designed to be fed with 230V~, 50Hz voltage. The electrical system should be three core (with protective wire), and in accordance with applicable regulations. The grounding cable should be connected to the terminals marked with the symbol .

The connection wires should not have contact with hot surfaces (with temperature exceeding the nominal temperature of their operation). Terminals L, N and number 1-8 are intended only for connecting devices with mains supply 230V~. Terminals 9-20 are intended for cooperation with low voltage devices (below 12 V).

Tips of the connected wires, especially power leads, must be secured against splitting by means of insulated clamp sleeves, in accordance with the drawing below:



## ELECTRICAL CONNECTIONS

Tips of the connected wires, especially power leads, must be secured against splitting by means of insulated clamp sleeves, in accordance with the drawing below:

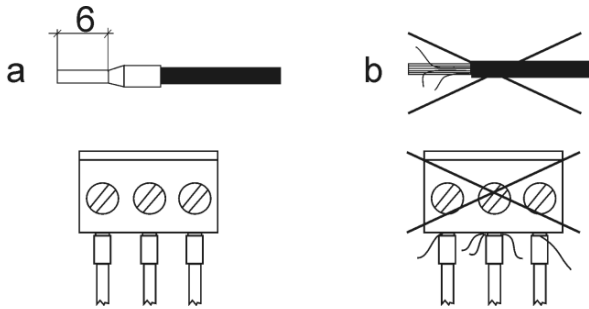
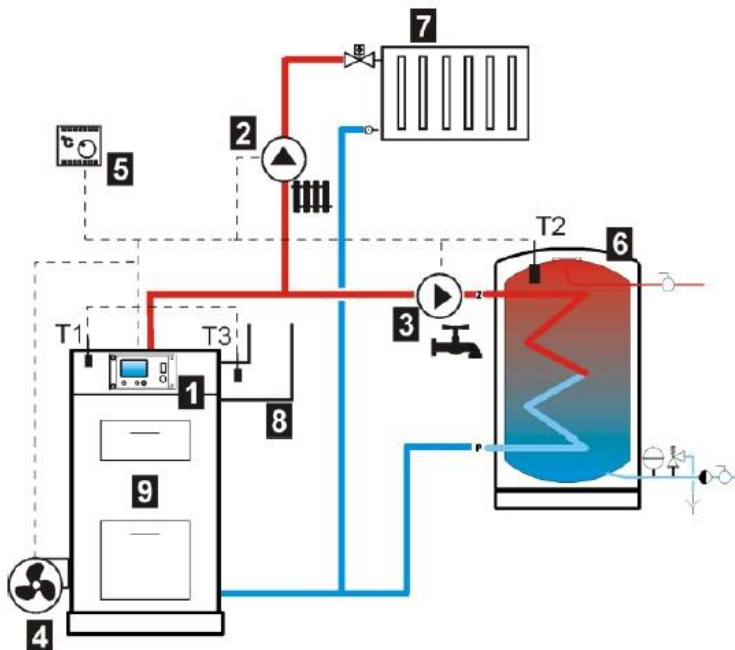


Fig 5. Securing wire tips a) right, b) wrong

### 5.4. Hydraulic function scheme



#### Legend

1. Regulator
2. Central heating pump
3. Hot utility water pump
4. Fan
5. Room thermostat
6. Hot utility water tank
7. Central heating system
8. Chimmey duct
9. Boiler
- T1. Boiler temperature sensor
- T2. Hot utility water temperature sensor
- T3. Emission temperature sensor (optional)



**The presented hydraulic diagram does not replace the central heating system design and it can be used for reference purposes only.**

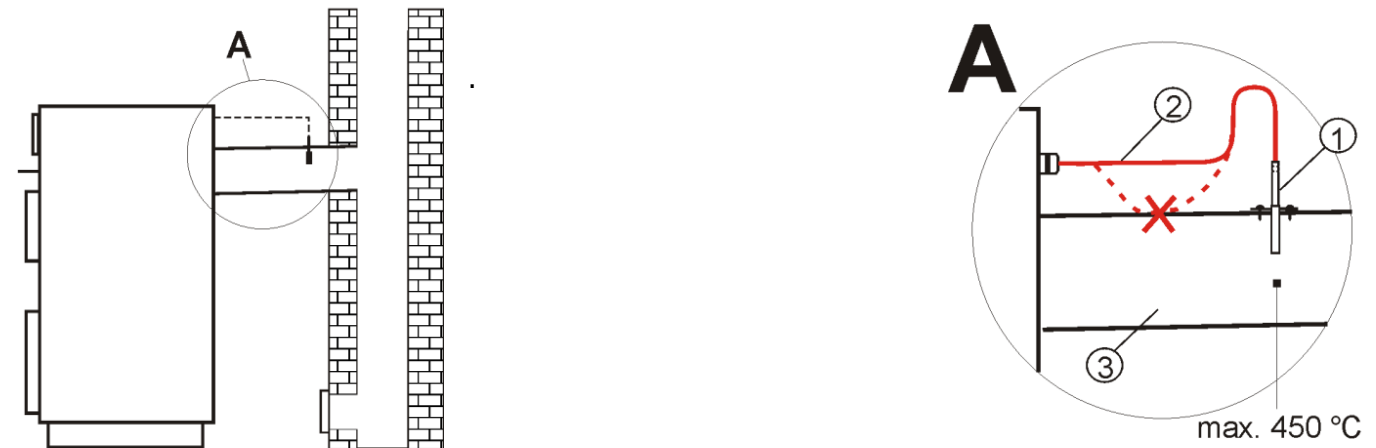
Brief description of the system functioning: after firing the boiler up, the central heating pump is activated after the boiler exceeds the *central heating pump activation temperature* (service parameter n0, by default n0=40°C). The hot utility water pump is activated when the tank temperature (6) drops below the preset value. If at this time the preset boiler temperature is lower than the preset hot utility water temperature, the regulator increases the preset boiler temperature in order to fill the hot utility water tank.

After filling the hot utility water tank, the hot utility water pump can continue work for a preset time, in order to collect heat from the boiler. After the room thermostat (5) operates,

the regulator decreases the preset boiler temperature and/or temporarily disables the central heating pump (2).

Fitting an emission temperature sensor (8) in the boiler flue enables very fast detection of fuel depletion and turns the fan off. Moreover, it allows operation in the PID- EMISSION boiler regulation mode, and preview of the emission temperature.

### 5.5. Connecting exhaust temperature sensor



The emission sensor should be fitted in the boiler flue (3). The gap between the sensor and the flue should be sealed. The sensor should be installed by a qualified fitter, while observing regulations applicable for chimney systems. The emission sensor should be connected to the sensor terminals according to the electrical scheme. The emission sensor lead cannot touch hot elements of the boiler and the flue, the temperature of which exceeds 350°C. The emission sensor should be installed in such distance from the boiler at which it is not directly exposed to flames, and where the emission temperature does not exceed 450°C.

### 5.6. Connecting temperature sensors

The regulator is compatible only with sensors type CT4 (sensor of boiler and hot utility water) and CT2s (emission sensor). It is prohibited to use different sensors. Sensor leads can be extended with wires with section of at least 0,5mm<sup>2</sup>. Total length of the sensor leads cannot exceed 15m. The boiler temperature sensor CT4 should be fitted in the boiler bulb pipe. Hot utility water temperature sensors CT4 - in the thermometric pipe welded into the tank.



**The sensors must be secured against coming loose from the measured surfaces.**

### 6. BOILER START-UP

#### 6.1. Initial lighting checks

Before you start the boiler, make the following checks:

- Check that all the hydraulic connections and make sure they are tight. Make sure there is no leakage or moisture on the pipes or other equipment.
- Make sure that the connection with the chimney is air-tight and the chimney installation is properly made.
- Check that the controller bulbs are well inserted and secured in the boiler's case.
- Make sure that the pressure in the network is correct.
- Check that the boiler pump and the central heating pumps function properly.
- Make sure that the connection with the expansion vessel is correct and the expansion volume is sufficient for the boiler. No valves should be installed between the boiler and the expansion vessel.
- Make sure the boiler's separation valves are open.
- Make sure that there is sufficient air supply and natural ventilation in the boiler room.



**Do not store inflammable materials or fuel close to the boiler! Before you light the boiler make sure the boiler room is clear and safe.**

#### 6.2. Start-up

To correctly start up the ECOWOOD boiler follow the next steps:

- Make sure the control panel switch is set to STOP and that fan does not function.
- Make sure the chimney damper is positioned in horizontal position (completely open).
- Open the upper door (fire chamber) and introduce a sufficient amount of small and thin pieces of wood.
- Using sheets of thin paper light the wood placed inside the boiler.
- Close the door of the boiler.
- Wait several minutes until the flame develops and produces some embers.
- After formation of embers, load the fire chamber with wood. Position them on top of the grate.
- Close the door and secure it with the handles.
- Activate the airflow by pushing the START button.



**It is prohibited to light the boiler with inflammable or explosive liquids.**

#### 6.3. Checks to carry after initial start-up

During the first start-up you need to carefully check the air-tightness of all the connections, especially the doors and the connection with the chimney.

Check that the thermostats function properly and devices operate accordingly. Wait for the boiler to reach the preset temperature and make sure the fan stops properly and the flame falls down.

Check the temperature and pressure rise in the network. Make sure it is according to the indications. Check if there is any water leakage in the network.

After burning of the fuel is completed, check the situation inside the boiler. If the walls are too black, it means that there is insufficient air supply. If there is condensation forming on the boiler walls, it means that the pump operation starts at a low temperature or the fuel has too big humidity content. Make sure you set the pump according to the indications and you install a return temperature protection system as indicated.

### 6.4. Fuel loading


In order to correct add fuel to the boiler follow the next steps:

- Stop the fan function by pressing the STOP button. Wait 30 seconds for the fume to exit the boiler.
- Open the upper door slowly to avoid leakage of smoke. Load a sufficient amount of fuel. Each loading should be regulated according to the boiler output and the heat demand. Never load too much to fuel to fill all the fire chamber volume! Maximum fuel should be 70-80% of the fire chamber volume.
- Close the door and secure with the handle.
  - Start again the fan function by pressing the START button.



**When loading fuel in the boiler do not throw them but position them carefully.**

### 6.5. Operation mode

The regulator features three selectable methods of regulating the combustion process: CLASSIC, PID, PID-S. In order to choose the operation mode, press the F button in the main window until the arrow is in the *boiler regulation mode* position.  Use „+“ or „-“ buttons to set value according to instructions below.

#### **CLASSIC regulation (regulation mode 1)**

The method is based on the T1 boiler indication, and consists in decreasing of the airflow power from *Maximum revolutions* to *Minimum revolutions* while achieving the preset boiler temperature. Revolutions start to be reduced at 5°C (service parameter n7) before the preset boiler temperature. After achieving the preset boiler temperature, the SUPERVISION mode is activated, where blow-offs are performed.

#### **PID regulation (regulation mode 2)**

This method is based on boiler temperature indications T1, it consists in constant, smooth modulation of the fan revolutions in order to stabilize the preset boiler temperature. The regulator itself selects the airflow power in such a way that the boiler generated minimum amount of heat necessary to satisfy the heat demand of the building. Transition to the SUPERVISION mode is rare and it happens during lack of heat demand. This is the preset setting of the boiler.

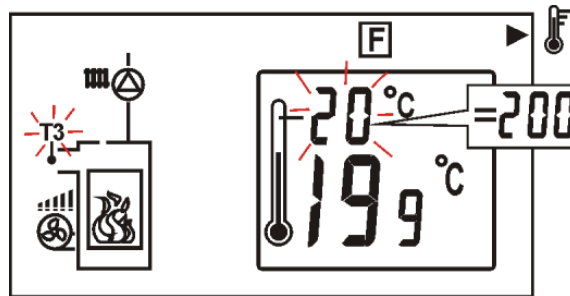
#### **PID-S regulation with exhaust temperature sensor (regulation mode 3)**

This method is based on emission sensor indications T3. It consists in constant, smooth modulation of the fan revolutions in order to stabilize the preset emission temperature. As opposed to the PID, the airflow operation is more stable, without excessive increasing of the airflow power, which makes that method more economical in respect of fuel saving.

After loading the fuel and pushing the START button, the fan operates with maximum revolutions. As the preset emission temperature is approached, the revolutions are automatically reduced. When the emission temperature reaches the preset temperature for the first time, a slight adjustment is made.

Moreover, after equipping the regulator with an emission sensor, it is possible to enable very fast detection of fuel shortage. This provides additional saving of heat energy resulting from almost instantaneous deactivation of the fan when the fuel runs out. Also, the fuel needs not be added quickly, as fast detection of the lack of fuel maintains glow in the boiler furnace for a longer time.

In order to preset the emission temperature, press the “F” button until the following window appears:



Use the „+“ and „-“ buttons to respectively increase or decrease the preset emission temperature; please note that the value in the upper part of the thermometer symbol is x10, e.g.: 20°C, means 200°C. The preset emission temperature should generally be between 160 and 250°C.

The optimal preset emission temperature depends on the type of fuel and the boiler design, and it should be determined experimentally. When burning wood, the flame should be blue-yellow, and when burning coal – yellowish. For example, the optimal temperature for wood is between 190 and 260°C.

If optimal emission temperature causes excessive heating up of the boiler, it is best to store the surplus energy in a thermal buffer. If the central heating system does not feature a thermal buffer, you must find such preset emission temperature at which the temperature of water in the boiler is at the desired level. If it is too hot in a room, decrease the preset emission temperature, and increase it in the opposite case. The preset boiler temperature is in this method of secondary importance, it prevents exceeding undesirable temperature of the boiler. It is recommended to preset the boiler temperature as 10°C higher than the expected boiler temperature after the emission temperature settles. After the boiler reaches the preset temperature, the regulator switches to SUPERVISION mode.

**Note: the regulator will automatically switch from regulation mode 3 to mode 1, if the emission sensor is damaged or if the emission temperature exceeds the emission sensor measuring capacity. Therefore, it is important to set proper parameters for the regulator to operate in mode 1, without causing any danger.**



**Setting emission temperatures lower than 160°C can cause condensing in the chimney!**



**If PID-S mode is chosen, it is recommended to use combined with a buffer tank.**



**High emission temperature, even if the fan rotates slowly, can mean that the boiler is blocked of ash and need to be cleaned.**



**If emission temperature reaches higher than 400°C the boiler will stop and alarm will be activated.**

### 6.6. Combustion regulation

After completing the fuel loading procedure and closing the door, set the required temperature. After the fan is activated, you can adjust the air volume from the control panel.

The flame will have to occupy about two thirds of the fire chamber and quietly lick the cylindrical heat exchanger. Its shape must be fully developed and with not too many detachments at the flame end. Its color must be vivid orange-yellow, not too transparent.

#### GENERAL SUGGESTIONS

- The flame needs to have reasonable dimensions and fill up the fire chamber as told.
- The flame must not be **too red (too low air supply)**.
- The flame must not have **big detachments and sparkles (too high air supply)**.
- The flame must not be **too small**. If it is slow, easily influenced by air currents and the chimney draught, it means that the **air supply is too low**.
- The **smoke at the chimney** must be clear-grey. Black smoke means **lack of air supply**.
- If **too much ash and big coal pieces** fall down to the ash box **reduce the air supply**.  
The flame is too fast, dry, and might make a noise.

### 6.7. Supervision mode

After the boiler has reached the preset temperature, it will enter in SUPERVISION mode. In the SUPERVISION mode the fan is enabled cyclically for short periods, in order to prevent the fire from going out and to remove accumulated combustible gases from the fire chamber.

### 6.8. Stop mode

Unless the START button is pressed in the main display window (right after turning the regulator on via the mains switch), the device controls only the pumps.

The central heating pump and the hot utility water pump operate in accordance with their algorithm. They are activated if appropriate conditions are met. The conditions for pump activation are described in individual sections of the manual.

### 6.9. Chimney damper adjustment

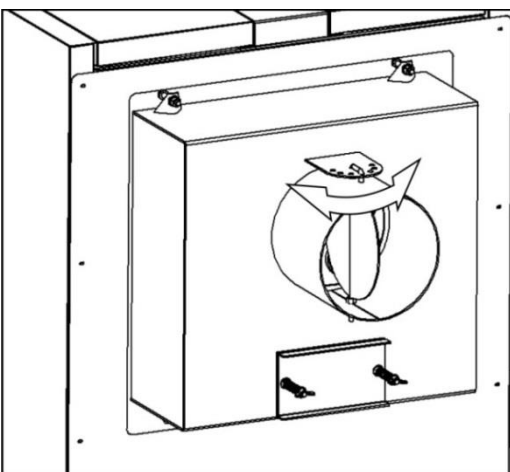


Fig 6. Chimney damper

The boiler chimney pipe is equipped with a damper. This can be set in various positions to throttle the exhaust gases.

At nominal function of the boiler this damper should be normally open. Also it should always be at open position at boiler start-up.

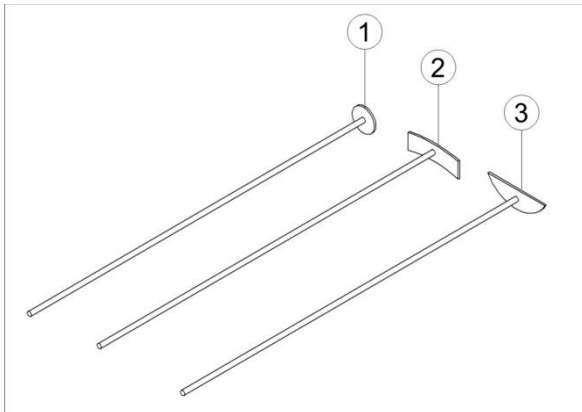
If the chimney draught is too big and the gases are evacuated too fast, set this damper at a side position by inserting the positioner at a different hole.



## 7. SERVICE AND MAINTENANCE

### 7.1. Cleaning the boiler

Solid fuel boiler require regular cleaning in order to function properly and efficient. **Cleaning must be effected at least once a week.** The boiler is equipped with three cleaning tools appropriate for the cleaning procedure of the boiler, as shown in Fig 7.



**Legend:**

1. Tubes cleaning tool
2. Heat exchanger cleaning tool
3. Ash cleaning tool


**The boiler function must be stopped before cleaning! Make sure all the devices are stopped, and the boiler has cooled down. It is strictly prohibited to clean the boiler while in function!** 

Fig 7. Boiler cleaning tools

Open the upper door to have access to the heat exchanger. Remove the turbinators from the tubes, and clean the tubes with the appropriate tool. Afterwards clean the exterior surface of the cylindrical heat exchanger with the exchanger cleaning tool, as shown in Fig 8. With the same tool, scrape the ash and any other remains from the side walls of the boiler.

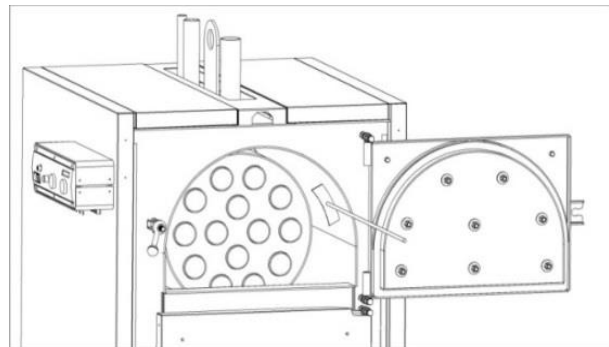
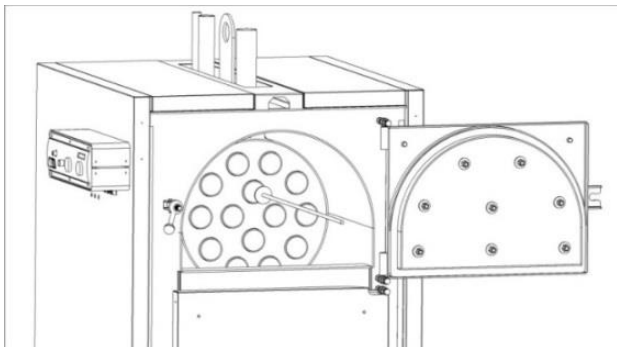
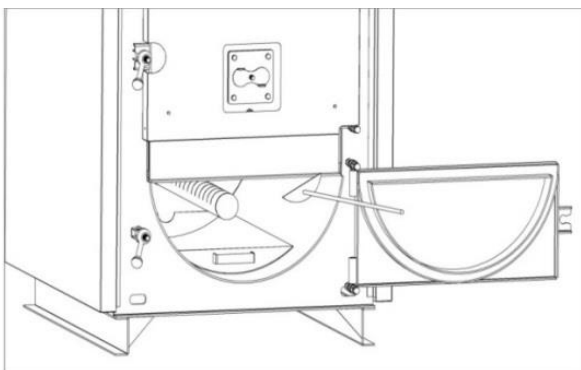


Fig 8. Cleaning of the heat exchanger



Open the lower door of the boiler and remove the ash box. Empty all the containing ash. With the ash cleaning tool you can scrape the lower surface of the boiler for any residues of ash.


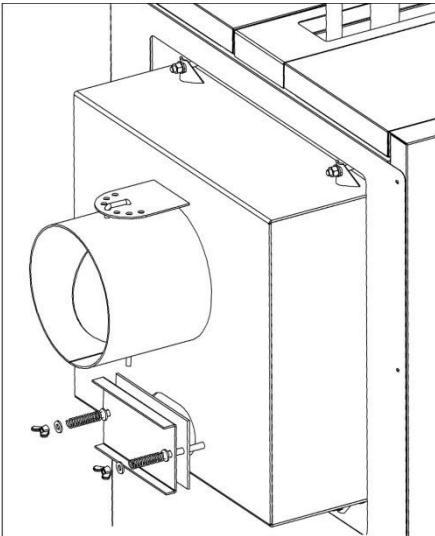
** The ash must be disposed in an appropriate container! Do not throw the ash together with the domestic garbage. Be careful since ash might contain hot particles, even long time after stop.**

Fig 9. Removing the ash



## **7.2. Cleaning the chimney box**



To ensure efficient and safe function of the boiler, you must clean the chimney box from ash residues **at least every 3 months**.

The ash box is equipped with a cleaning door for this purpose, as shown in Fig 10. In order to open the door, unscrew the wing nuts, remove the washers and springs that keep it in place.

Clean the interior of the chimney box and remove all the ash and residues.

Put back the door the same way as removed.

**The springs must not be omitted! They act as safety in order of explosion of exhaust gases in the chimney box.**



*Fig 10. Cleaning the chimney box*

## **7.3. Maintenance intervals**

### **7.3.1. Daily maintenance**

The pressure of the network must be daily verified to be within the allowed limits. Make sure that all the safety devices and pumps function properly.

### **7.3.2. Weekly maintenance**

The boiler must be cleaned every 3-4 days or at least once a week, depending on the ash quantity accumulated on the boiler walls and in the heat exchanger. Cleaning procedure must be performed according to the instruction given in the corresponding paragraph.

Check the quantity of ash accumulated in the ash box. The ash disposal can be performed every 1-2 weeks, depending on the ash quantity formed.

### **7.3.3. Monthly maintenance**

Check the doors and the sealing cord. Make sure the contact with the boiler is air-tight. If ash has accumulated on the sealing cord, clean it.

Check the fan and make sure it functions properly. Clean from dust and check that the air passage is clear of obstacles and dust.

Remove the turbinators from the heat exchanger and check their condition.

It is recommended that you clean the chimney box of the boiler and the chimney pipes at least every 3-4 months, in order to assure efficient and safe function of the boiler.

### 7.4. Basic service procedures

#### 7.4.1. Service after overheating

If overheating occurs, the safety valves of the boiler must open.

Make sure the boiler pump is working. In case of blackout open all the valves of the system to let hot water out of the boiler. In any case a blackout protection UPS is recommended to be installed on the boiler pump.

If the chimney damper is not fully opened, put it in fully open position.

All safety devices must lead to drainage! After overheating, make sure that all the water from the safety devices has drained, and the system has filled with cold water. Check the pressure and the temperature of the boiler.

At overheating, the safety thermostat will activate, and cut electrical supply to the fan. In that case, you need to manually reset the safety thermostat and put the system back in function. Unscrew the plastic cover of the safety thermostat and press the switch. Put the plastic cover back.



**Verify the causes of the overheating! If it happens again, check the installation and function of the pumps and safety devices!**

### 7.5. Maintenance after long stop

It is necessary to perform a general maintenance and cleaning of the boiler after the heating season. Clean thoroughly all the surfaces of the boiler as described in the corresponding paragraph. Also clean the chimney box, and all the chimney parts where ash might be deposited. After cleaning all the ash, empty the ash box and leave the boiler clean for the next winter season.

After long stop of the boiler, before you put in function you need to perform the following checks:

- Check the condition of the electric cables and the sensors. Make sure they are not damaged. Check that the thermometer indicates the correct temperature and all the thermostats function properly. Make sure the bulbs are properly positioned in the case.
- Make a general check of the chimney and make sure it is clean and free of obstacles.
- Verify the pressure in the heating network and the boiler.



**Do not empty the water of the boiler and the heating installation after the heating season! It will corrupt all the installation and especially the boiler.**

- Check that all the valves are working properly. Replace them if necessary. Pay special attention so that all the safety equipment of the boiler functions properly!
- Make sure all the ball valves of the boiler and other relative equipment are open.
- Check the function of the pumps. They might be blocked after long stop.
- Check that there have been no modifications to the installation and the boiler room (ventilation openings, chimney, doors).
- Check the fan and clean from dust. Turn it manually to ensure it is not blocked.

## 8. TROUBLESHOOTING

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
The lamps of the control panel do not light	<ul style="list-style-type: none"> <li>- no electrical supply to the lamp</li> <li>- the control panel is not connected to electricity</li> <li>- lamp defect</li> <li>- electric cable defect</li> </ul>	<ul style="list-style-type: none"> <li>- check/replace the lamp</li> <li>- connect to electricity</li> <li>- check/replace the cables</li> </ul>
The boiler does not reach set temperature	<ul style="list-style-type: none"> <li>- fan blocked</li> <li>- air passages are blocked</li> <li>- boiler is not cleaned</li> <li>- incorrect boiler start-up</li> <li>- insufficient water in the system</li> <li>- too big pump debit</li> <li>- boiler under dimensioned</li> <li>- bad quality fuel used</li> <li>- insufficient chimney draught</li> </ul>	<ul style="list-style-type: none"> <li>- check/replace the fan, check the function of the fan regulator and thermostat</li> <li>- clean the air passages</li> <li>- clean the boiler</li> <li>- start the boiler correctly</li> <li>- fill the system</li> <li>- regulate the pump speed</li> <li>- change the fuel used</li> <li>- check/clean the chimney</li> </ul>
High temperature in the boiler, but low temperature at the radiators	<ul style="list-style-type: none"> <li>- too high hydraulic resistance in the heating network</li> <li>- thermostatic mixing valve is connected wrong</li> </ul>	<ul style="list-style-type: none"> <li>- increase the pump speed</li> <li>- check/replace the mixing valve</li> </ul>
Condensation formation in the fire chamber	<ul style="list-style-type: none"> <li>- too big boiler power</li> <li>- too low return temperature in the boiler</li> <li>- fuel with excessive humidity</li> </ul>	<ul style="list-style-type: none"> <li>- load less fuel in the chamber</li> <li>- install a return protection system/thermostatic valve</li> <li>- change the fuel used</li> </ul>
Smoke coming out of the doors	<ul style="list-style-type: none"> <li>- boiler doors not regulated</li> <li>- defect sealing cord of the door</li> <li>- insufficient chimney draught</li> <li>- too high air supply by the fan</li> </ul>	<ul style="list-style-type: none"> <li>- regulate the doors so that the sealing cord stays tight</li> <li>- check/replace the sealing cord</li> <li>- check/clean the chimney</li> <li>- reduce the air speed</li> </ul>
The fan does not function or it makes a lot of noise	<ul style="list-style-type: none"> <li>- set temperature reached</li> <li>- disconnected by safety thermostat</li> <li>- capacitor/motor defect</li> <li>- bad electrical connection of the fan</li> </ul>	<ul style="list-style-type: none"> <li>- correct boiler function</li> <li>- reset manually</li> <li>- check/replace the fan</li> <li>- check the electrical connection of the fan</li> </ul>

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