

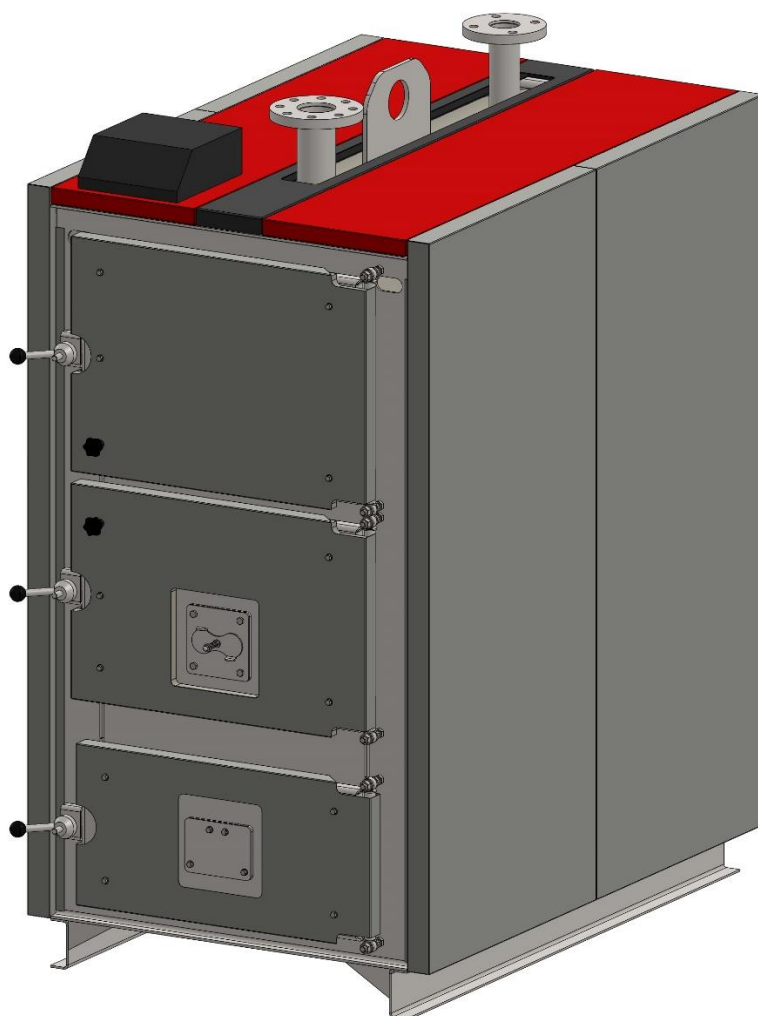


SOLID FUEL BOILER

# MCL

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## ***INSTALLATION AND USER MANUAL***



VERSION: 2.4  
UPDATE: 13.10.2022

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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 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

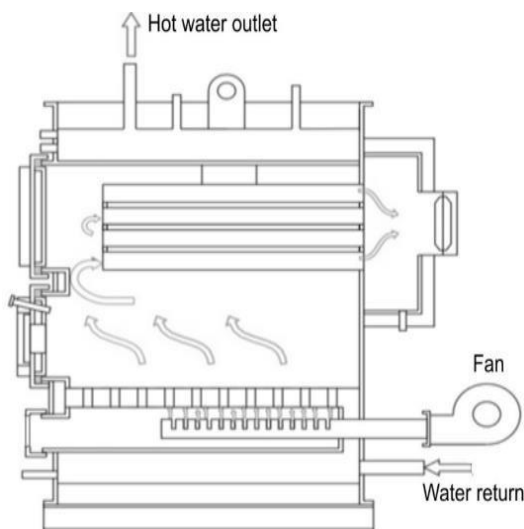
MCL boiler is a steel solid fuel boiler, with cylindrical heat exchanger consisted of fire tubes.

The boiler body is made of cold rolled steel S235JR EN 10025/90. The boiler is designed so that all the parts in contact with exhaust gases are water cooled. The boiler body parts are assembled by welding. Weldings are performed according to standards 288-1 and 288-3 according to DIN 50120, 50121-50145, SR EN 1011.1/2001, by means of electric arc welding (MIG-MAG).

#### DESCRIPTION OF COMPONENTS

- Steel boiler body with cylindrical heat exchanger
- Removable rear smoke box with inspection cleaning door
- Upper door for cleaning the heat exchanger
- Middle door for ignition and fuel loading, equipped with an inspection flange, which can also be used for a burner mounting
- Lower door for ash removal
- Ash box positioned on the lower part of the fire chamber
- Combustion fan positioned on the rear of the boiler
- Air distributor on the bottom of the grate for even air distribution to all the boiler length
- Glasswool body insulation of 50 mm thickness
- Electrostatically painted external covers
- Control panel
- Safety heat exchanger (optional)

### 2.2. Function principle



The function of the MCL 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.

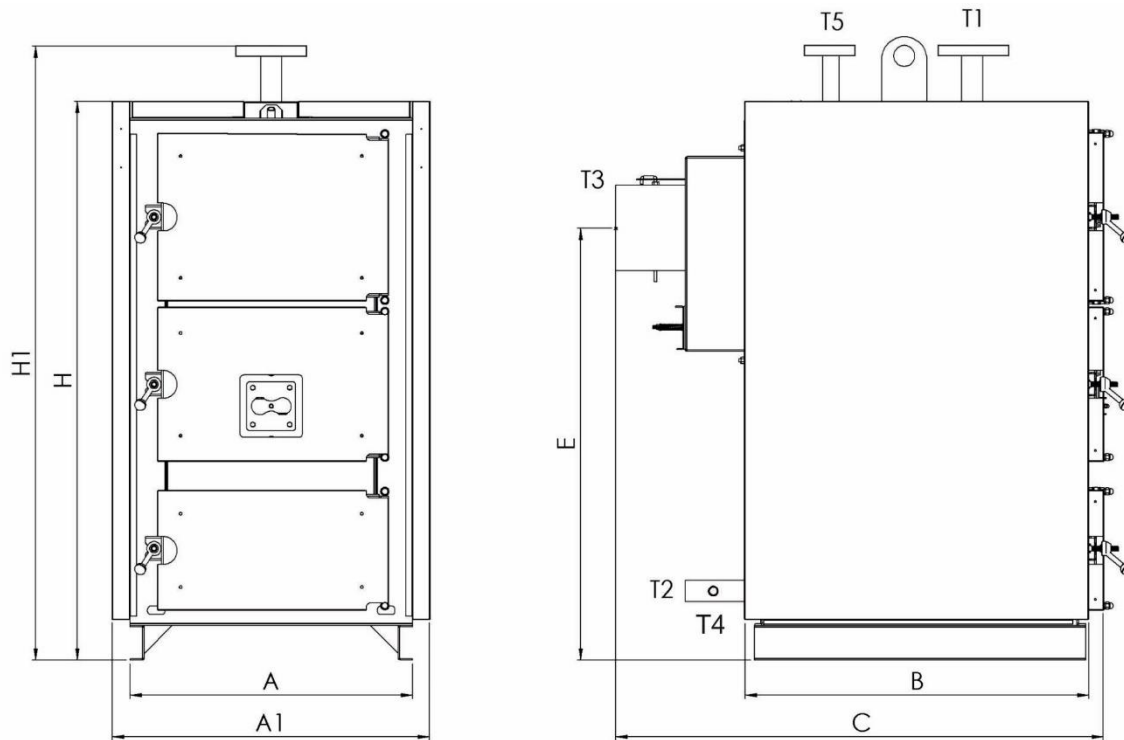
The combustion air is supplied by the fan and distributed through an air distributor, positioned below the fuel grate. The combustion is regulated through the fan, controlled by the control panel.

Fig 1. Boiler function

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. The flange on the middle door has a rotating clamp, for secondary air adjustment and flame inspection. If necessary, this flange can be removed, and a burner can be placed in its position.

## 2.3. Dimensions



**DIMENSIONS**

Type	Feeding door	A1	A	B	H	H1	E	C	T3	T1-T2	T5	T4
	mm	mm								mm	inch	
MCL 120	590x370	920	810	1320	1585	1740	1245	1765	295	DN 65	DN 50	1/2"
MCL 150	590x370	920	810	1570	1585	1740	1245	2015	295	DN 65	DN 50	1/2"
MCL 180	590x370	920	810	1825	1585	1740	1245	2265	295	DN 65	DN 50	1/2"
MCL 200	825x510	1107	1000	1320	1970	2150	1510	1840	345	DN 80	DN 50	1"
MCL 250	825x510	1107	1000	1570	1970	2150	1510	2090	345	DN 80	DN 50	1"
MCL 300	825x510	1107	1000	1820	1970	2150	1510	2340	395	DN 100	DN 50	1"
MCL 400	825x510	1107	1000	2070	1970	2150	1510	2590	395	DN 100	DN 50	1"
MCL 500	1180x665	1575	1475	1590	2465	2570	1870	2225	445	DN 100	DN 65	1 1/4"
MCL 600	1180x665	1575	1475	1840	2465	2570	1870	2475	445	DN 125	DN 65	1 1/4"
MCL 700	1180x665	1575	1475	2090	2465	2570	1870	2725	495	DN 125	DN 65	1 1/4"
MCL 800	1180x665	1575	1475	2340	2465	2570	1870	2975	495	DN 150	DN 80	1 1/4"
MCL 900	1180x665	1575	1475	2590	2465	2570	1870	3225	495	DN 150	DN 80	1 1/4"

## TECHNICAL FEATURES AND DIMENSIONS

### TECHNICAL DATA

Boiler type	Output Power*		T <sub>max</sub>	P <sub>max</sub>	Efficiency	Max. wood length	Water contents	Electrical supply	Weight
	kcal/h	kW	°C	bar	%	mm	lit	V/Hz	kg
MCL 120	120.000	139	90	3	80	1150	360	230/50	880
MCL 150	150.000	174	90	3	80	1400	420	230/50	990
MCL 180	180.000	208	90	3	80	1600	550	230/50	1220
MCL 200	200.000	232	90	3	80	1000	620	230/50	1420
MCL 250	250.000	291	90	3	80	1250	720	230/50	1600
MCL 300	300.000	349	90	3	80	1500	820	230/50	2130
MCL 400	400.000	465	90	3	80	1750	920	230/50	2200
MCL 500	500.000	581	90	3	80	1250	1420	230/50	2750
MCL 600	600.000	698	90	3	80	1500	1860	230/50	3050
MCL 700	700.000	814	90	3	80	1750	2440	230/50	3350
MCL 800	800.000	928	90	3	80	2000	2650	230/50	3680
MCL 900	900.000	1.044	90	3	80	2250	2890	230/50	4000

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

### 2.4. Fuel

The MCL 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 chesnut and birch. Low quality wood is poplar and willow.

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

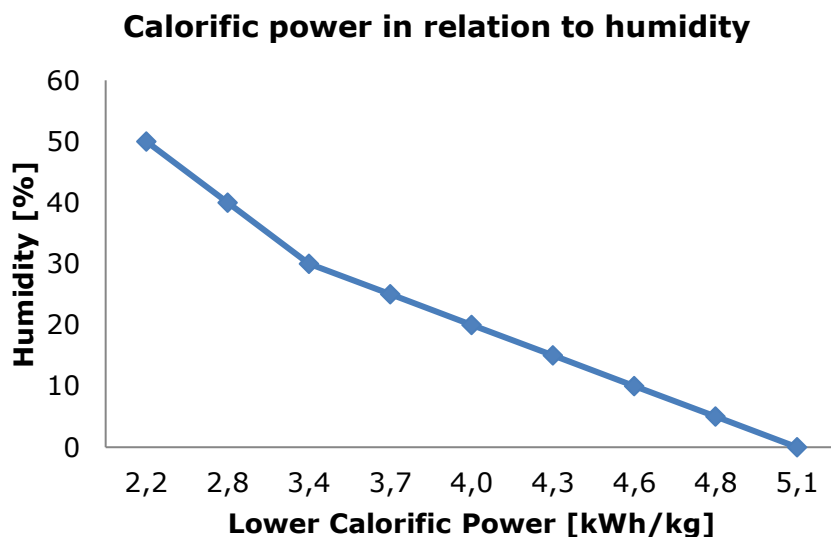
Table 1. Calorific power of different types of wood

Every type of wood contains a significant amount of humidity, which highly affects its combustion behaviour 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%.

## TECHNICAL FEATURES AND DIMENSIONS

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 heterogenous fuel, due to different essences, different humidity contents, shapes and dimensions. This is why the combustion behaviour highly varies through time and average data as fuel consumption, autonomy, and output are very difficult to forecast.



**It is prohibited the use of laminated wood, or other chemical treatment.**



**It is prohibited the use of explosive, inflammable materials, plastic, domestic residues, etc.**

The boiler is provided with a flange for mounting a burner for use with oil or gas as an alternative fuel. However, this option is an emergency alternative, and it is not recommended that boiler is on stable function on oil or gas. The efficiency will be very low on such fuels.

If a burner is mounted, remove it before you use solid fuel again.



**It is prohibited to manually feed solid fuel in the boiler simultaneously with the burner function!**

### 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. A special hook is provided on the upper part of the boiler for lifting.



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

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

- Boiler steel body
- Glasswool insulation mounted on the boiler body and tightened with plastic tapes
- Metal covers mounted on the boiler body
- Turbinators positioned inside the fire tubes
- Control panel and electrical connections
- Fan

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

- Cleaning tools

In the documentation folder you will find:

- Technical manual
- Warranty leaflet

#### 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.



## BOILER MOUNTING

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.

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):

#### Distance from the front wall (N):

For boilers up to 100 kW – minimum 1,5 m

For boilers bigger than 100 kW – minimum 2 m

#### Distance from the rear wall (L):

Appropriate distance for maintenance access. Minimum 0,6 m.

#### Distance from side walls (M):

For boiler up to 300 KW – minimum 0,6 m

For boilers bigger than 300 kW – minimum 1 m

#### Boiler room height (H):

For boilers up to 70 kW – minimum 2 m

For boilers 70 to 230 kW – minimum 2,4 m

For boiler 230 to 400 kW – minimum 3 m

For boiler bigger than 400 kW – minimum 3,5 m

Distance between two boilers (P) must be at least 1m.

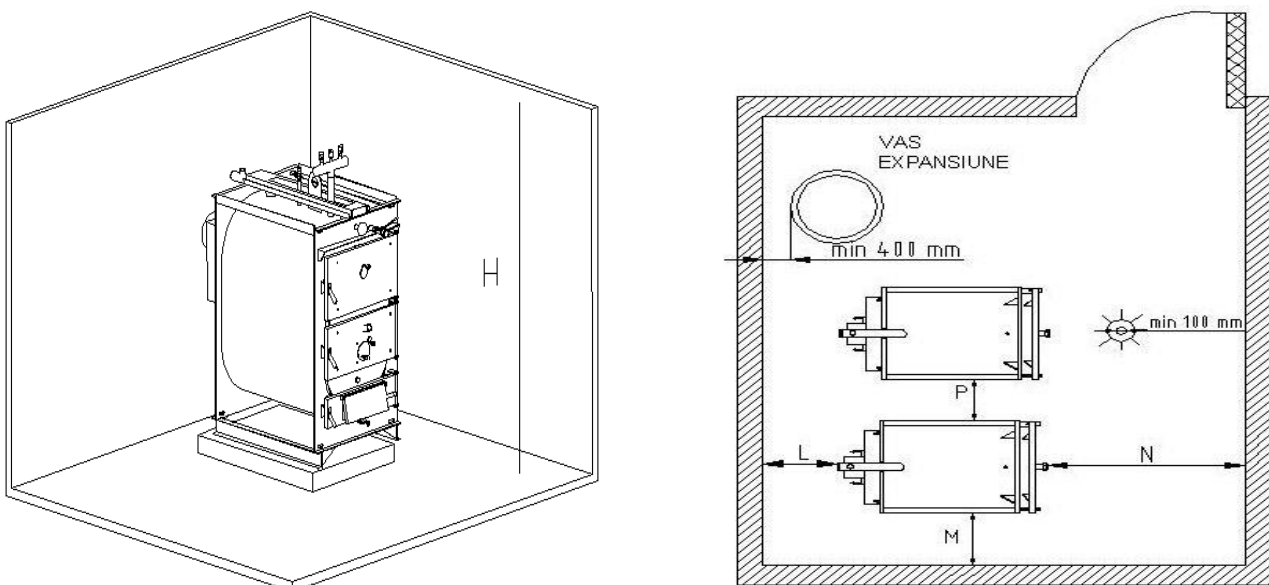


Fig 2. Boiler room dimensions

## 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.

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.

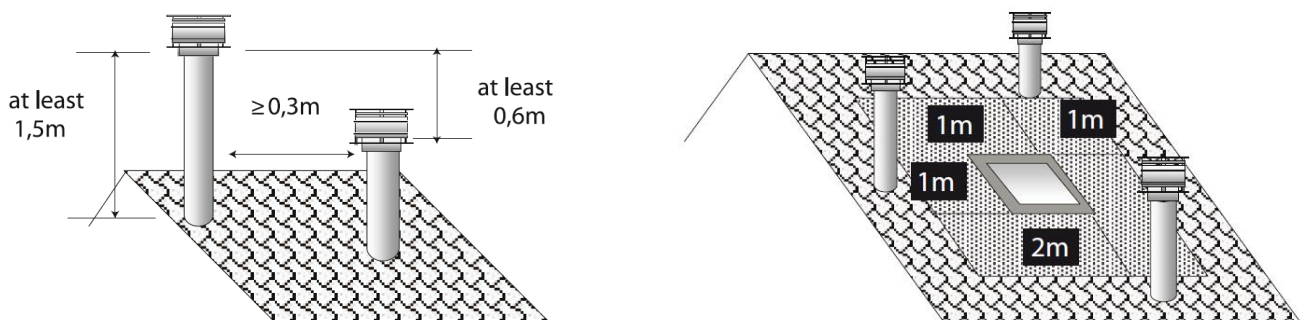


Fig 3. Chimney distances

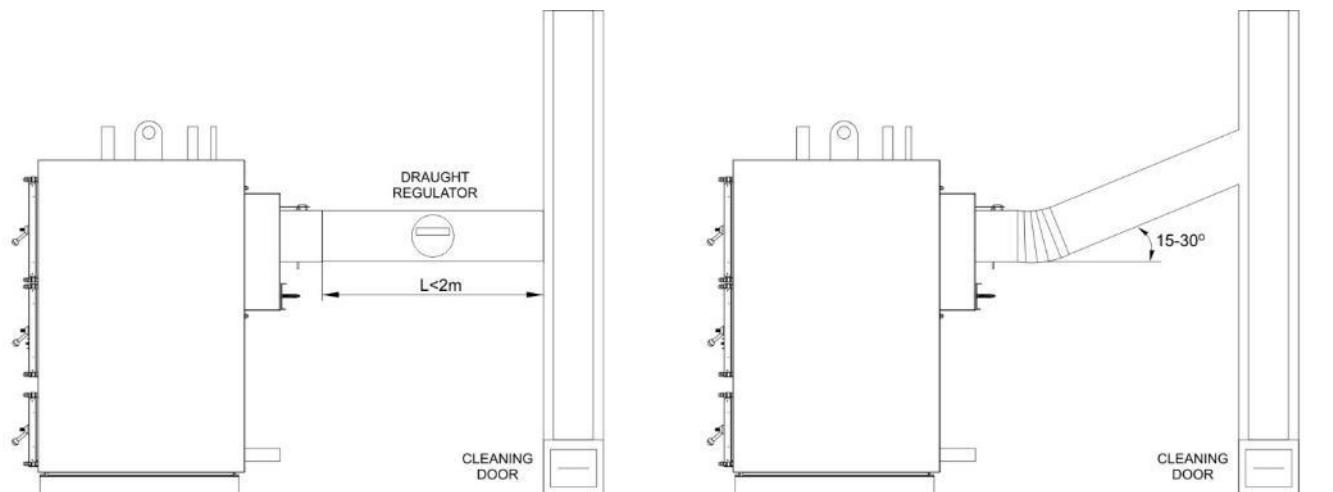


Fig 4. Chimney connection

## 4. INSTALLATION

### 4.1. Hydraulic connections

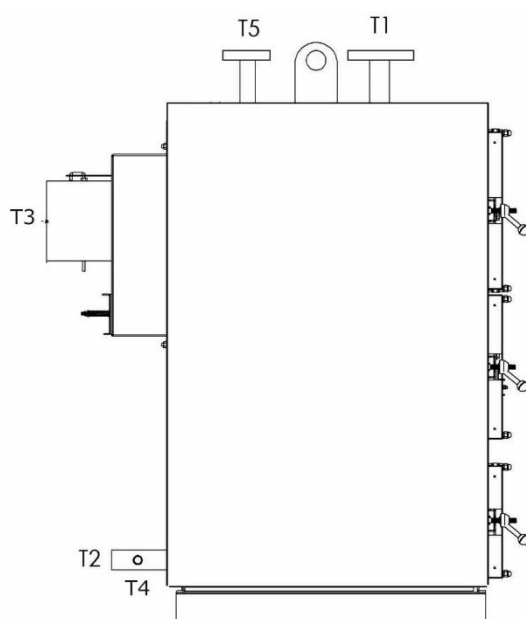
The boiler is intended for connection with an open expansion vessel network. The boiler can be connected also with closed expansion vessel, if it is equipped with an overheating serpentine (optional).

The boiler is intended for maximum working temperature 90°C and maximum pressure 3 bar.

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 Discharge valve connection
- T5 Safety 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.

## INSTALLATION

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 5°GH.**



**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. Overheating serpentine (optional)

As an optional, the boiler can be equipped with an overheating protection serpentine. This is incorporated in the boiler body, surrounding the upper part of the fire chamber.

**For the function of the safety serpentine, a discharge valve must be installed.** The bulb of the valve must be mounted on the boiler's hot water delivery, at maximum distance 1m from the boiler.

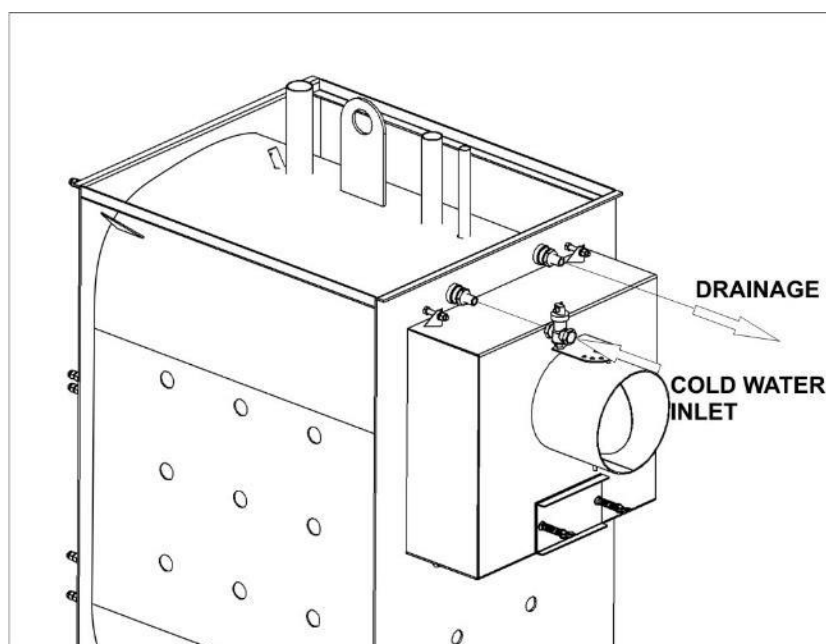


Fig 5. Overheating serpentine connection

The valve can be connected on either side of the serpentine. Attention should be given to the flow direction of the valve. The valve can be fitted on the cold water inlet or hot water outlet. However, we recommend that the valve is fitted on the cold water inlet.

For the protection of the valve, a filter is recommended to be installed on the water line before the valve. On the opposite side of the serpentine, drainage must be connected.



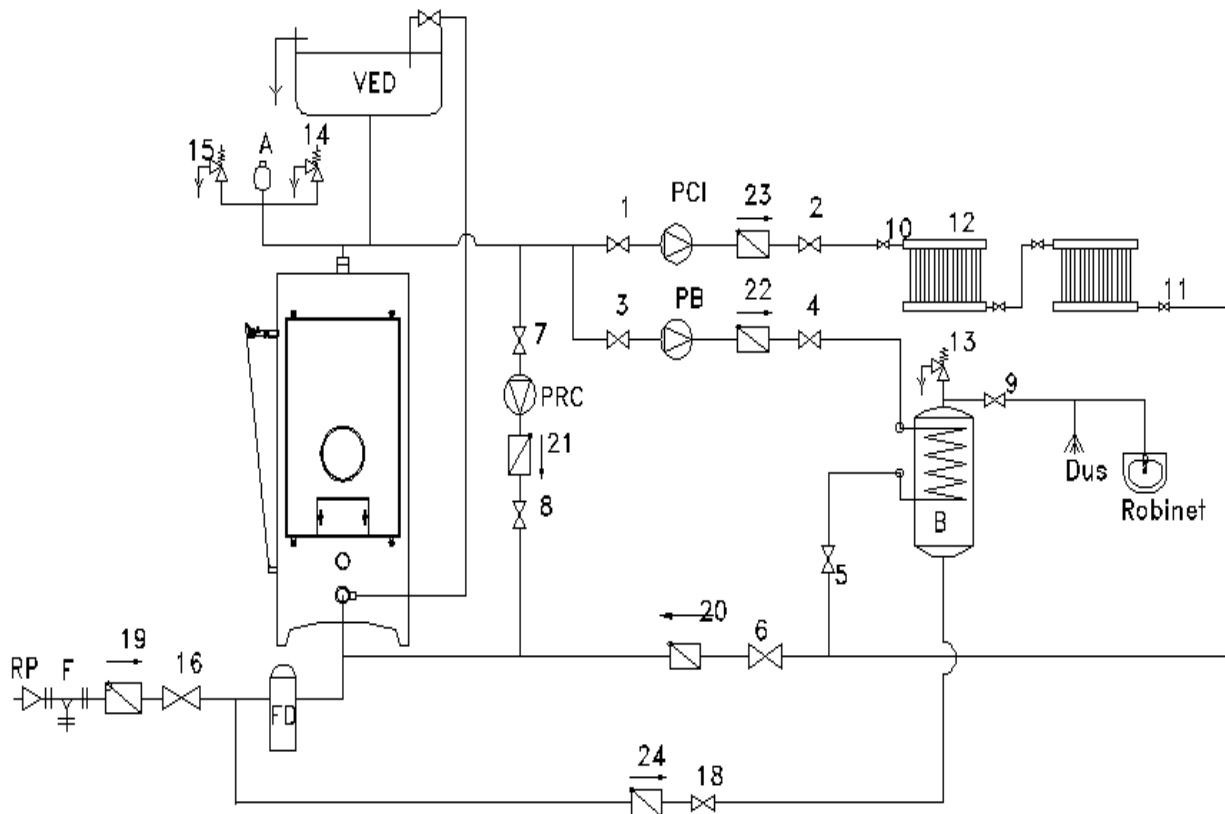
**The correct function of the discharge valve is crucial for the boiler's safety. Verify its function often and replace if defect.**



**For the correct function of the serpentine constant water flow must be ensured! If there is no water flow, an appropriate water tank should be installed.**

## 4.5. Connection diagrams

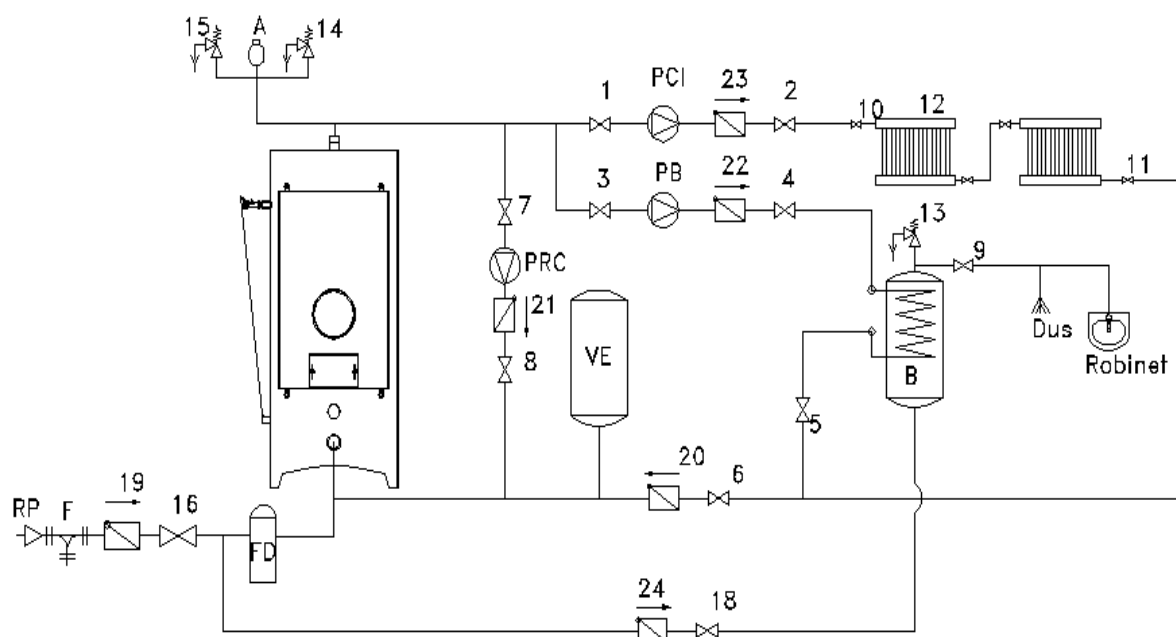
### 4.5.1. Open expansion vessel connection



#### Legend

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

## 4.5.2. Closed expansion vessel connection



### Legenda

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

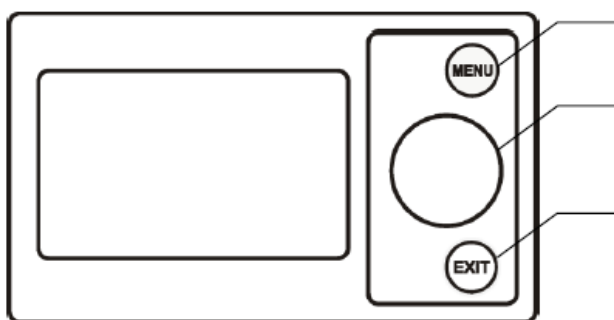
All wiring must be waterproof insulated. Exposed cables should be protected within plastic channel. The main electrical supply of the boiler must be connected to an independent safety of max 16A. The boiler room lighting must be on a separate circuit.



**THERMOSTAHL 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

#### 5.2.1. Description of buttons and display

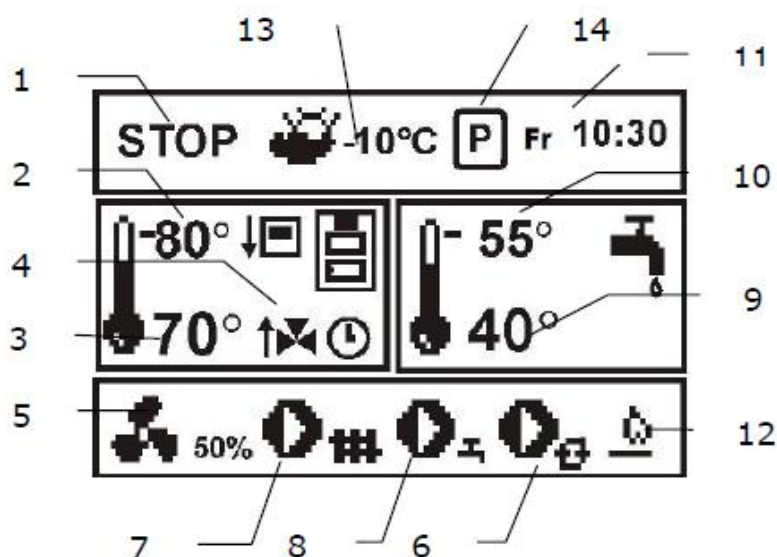


#### Legend

- 1. MENU button
- 2. Control knob with button
- 3. EXIT button

Turning the control knob increases or decreases the edited parameter. This is an element of quick operation of the regulator. Pushing this knob causes given parameter to be edited, or selected value confirmed.

#### 5.2.2. Description of the main display screen



## ELECTRICAL CONNECTIONS

### Legend:

1. Regulator operation mode: STOP, FIRING-UP, OPERATION, SUPERVISION

2. Preset boiler temperature

3. Measured boiler temperature

4. Factors influencing preset boiler temperature:



-symbol of decreasing preset boiler temperature from opening of room thermostat contacts



-symbol of opening room thermostat contacts



-symbol of decreasing preset boiler temperature according to decrease schedule



-symbol of increasing preset boiler temperature for the time of filling hot water tank HUW



-symbol of increasing the preset boiler temperature to fulfill mixer circuit demands



-weather control for boiler cycle is active (only mixer circuits)

5. Fan operation symbol

6. Recirculation pump operation symbol

7. Central heating pump operation symbol

8. HUW pump operation symbol

9. Measured HUW container temperature

10. Preset HUW temperature

11. Clock and date

12. Symbol of lighter

13. External temperature

14. Symbol of boiler regulation mode



PID mods is based on boiler water temperature fan modulation



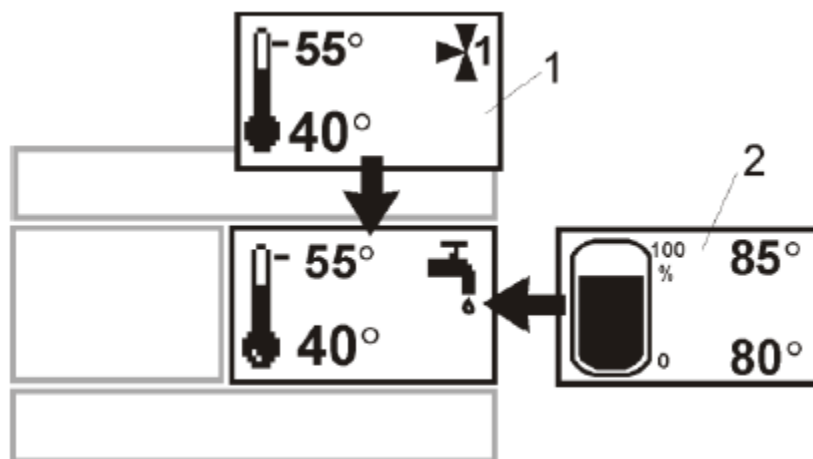
PID-C mode is based on emission temperature (recommended for operating with buffer)



PID-S mode is based on emission temperature and boiler water temperature (recommended for operating without buffer tank)

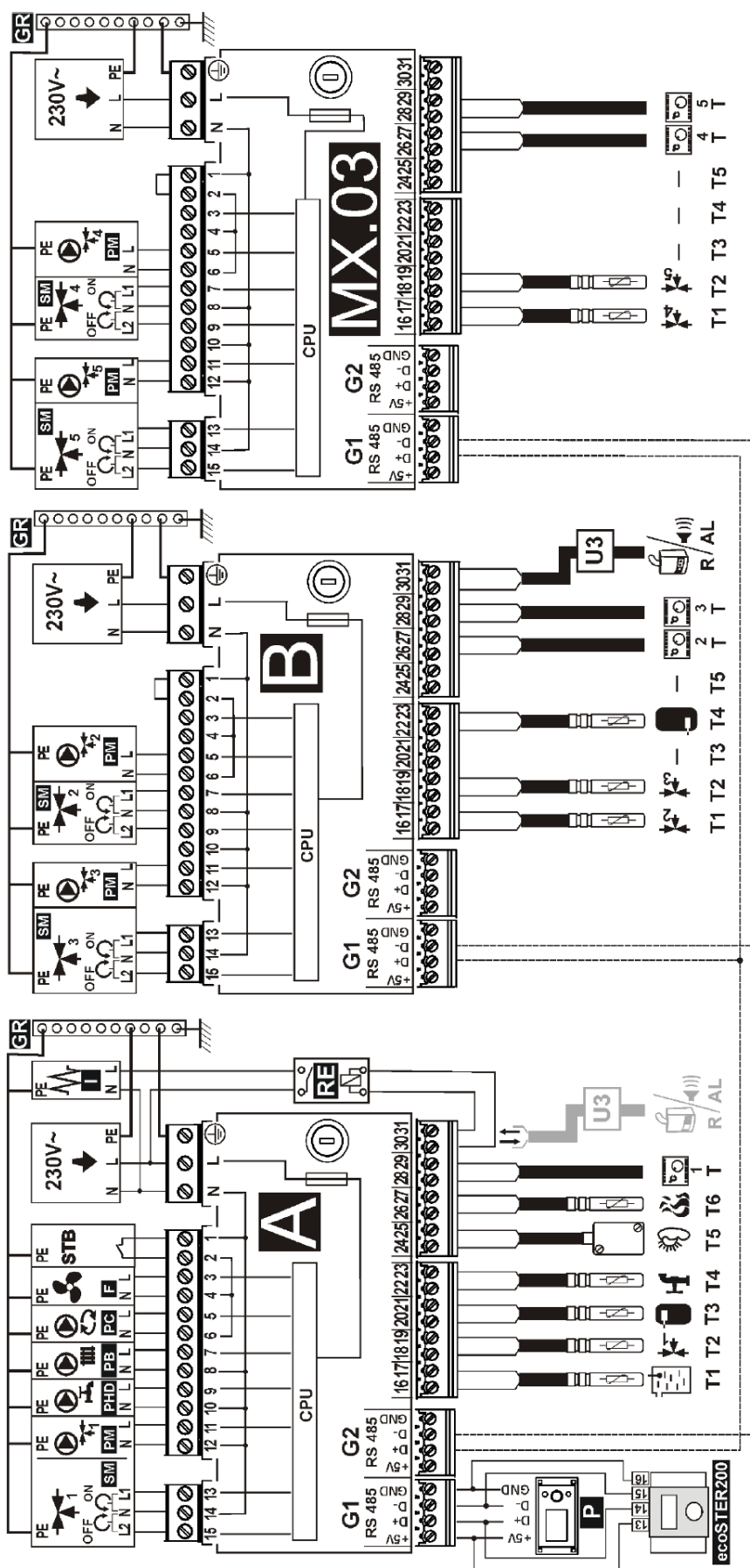
No symbol means STANDARD mode and is based on boiler water temperature without fan modulation

The HUW window on the main display can be switched to a selected mixer circuit (1) or buffer loading indicator (2) by turning the knob. Buffer loading indicator (2) appears only when buffer's lower temperature sensor is connected to the additional B module.





## 5.3. Electrical scheme



**MODULE A:** T1 – boiler temperature sensor CT4, T2 – mixer circuit' s temperature sensor 1 CT4, T3 – buffer' s temperature sensor (upper) CT4, T4 – HUW temperature sensor CT4, T5 – Feather temperature sensor type CT4-P, T6 – emission temperature sensor CT2s, T – room thermostat, R – reserve boiler, RE – transmitter, AL – alarm signaling, P – ecoSTER200 boiler' s control panel – room panel, B –extension module (optionally, two additional heating circuits), 230V~ - Power cord, I – lighter, STB – emergency temperature limiter (disables blow-in), F – fan, PC – circulation pump, PB – central heating pump, PHD – HUW pump, PM – mixer pump, SM – mixer motor, GR – null strip, U3 – transmitter for connecting reserve boiler or alarm (if 30-31 contact is already occupied by lighter, reserve boiler should be plugged to module B)


**MODULE B:** T1 – mixer circuit 2 temperature sensor CT4, T2 –mixer circuit 3 temperature sensor CT4, T4 – Buffer temperature sensor (Lower).

**MODULE MX.03:** T1 – mixer circuit 4 temperature sensor 4 CT4, T2 – mixer circuit 5 temperature sensor CT4.

## ELECTRICAL CONNECTIONS

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

**Standard boiler controller includes MODULE A. Additional moduels are optional.**

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:

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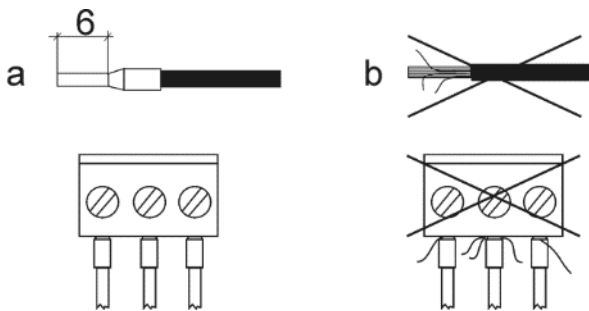
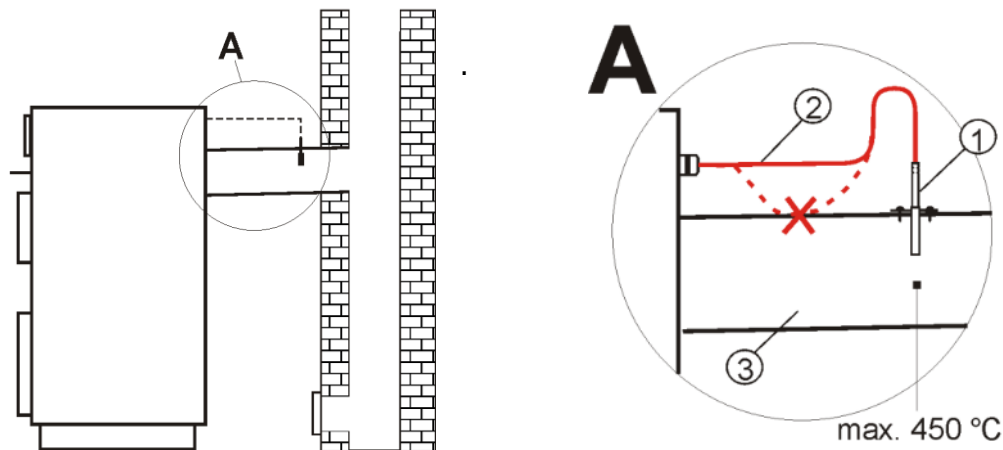


Fig 6. Securing wire tips a) right, b) wrong

### 5.4. 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.

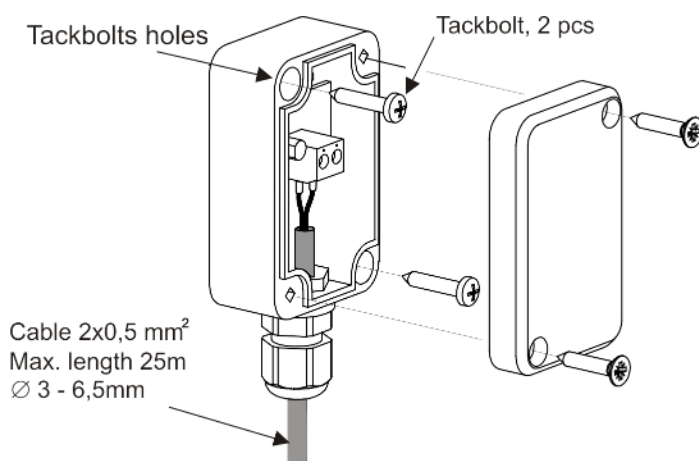
### 5.5. Connecting temperature sensors

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  $0,5\text{mm}^2$ . 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.**

### 5.6. Connecting weather sensor



The regulator cooperates only with a weather sensor of the CT4-P type. The sensor should be installed on the coldest wall of the building, usually this is the northern wall, under the roof. The sensor should not be exposed to direct sunlight and rain. The sensor should be fitted at least 2 m above the ground, far from windows, chimneys and other heat sources which could disturb the temperature measurement (at least 1,5 m).

Connect the sensor using cable of  $0,5\text{ mm}^2$  cross-section, up to 25 m long. Polarity of the leads is insignificant. Connect the other end of the cable to the regulator, as shown in picture.

Attach the sensor to the wall using tackbolts. To access the tackbolts holes, unscrew the sensor lid.

### 5.7. Connecting room thermostat

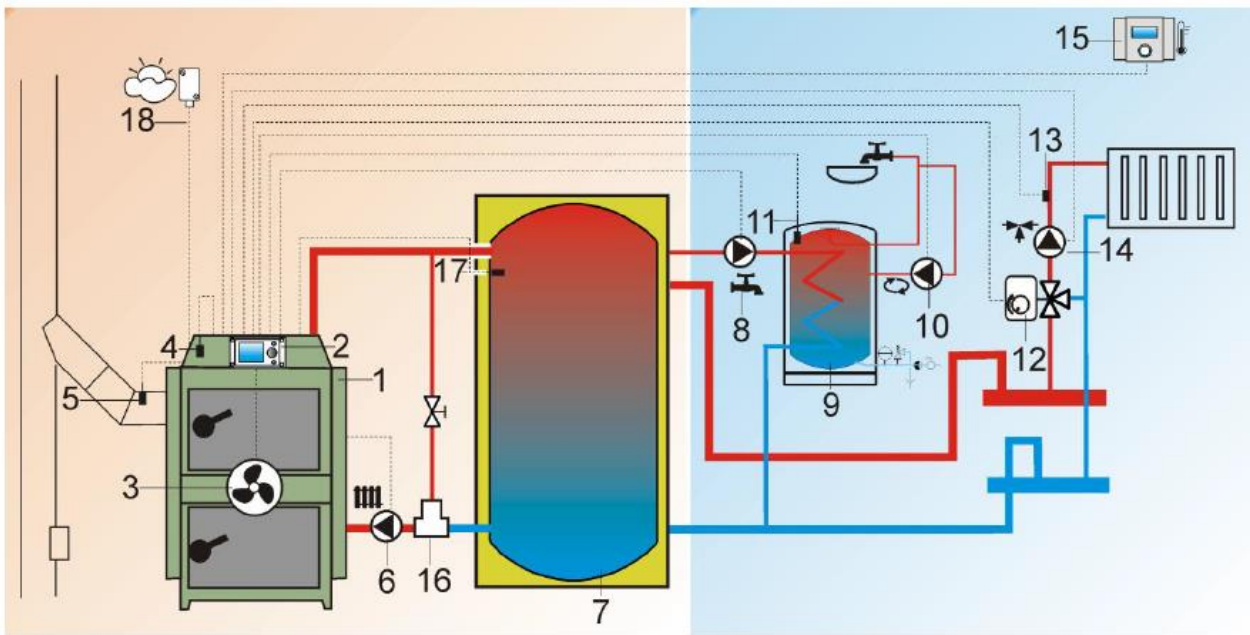


**Room thermostat should be connected to the boiler only if a buffer tank is installed or a the installation is controlled by a mixing valve.**

The regulator works with mechanical or electronic room thermostat, that after registering preset temperature opens its terminals. After installing, room thermostat service should be enabled at: MENU→Boiler settings→Room thermostat→Thermostat service→*enabled*

When a room in which the thermostat was mounted reaches the preset temperature, the regulator will automatically decrease boiler preset temperature by *Reduce preset mixer temperature to thermostat* value. It will cause longer intervals in boiler's operation (activating SUPERVISION mode) and thus decrease of temperature in heated rooms.

## 5.8. Hydraulic function scheme



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

### Basic scheme with buffer tank – without extension modules

1 – boiler, 2 – regulator, 3 – fan, 4 – boiler temperature sensor, 5 – emission temperature sensor, 6 – boiler pump, 7 – buffer, 8 – HUW pump, 9 – HUW container, 10 – HUW circulation pump, 11 – HUW sensor, 12 – mixer circuit motor, 13 – mixer sensor, 14 – mixer pump, 15 – ecoSTER200 room panel with room thermostat function or traditional room thermostat, 16 – thermostatic mixer valve securing the boiler from cold water or Laddomat, 17 – upper buffer sensor, 18 – room temperature sensor.

### 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 MCL boiler follow the next steps:

- Make sure the control panel switch is set to OFF and that fan does not function.
- Make sure the chimney damper is positioned in horizontal position (completely open).
- Open the middle door (feeding door) 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 middle door of the boiler. Open the lower door for natural combustion.
- 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 middle and the lower door and secure with the handles.
- Activate the airflow by pressing the knob to enable OPERATION mode.



**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 turning the fan thermostat to zero. Wait 30 seconds for the fume to exit the boiler.
- Open the middle 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 putting the thermostat to the preset temperature.



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

### 6.5. Operation mode

Enabling OPERATION mode can be done by pressing the knob while in main menu and selecting OPERATION mode. OPERATION mode can also be enabled automatically while in FIRING-UP mode. In OPERATION mode, the device operates the fan accordingly to the selected boiler regulation mode.

The regulator features four selectable methods of regulating the combustion process: STANDARD, PID, PID-C, PID-S. In order to choose the operation mode, press the F button in the main window until

#### STANDARD

This method of adjustment is based on boiler temperature readouts and decreases airflow output from *Maximum airflow output* to *Minimum airflow output* when the boiler is working on reaching its preset temperature. Fan's revolutions are starting to be reduced at 5°C before boiler's preset temperature. After reaching this temperature, SUPERVISION mode is enabled, where air flushes occur.

#### PID



This method is based only on boiler's temperature readouts. It constantly and smoothly modulates fan's revolutions in order to stabilize boiler preset temperature. The regulator adjusts the airflow output itself in such way that the boiler produces minimum necessary amount of heat to maintain required temperature of a building. After boiler preset temperature +5°C is reached, SUPERVISION mode enables, where air flushes occur.

#### PID-C



This method is based only on emission temperature readouts. It constantly and smoothly modulates fan's revolutions in order to stabilize emission temperature. The regulator adjusts the airflow output itself in such way that the boiler maintains constant preset emission temperature. When preset water's temperature in the boiler is exceeded, the regulator enables SUPERVISION mode. **This method is recommended for boilers with heat buffer installation.**

#### PID-S



PID-S algorithm automatically adjusts combustion process, maintaining boiler temperature on preset level, and not exceeding maximum emission temperature at the same time. Note: the regulator does not stabilize emission temperature, but it only limits it. **This method is recommended.** After reaching preset boiler's temperature +5°C, SUPERVISION mode is activated, where air flushes occur.

### 6.6. Firing-up mode

Enabling FIRING-UP mode can be done by pressing the knob while in main menu and selecting FIRING-UP. The fan is activated with *firing-up airflow* power for the *firing-up time*. After *firing-up time* passes or the boiler temperature nears the preset temperature by *fire-up delta temperature* value, OPERATION mode is automatically enabled.

### 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

On factory settings the regulator is set on STOP mode. To start the boiler press the knob. Enabling STOP mode at any mode can be done by pressing the knob while in main menu and selecting STOP mode. In this mode, the fan is deactivated, and the pumps still operate.

### 6.9. Combustion regulation

After completing the fuel loading procedure and closing the door, activate the fan and set the required temperature to the controller. After the fan is activated, have a look at the flame shape and color through the flange provided on the middle door.

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.

The combustion is regulated through the air delivery. By positioning the fan damper you regulate the air pressure and by the control panel speed regulator you regulate the fan speed. The combination of these two will result to the optimum air delivery in order to accomplish perfect combustion.

#### 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.

### 6.10. Chimney damper adjustment

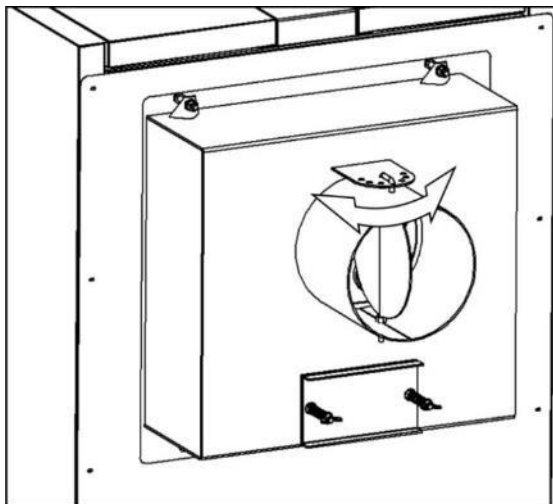


Fig 7. Chimney damper

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.

If a burner is installed, it is recommended that the damper is in completely closed position.



## 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 8.

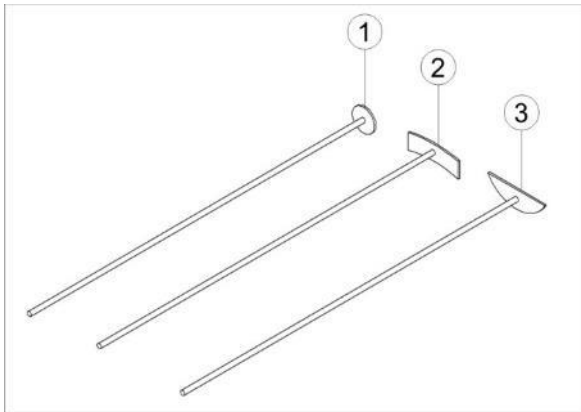


Fig 8. Boiler cleaning tools

#### 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!**

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 9. With the same tool, scrape the ash and any other remains from the side walls of the boiler.

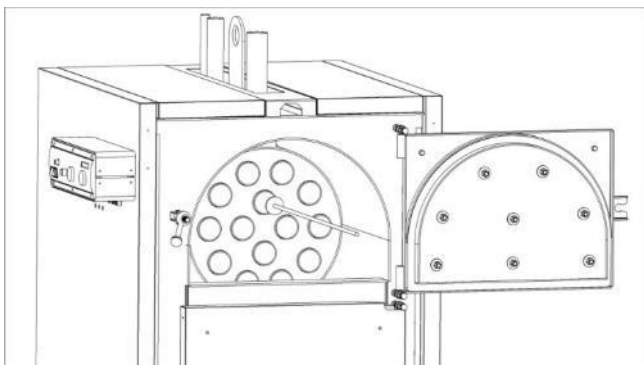


Fig 9. Cleaning of the heat exchanger

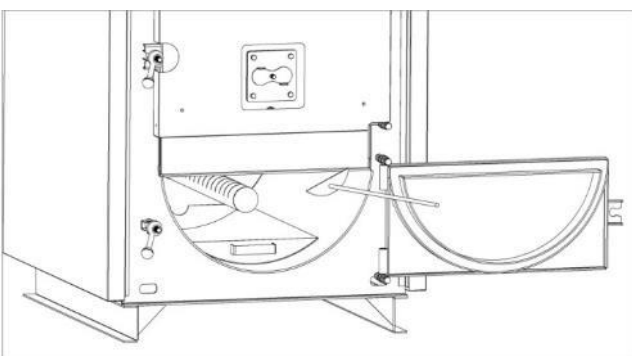
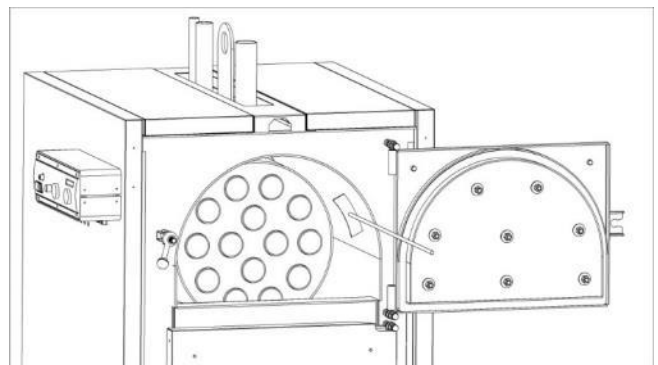


Fig 10. Removing the ash

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.**

### 7.2. Cleaning the chimney box

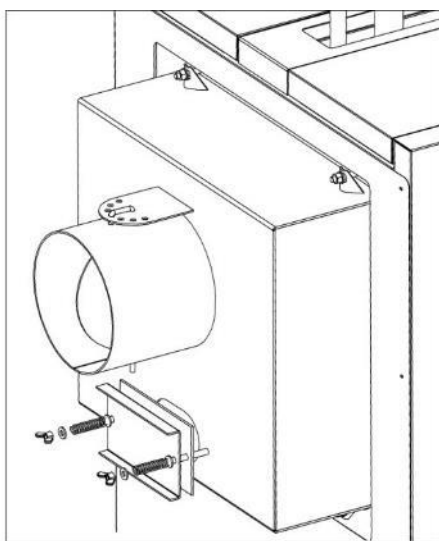


Fig 11. Cleaning the chimney box

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 11. 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.**

### 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. If the boiler is equipped with an overheating protection coil, cold water will enter the coil to protect the boiler.

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

Problem	Cause	Solution
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>

**DECLARAȚIE DE CONFORMITATE EC**  
**CE DECLARATION OF CONFORMITY**  
(conform cu ANEXA VII din Directiva Europeană 97/23/EC)  
(in compliance with the Annex VII of the European Directive 97/23/EC)

Producător / The Manufacturer's name:  
Adresa producătorului / Manufacturer's address:

**THERMOSTAHL ROMANIA SRL**

Str. Drumul Osiei 57-59, sector 6, București, România

**PRIN PREZENTA, DECLARĂ**

*Declares that the equipment*

<b>Tip:</b> <i>Type:</i>	<b>Cazan de apă caldă cu funcționare pe combustibil solid -încărcare manuală</b> <i>Heating boiler for solid fuel, manually stocked</i>
<b>Obiectul declarației:</b> <i>Object of the Declaration:</i>	<b>MCL</b>
<b>Procedura de evaluare a conformității aplicată:</b> <i>Conformity assessment procedure used:</i>	<b>Modul B1 – examinare EC de tip a proiectului</b> <i>Module B1 – EC project type examination</i>
<b>Nr. Certificat CE</b> <i>CE Certificate Nr.</i>	<b>038B1-584/EC, 040B1-584/EC</b>
<b>Număr, denumire și adresa Organismului Notificat care a efectuat certificarea EC de tip a a proiectului :</b> <i>Number, name and address of the Notified Body appointed to the CE certification of project type:</i>	<b>S.C. ISCIR CERT S.A.</b> <b>Notified Body no. 1798</b> <b>Str. Sf. Elefterie, nr. 47-49, parter, sector 5, București, România</b>

**ESTE CORESPUNZĂTOR CU CERINȚELE DIRECTIVEI 97/23/EC-ECHIPAMENT SUB PRESIUNE**  
*MEETS THE REQUIREMENTS PROVIDED BY THE 97/23/EC DIRECTIVE-PRESSURE EQUIPMENT*

**ȘI A URMĂTOARELOR DOCUMENTE:**  
*AND THE REQUIREMENTS OF THE FOLLOWING DOCUMENTS:*

<b>Produsul este conform cu următoarele standarde:</b> <i>The product is in compliance with the following standards:</i>	
<b>EN 303-5:2012</b>	<b>Cazane de încălzit.</b> <b>Partea 5: Cazane speciale care utilizează combustibili solizi, cu încărcare manuală și automată, cu puterea utilă mai mică sau egală cu 500 kW. Terminologie, cerințe, încercare și marcare</b> <i>Heating boilers.</i> <i>Part 5: Heating boilers for solid fuels, hand and automatically stocked, nominal heat output of up to 500 kW</i> <i>Terminology, requirements, testing and marking</i>
<b>Directive Europene aplicabile echipamentului</b> <i>European Directives applied to the equipment</i>	
<b>97/23/EC</b>	<b>Directiva Echipament sub Presiune (HG 584/2004) / Pressure Equipment Directive (PED)</b>
<b>2014/35/EC</b>	<b>Directiva Echipamente de joasă tensiune / Low Voltage Directive (LVD)</b>
<b>2014/30/EC</b>	<b>Directiva Compatibilitate Electromagnetică / Electromagnetic Compatibility Directive (ECD)</b>

Informații suplimentare / Additional information:

Toate echipamentele care fac obiectul prezentei declarații au fost testate hidraulic la presiune de proba egală cu 1,5 ori presiune maxima de lucru, conform cu Anexa I – p. 7.4 a Directivei 97/23/EC.

*As provided by the Annex I - p. 7.4. of the 97/23/CE Directive, all the equipment object of the present Declaration have been hydraulic tested to a test pressure equal to 1,5 times the maximum allowed working pressure.*

Director General  
General Director

**Matsios Dionysios**



România, București, 15 Octombrie 2015

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