



**CENTRAL HEATING BOILER
ON SOLID FUEL**

**KALVIS - 6 MPP
WITH PelIX BURNER**



USER'S MANUAL



LST EN 303-5 GOCT 9817-95
IST 144948958.13:2004

Barcode



To _____

Guarantee servicing request

Having acquainted with fireplace's "Kalvis _____" user's manual (Products No. _____) and having installed it as required I have following claims:

1. _____

I consider it a manufacturing error and I ask you to send your representatives to inspect the fireplace, determine the defects and remove them.

If the aforementioned defects are due to wrong installation and operation of the fireplace I shall cover the arrival costs of your representatives (_____) and the time spent for travel and on site at ____/hour for each representative including the driver.

My address _____ Phone number. _____

Name Surname Signature

Notice: Request should be sent by a registered mail to the address specified in this passport, in case of emergency call specified phone number.

Boiler sold by: Company _____
Sales date: _____
Address _____
Phone _____

Boiler installed by: Company _____
Address _____
Phone _____
Foreman _____
(name, last name, signature)

In case of a breakdown contact Company _____
Address _____
Phone _____

Manufacturer
UAB "Šiaulių tauro kalvis"
Pramonės 15,
LT-78137 Šiauliai, Lithuania
Phone: (+370 41) 540556
E-mail: prekyba@kalvis.lt

ATTENTION!

Get acquainted with this technical certificate before installing the boiler. It shall help you to mount and operate the boiler as efficiently as possible.

1. Basic engineering data

Central heating boiler with pellet burner „**Kalvis-6MPP**“ (hereinafter referred to as the boiler) is used for heating various premises with installed central heating system with enforced water circulation.

Boiler combusts 6-8 mm diameter saw dust pellets, or may be used as a solid fuel (coal, fire-wood) fired boiler, when burner is removed and protection is mounted.

Main technical data

Table 1

Name of parameter		Parameter value	
Fuel fired		Saw dust pellets (max diameter Ø 6-8 mm)	Fire wood, waste wood, coal, saw dust and peat briquettes, coal
Heated area, up to m ²		200	
Fuel load, dm ³		470	50
Max wood length, mm		380	
Combustion duration*:	- wood fired, h.	130	3
	- coal fired, h.		6
Fuel consumption per heating season, pellets /wood m ³		7 - 8	20 - 25
Nominal output, kW		20 - 25	
Efficiency, no less than:	- firing wood, %	80	72
	- firing coal, %		78
Water pressure in the boiler, no greater than, MPa (kgf/cm ²)		0,15 (1,5)	
Water volume in the boiler, l		86	
Water temperature control range, °C		55 – 90	70-90
Minimum recommended water temperature in the boiler during operation, °C		65	
Recommended water temperature during operation, °C		70-90	
Minimum chimney draught, Pa		15	25
Smoke outlet dimensions, mm		Ø198	
Loading dimensions, mm		270 x 400	
Voltage, V		230	
Electric capacity (motor + fan), W		90 + 57	
Electric protection grade		IP 40	
Loading hole dimensions: H×B, mm		270 x 400	
Overall dimensions, not greater than: height x depth x length, mm		1390 x 950 x 2260	
Mass, not greater than, kg		365	

* Combustion duration depends on fuel type and quality, humidity, external conditions and other factors.

Firing wood with moisture content of over 30% is not recommended.

10. Certificate of acceptance

Boiler "**Kalvis-6MPP**" factory No. _____ conforms to requirements of LST EN 303-5, and İST 144948958.13:2004 and is fit for comissioning.

Boiler was tested at 0,4 MPa pressure.

Hydraulic test date _____

Date of manufacture _____

Q/A manager _____

11. Complement

1. Boiler " Kalvis-6MPP "	1 pcs.
2. Draught adjuster C20/25	1 pcs.
3. Grinder	1 pcs.
4. Scoop	1 pcs.
5. Poker	1 pcs.
6. Boiler user's manual	1 pcs.
7. Burner PellX 20kW with fuel pipe	1 pcs.
8. Tank	1 pcs.
9. Burner hole cover	1 pcs.
10. Burner PellX 20kW user's manual	1 pcs.

12. Warranty

12.1. Manufacturer guarantees, that products conforms to reequirements of technical documents and İST 144948958.13:2004.

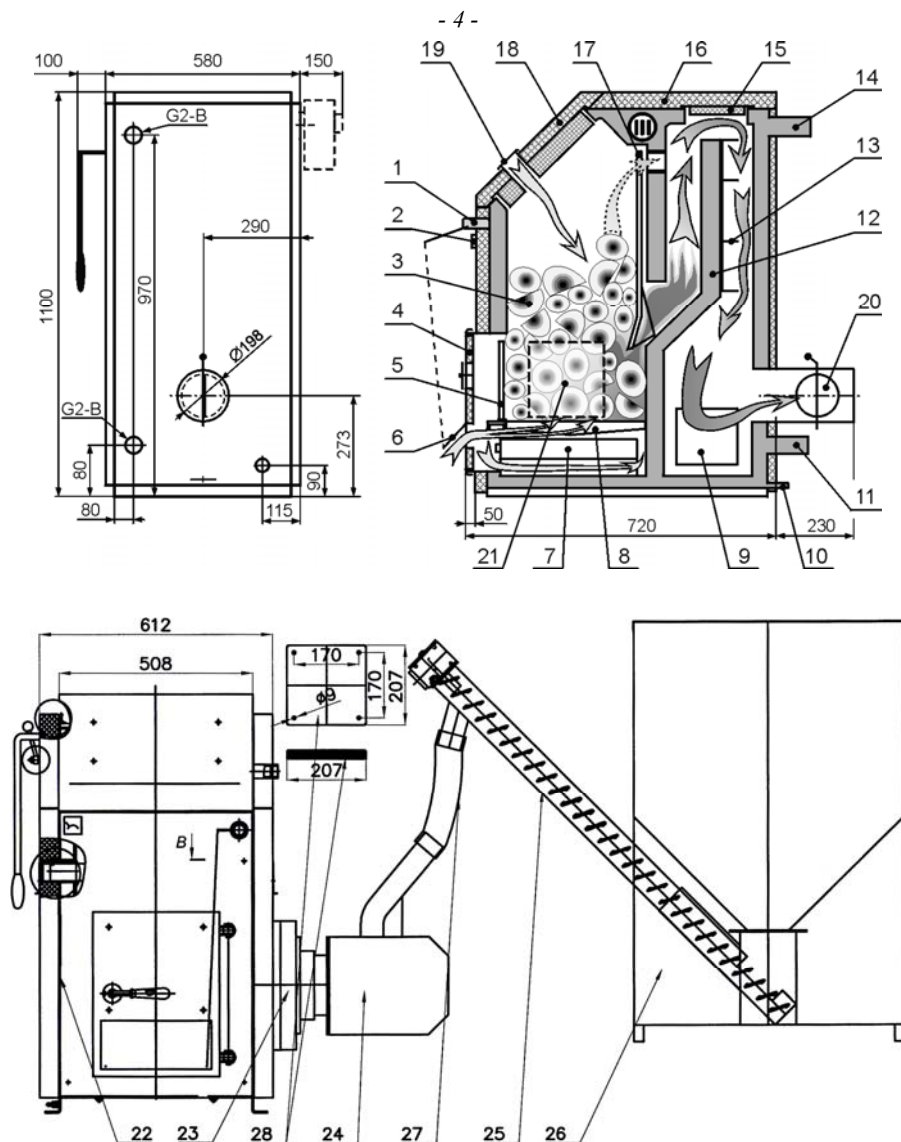
12.2. Manufacturer applies the following warranty terms from the date of sale:

- Boiler frame – 24 mèn.
- Complement – 12 mèn.
- Consumables (para 7) – 6 mèn.

Manufacturer is obliged to remove all the malfunctions appearing due to manufacturer's fault during this period, unless user has violated transportation, storage, connection or operation and servicing requirements.

I am acquainted with rules of installation and servicing and guarantee policy:

Purchaser: _____
(name, last name, signature)



1 fig.

1.Draught adjuster. 2.Thermomanometer. 3.Fuel load. 4.Door. 5.Door. 6.Air damper. 7.Ash tray. 8.Fire grate. 9.Cleaning holes. 10.Water drain pipe. 11.Return water pipe. 12.Internal partition. 13.Dispenser. 14.Hot water pipe. 15.Service cover. 16.Isnulation shields. 17.Catalyst plate. 18.Fuel loading cover. 19.Secondary air valve. 20.Draught damper. 21.Burner mounting hole. 22.Boiler. 23.Burner door. 24.Burner. 25.Fuel pipe. 26.Tank. 27.Hose. 28.Burner hole cover.

User may purchase consumables from manufacturer of the boiler.

Use only manufacturer's spare parts

8. Fuel types and properties

Combustion heat of absolutely dry wood does not depend on the kind of wood and equals 4510 kcal/kg. So in order to compare different kinds of wood we need to assume their relative weight. 1m³ weighs:

- oak wood - 500 kg;
- birch wood - 450 kg;
- fir wood - 330 kg;
- asp wood - 330 kg.

The higher wood humidity – the less calorie value. Decrease in calorie value of humid wood in comparison to 20% humidity wood:

- 30 % humidity - 10 ÷ 15 %;
- 50 % humidity - 35 ÷ 40 %.

Fresh cut tree has about 35 ÷ 60 % water. Wood cut in the beginning of winter or hard wood has least water.

Peat and wood calorie value is similar.

1 kg of coal gives 2 ÷ 3 times more heat than 1 kg of wood.

Combustion of 1 kg of wood requires 4 ÷ 5 m³ of air, coal – around 10 m³.

The more ash is left – the worse fuel is.

Energy radiation from combusting 1 dm³ of wood of 20 % humidity:

Wood type	Kcal	Kwh	Comparison to oak %
Oak, maple	2520	2,93	100 %
Ash	2460	2,86	98 %
Birch	2270	2,64	90 %
Alder	1900	2,21	75 %
Pine	1850	2,15	73 %
Asp	1810	2,10	72 %
Polar	1680	1,95	67 %
Fir	1610	1,87	64 %

Average coal caloric value 6500 kcal/kg (7,56 kWh/kg).

9. Operating burner.

Boiler uses PelIX pellet burner. Operating burner is described in pellet burner PelIX user's manual.

2. Design description

Boiler design is constantly improved. There may be minor deviations from this manual.

Boiler frame is welded from steel sheets and has water cavities where water is heated (see 1 fig.). Internal walls are 6 mm thick, external – 4mm. Boiler exterior is covered with insulation shields (p.16). In the front of the boiler there is a draught adjuster (p.1), that controls air damper (p.6); thermomanometer (p.2), doors (p.4), with servicing doors (p.5) behind them and an ash tray (p.7). Fuel loading chamber is closed with a cover (p.18), with installed secondary air valve (p.19).

In the chamber there is a catalyst plate (p.17) and fire grate (p.8). For servicing of internal boiler surfaces, under the top insulation shield (p.16) there is a cover (p.15). Catalyst plate (p.17) should be removed when firing coal.

On the sides of the boiler there are covers (p.9) used to remove the ash.

On the back side of the boiler there are drain water (p.10), return water (p.11) and hot water (p.14) pipes with G2-B thread; smoke outlet with smoke damper (p.20).

Burner (p.24) is mounted on boiler's burner door (p.23). Burner has a separate manual. Fuel pipe (p.25) supplies granulated fuel from the tank (p.26). Burner and fuel pipe are connected by a hose (p.27). Burner hole cover (p.28) is mounted when firing wood.

It is prohibited to alter the design of the boiler.

3. Transportation and storage.

Transport boilers only in vertical position by all types of covered transport. Transporting by not covered transport is possible only when the weather is dry. Use additional protection means to protect boilers against fall downing and scratching. Striking, turning over or throwing boilers during loading, unloading or transportation time is strictly prohibited.

The boilers are to be stored in the dry rooms, where there is no vapour of chemically active materials.

4. Boiler mounting

Boiler should be mounted in premises, complying with the requirements of RSN-159-95 or RPST-01-97 and according to the rules of installation of solid fuel boilers in premises ST 8860273.02:1998.

Boiler should be mounted vertically, or with forward inclination not exceeding 1°. Exhaust cover should be mounted above the boiler.

When boiler is mounted outside the territory of Lithuania, mountign and installation should proceed according to relevant national regulations.

4.1 Fire precautions:

- * Boiler should be placed on an incombustible material;
- * If boiler is connected to the chimney by metal pipes, pipes should not be thinner than 1,5mm and they have to be covered by thermal insulation

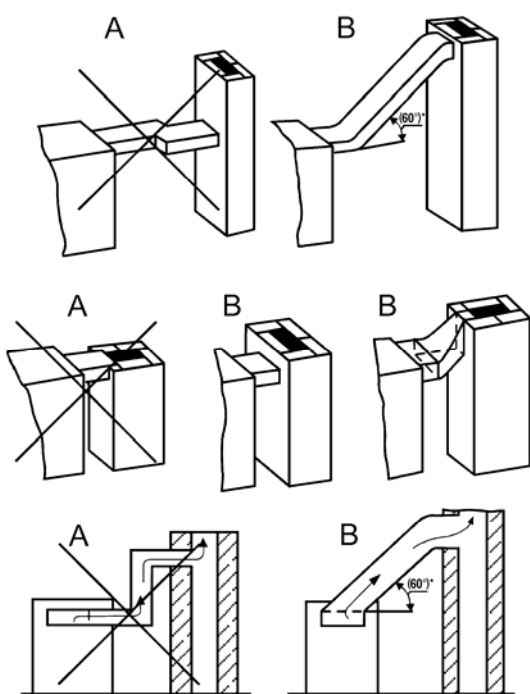
Attention !

When chimney's draught is too great and sawdust is used for fuel sparks may fly out through the chimney.

It is prohibited to use sawdust for fuel, if the distance between chimney and flammable roof or other flammable structures is less than 20 m.

4.2. Requirements for chimney:

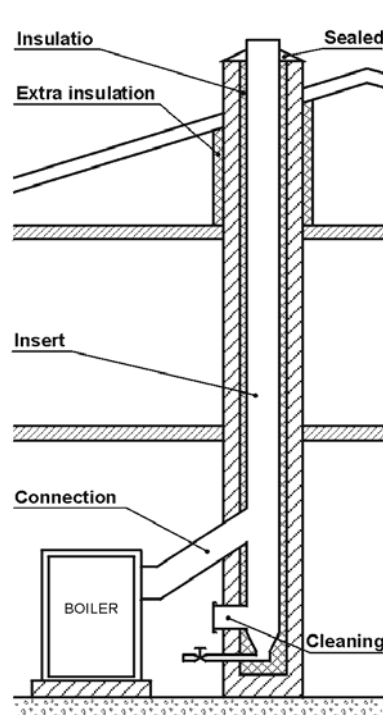
Chimney design and boiler connections into it are shown on the fig 3a, 3b and 3c.



3a fig.

Boiler to chimney connection.

* not less than 60° A - incorrect B – correct



3b fig.

Chimney insert installation

Error	Reason	Solution
Boiler overheats	Too intense combustion. Power outage (for systems with enforced circulation)	Close air supply. Monitor boiler temperature. When temperature drops return to regular combustion mode.
Power outage		Call serviceman. In case of a risk of system freezing, during prolonged power outage, drain water from the boiler
Boiler does not reach nominal output	Humid fuel. Insufficient draught.	Use dry fuel. Check chimney draught, clean the chimney.
Boiler „weeps“	Bad fuel. Too low return water temperature (>57°C !).	Use dry fuel. Adjust mixing valve.
Too high pressure	Boiler overheats. Protection valve malfunctions.	Close air supply, monitor water temperature. Check and replace protection valve.

6. Safety precautions

Prohibited:

- Disassemble boiler or electric installation;
- Connect boiler to the system without protection valve, that keeps pressure in the system below 0,15MPa (1,5 kgf/cm²);
- Close hot or return water valves when boiler is operated;
- Store dry fuels or other combustible materials close to or on top of the boiler;
- Store fuel closer than 500 mm to boiler;
- Ignition fuel with combustible liquids (petroleum, kerosene etc.);
- Operate boiler with doors and covers open;
- Open burner while boiler is operated;
- Allow children to be by the working boiler without adult supervision;
- Operate boiler without having it grounded;
- Rapidly open loading doors during combustion (open a little, wait, then slowly open wide);
- Operate boiler with tank cover opened or non hermetic pellet supply hose;
- Clean or service boiler when electric power is on.

7. Consumables

Fire grate and cast iron door may burn up, especially if user combusts coal, servicing door and servicing cover fiber gasket may wear out.

Boiler premises have to be well ventilated.

Recommended fuel humidity not greater than 15-20 %.

Notice. At the start of operation, until there is no soot layer on the internal boiler surfaces, during combustion a water condensate may form, giving the impression that boiler is not tight. Water vapour condensate will disappear when water temperature in the boiler reaches 70-80°C. It is recommended to keep water temperature in the boiler as high as possible. When water temperature is below 55°C condensate will form intensely and may cause a corrosion. In order to avoid low temperature corrosion, it is recommended to have an accumulation tank installed into a heating system, in order to fire boiler at maximum output..

5.4. Mounting and adjusting the draught adjuster

Draught adjusters manufactured by Swedish ESBE C20/25 with protection from boiler overheating or without it are used. Adjuster is turned into a socket, scotch tape is used for sealing, Attach chain to air supply damper.

When boiler heats up to 70°C, adjust adjusters handle to position "4" and shorten the chain so that, air supply damper is closed. Turning adjuster to the correspondent position sets desired temperature. Position "6" corresponds to 90°C. Temperature increment between positions is 10°C.

5.5. Boiler cleaning (1 fig.)

To ensure optimum boiler performance slag has to be removed from the burner and ash has to be cleaned from the internal boiler's surfaces and ash tray..

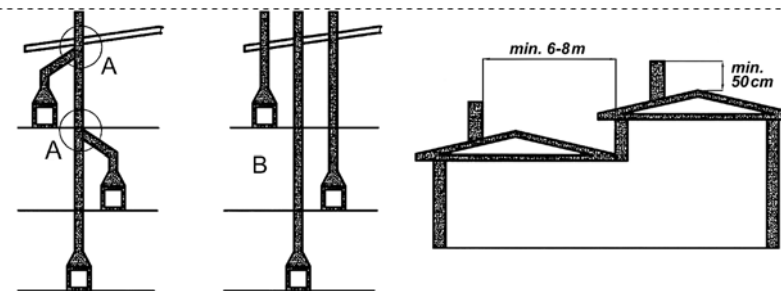
Intervals between boiler cleaning depend on fuel type and quality (especially humidity), combustion intensity, chimney draught, etc. It is recommended to clean internal surfaces when soot layer on heat exchanging surfaces is no greater than 3mm. Remove service covers (p.4), dampers (p.3; p.10) and carefully clean boiler surfaces.

Use special chemicals for hard residue cleaning.

Clean chimney at least once a year before heating season.

5.6. Troubleshooting

Boiler is protected against excessive pressure by protection valve and expansion tank mounted in the system.



3c fig.

Requirements:

- Chimney draught has to be no smaller than 22 Pa;
- Chimney hole's cross section should be not less than 120 x 270 mm;
- Boiler needs a separate hole for the chimney connection. No other connections through that hole are allowed
- If chimney is connected with additional elbow, it's cross section has to be not less than that of the boiler smoke pipe, and bending radii not less than 100mm;
- Pipe from the smoke pipe to chimney has to be not longer than 1,5 m and lean upwards toward chimney;
- Joints have to be well sealed;
- Chimney hole has to be well cleaned.

Necessary to know that:

- Smoke continues to cool in the chimney, vapor condenses on the chimney walls, especially in the unheated loft and on the outside of the building;
- Condensate acids and erosion may destroy the chimney in few years;
- Uncleaned soot in the chimney may self-combust and become the cause of fire.

Recommended:

- Mount an insert into the chimney. Well mounted insert protects chimney from condensate influence;
- Insert should not significantly decrease the cross section of the chimney;
- Insert parts should be well joined together (no soldering);
- Condensate collector and drainage should be arranged in the bottom;
- An incombustible material should insulate the cavity between the insert and chimney. Top slit should be hermetically sealed;
- In the unheated loft an incombustible material should insulate chimney.

4.3. Connection to heating system

Recommended connection method is shown in the 4a-4d fig

- Boiler may be connected to the heating system according to the project prepared by heating equipment specialists or works may be performed by a well qualified plumbing welder who is well acquainted with this manual and boiler design
- Boiler should be connected by hot and return water pipes not smaller than 1.5" in diameter
- Boiler may be connected to the heating system with the expansion tank, where operating pressure does not exceed 0,15 MPa (1,5 kgf/cm²);
- If system pipes have valves, that disconnect boiler from the system, mounted, they have to be fully opened. To avoid break down due to inadvertence, valve handles should be removed.
- It is necessary to mount the protection valve that keeps the operating pressure in the system not greater than 0,15 MPa (1,5 kgf/cm²).
- In order to avoid forming of condensate, which can significantly shorten the lifespan of boiler, it is necessary to install a four way mixing valve, or thermostatic valve in the system (see recommended connections), which will maintain return water temperature above 55°C;
- It is recommended that boiler is inspected at least once a year by a competent plumbing engineer;
- Water draining pipe is used to let the water out of the system when there is a risk of freezing.

When boiler operates at smaller than nominal output, its efficiency and environmental performance drops. It is recommended to use connections with accumulation tanks (see. 4c, 4d fig.). Minimum volume of accumulation tank is quoted according to the formula provided in 4d fig.

Mounting of burner and fuel tank with fuel pipe is described in *PellX 20kW* user's manual.

5. Operation

Adults that are well acquainted with the design and users manual may operate and service the boiler.

Attention! *When firing humid fuel or saw dust, condensate and combustion products may form aggressive acids that may shorten the lifespan of the boiler significantly.*

It is prohibited to fire boiler with fine waste wood, due to explosion risk.

5.1. System preparation for heating

Fill system with softened or desalinated water and let the air out. Check if valves disconnecting boiler from the heating system are fully opened and remove their handles.

5.2. Firing pellets

Boiler firing with pellets is described in Pellet burner *PellX 20kW* user's manual.

5.3. Firing boiler with solid fuel (1 fig.)

Open damper (p.20), load some wood through door (p.5) on the fire grate and ignite it. If coal will be fired, take 5 - 10 kg of wood and add a layer (about 10 cm) of coal. Secondary air valve (p.19) has to be closed.

When fuel is well ignited, loading chamber may be filled with fuel (wood, coal). Finer wood increases boiler output. Chimney draught is adjusted with damper (p.20).

Wood should be loaded freely, so that it is able to slide down during combustion.

Coal is added in layers, depending on desired heat output and quality.

Catalytic plate should be removed when firing coal.

Adding fuel:

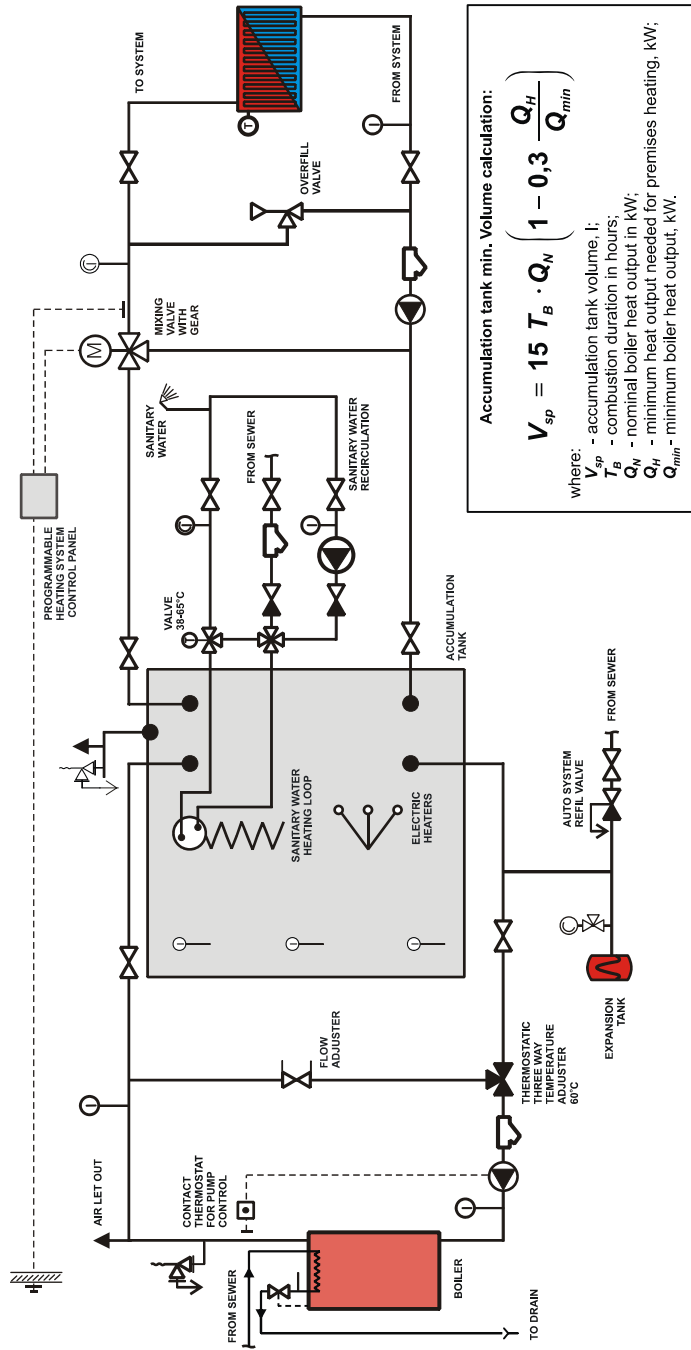
- Open door (p.4) and check if ash is not blocking fire grate air gaps. Shake the bottom fuel layer, close door in 15...20 seconds;
- Remove draught adjusters (p.1) chain from the door damper (p.6), so that the damper is closed tight;
- Carefully open fuel cover (p.18), in 5...10 seconds open cover fully and add fuel;
- Close fuel cover;
- Attach adjuster's chain to the damper.

Secondary air valve (p.19) is opened when temperature in the boiler rises to 60°C. Valve's position is adjusted depending on the fuel type and combustion intensity.

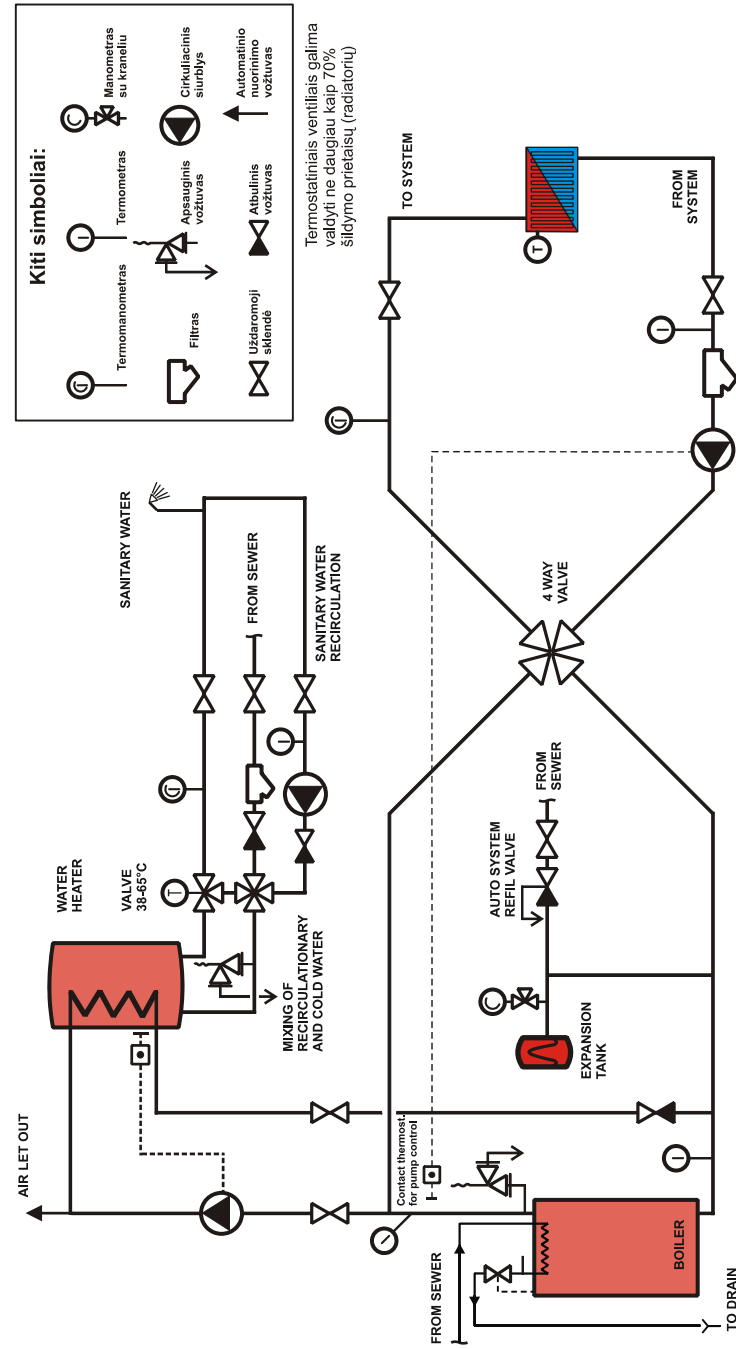
Check the smoke color out of chimney. Smoke should be thin of a light grey color. If smoke is thick and black it means incomplete combustion, not enough secondary air. Open secondary air valve.

As a part of combustion process ash is formed, it blocks the openings in fire grate, boiler capacity and combustion intensity drops. Move the fuel and ash by pressing the pedal of the fire grate mover. Excess of ash in an ashtray blocks primary air supply, that is why ash needs removal.

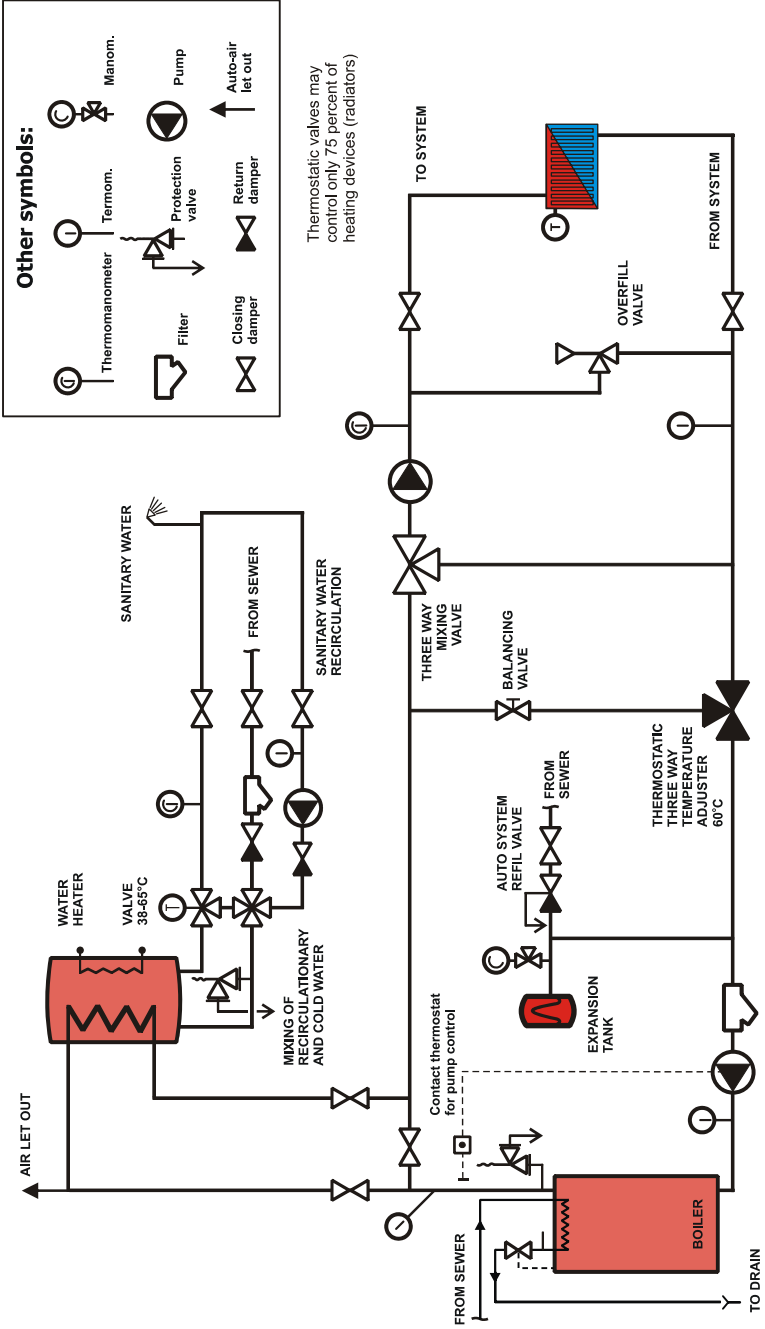
Unless there is a necessity it is not recommended to open fuel loading doors during combustion.



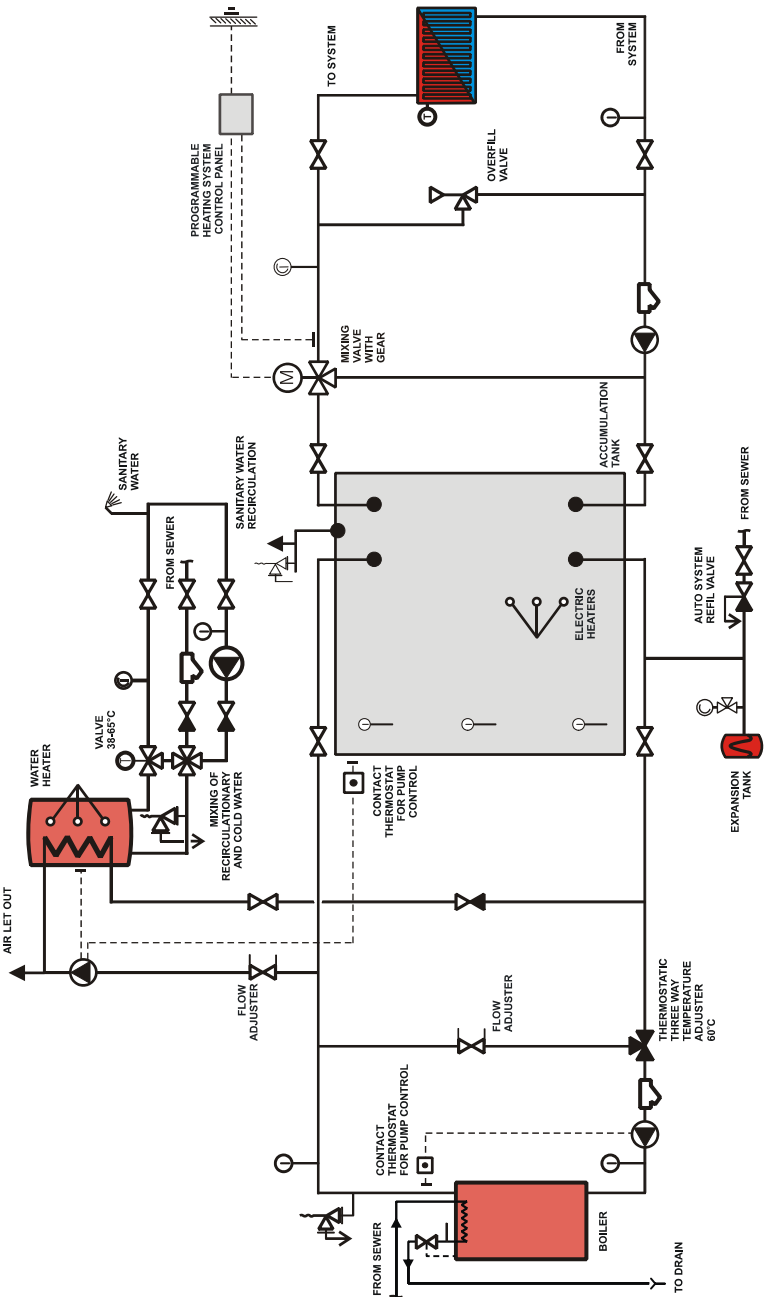
4d fig.
Recommended local heating system schema with the 3 way valve and accumulation tank.



4a fig.
Recommended local heating system schema with the four way valve.



4b fig.
Recommended local heating system schema with the 3 way valve.



4c fig.
Recommended local heating system schema with the 3 way valve and accumulation tank.