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Manual

Installation and operation
"B"-series hot water boilers
on solid fuel, pellets and biomass



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INSTALLATION, OPERATION AND MAINTENANCE MANUAL

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INSTALLATION, OPERATION AND MAINTENANCE MANUAL

WARNING!

BEFORE INSTALLATION AND EXPLOITATION OF THE BOILER, YOU NEED TO READ AND USE THIS MANUAL. FAILURE TO FOLLOW THE INSTRUCTIONS DESCRIBED BELOW MAY RESULT CONSEQUENCES FOR WHICH "LIMES INNOVATION" EOOD IS NOT RESPONSIBLE.

In correspondence with the manufacturer, please provide the following information:

1. *Boiler power;*
2. *Serial number of the boiler;*
3. *Year of manufacture;*
4. *Date of purchase;*
5. *Detailed description of the potential damage*

1. Operational instructions

Dear owners of the "B" series boilers produced by "Limes Innovation" EOOD Silistra.

We would like to congratulate you for the right choice when purchasing this highly efficient product that will bring you comfort at optimized fuel consumption, leading to saving resources and helping to protect the environment.

The following pages will provide you with the essential information and advice on the correct operation of the system, its function and maintenance. **Before installing the boiler, please see details of the current instruction manual.**

1.1. Safety instructions

The "B" series hot water boiler meets all the requirements and provisions of safety equipment. All accessories of your boiler operate using 220-230V AC electricity. Faulty electrical installations or repairs may endanger the lives of consumers. Installation of the boiler must be carried out by professionals with the appropriate qualifications.

IMPORTANT:

- Work on the heating system can be carried out only by persons who are authorized by the competent authorities.
- Work on the electrical installation must be carried out by professional electricians.
- When working with the equipment, follow:
 - legal regulations for technical safety
 - legal regulations for environment protection
 - professional installation regulation

"B" series hot water boilers are equipped with a safety valve that is designed for the removal of excess heat so that the temperature in the boiler does not exceed 95°C.

Upon detection of any damage, the boiler must be removed from service to repair the damage by a specialized company. To ensure continuous operation of the boiler it is necessary to carry out prevention of boiler and heating system at least once a year.

Malfunction resulting from unqualified installation, unqualified repairs, non-compliance with the instructions and manual, are not responsibility of the manufacturing company and are not warranty covered.

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1.2. Boiler function

"B" series hot water boilers are a heat source for heating homes, agricultural buildings (greenhouses, small poultry, livestock buildings), houses, small family hotels, factories and other similar premises. The heating system can be open-ended or by expansion vessel, with a separate or forced circulation of water with a maximum pressure of 2 bar.

Proper operation of the boiler is determined by both the professional performance of the installation and proper maintenance of the system.

1.3. Fuel

"B" series hot water boilers are designed to burn wood with a maximum moisture content of 20%, obtained from logs with a maximum diameter of 200 mm and a maximum length of 500 mm, chopped firewood, briquettes and coal.

When fitted with the appropriate pellet burner, the boilers can burn wood pellets in accordance to EN 14961-2: 2010 standard Class ENplus-A1 with the following key features:

Table 1
Recommended fuel - wood pellets

Parameter	Measure	Value
Pellet diameter	mm	6÷8
Pellet length	mm	3,5÷40
Pellet recommended calorific value (lower calorific value)	MJ/kg	>17,2
	kWh/kg	>4,7
Pellets category	A, AB, B	
Dry mass ash content	%	≤ 0,6 ÷ ≤ 1,0
Humidity	%	max 8 ÷ 10
Mechanical resistance DU	%	> 97
Bulk density	kg/m³	600

Pellets should be stored in a suitable dry place, in order to achieve smooth operation with optimum combustion and maximum efficiency.

1.4. Boiler description

The boiler is a welded construction of steel sheet brand St 237 JRG2, accordance to DIN 10 025 and seamless steel tubes brand St 37 in accordance to DIN 2448. In the bottom of the boiler is located the combustion chamber and in the upper part is the tube bundle. The combustion chamber and heat exchanger tubes are surrounded by a water jacket. At the bottom of the combustion chamber are placed stationary grills, under which is located an ashtray. The number of tubes in the tube bundle their diameter and the size of the combustion chamber are defining the output power of the boiler. The flue gases through the front and rear smoke box pass twice through the tube bundle and giving its heat and lead to smoke outlet ducts. The primary air flow is controlled manually or by a regulator valve which controls the door.

Inlet and outlet of the heating water is carried out by nozzles, the amount of which is dependent upon the capacity of the boiler and is shown in Table 2.

The 'B' series steel hot water boilers are available in two versions:

- Standard boiler for solid fuel (wood, briquettes, coal);

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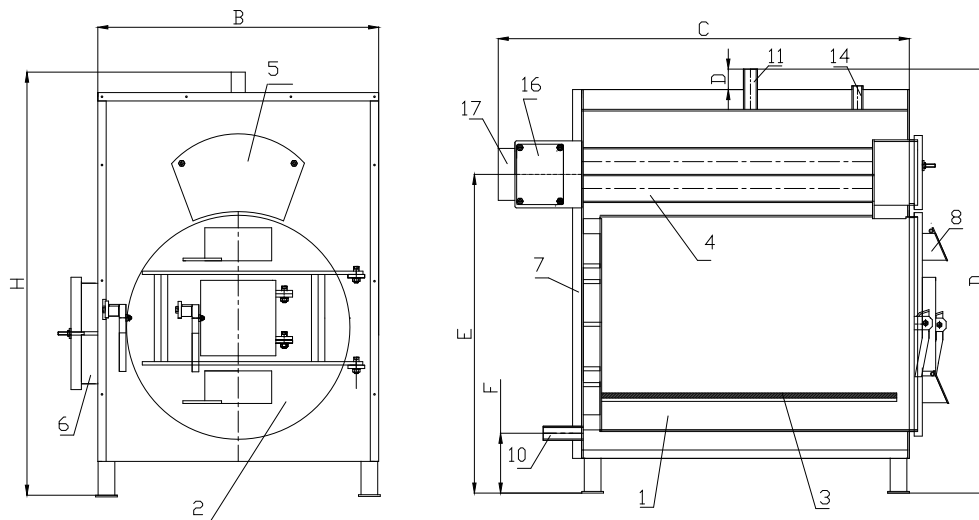
- Standard solid fuel boiler with side doors (stokers) for installation of the burner on the left or right side of the boiler.

Information regarding the different types of boilers series "B" can be found on www.limesboilers.com.

1.5. Dimensions

The overall dimensions of the "B" series boilers are shown in Figure 1 and Table 2.

Figure 1
The "B" series hot water boilers overall dimensions



1. Burning chamber;
2. Burning chamber door;
3. Grill;
4. Tube bundle;
5. Front smoke box door;
6. Side door (stoker) intended for burner mounting;
7. Boiler insulation;
8. Valve regulating the air flow;
9. TRV - power thermo regulator;
10. Cold water entrance;
11. Hot water exit;
12. Safety valve;
13. Filling and draining valve;
14. Thermo regulator;
15. Temperature sensor sleeve (only for burners "Simpex BG");
16. Rear smoke box with lids for cleaning and / or positioning the smoke duct;
17. Smoke duct;

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Table 2
"B" series boilers overall dimensions

Parameters	Description	Dimensions	"B" series			
			B 40	B 50	B 90	B 120
Height	H	mm	1210	1210	1650	1950
Length	B	mm	840	840	1150	1450
Width	C	mm	1450	1750	2100	2250
Nozzle height	D	mm	1270	1270	1700	2000
Axis height of the flue gasses duct	E	mm	950	950	1290	1630
Height of the nozzle for cold water - entrance	F	mm	1270	1270	1700	2000
Tube bundle			5	5	10	10
Tube diameter in the tube bundle		mm	Φ76	Φ76	Φ89	Φ89
Diameter of the inlet and outlet nozzle		mm	Φ42	Φ42	Φ60	Φ60
Diameter of smoke outlet ducts (external)		mm	Φ155	Φ155	Φ250	Φ250

1.6. Technical data

"B" series standard boilers are specialized for burning wood, coal and briquettes. Very high efficiency is achieved thanks to the three-way movement of the flue gas, which determines the high efficiency. The boilers are designed for heating agricultural buildings (greenhouses, small poultry, livestock buildings), family houses, small family hotels, small workshops, and to obtain hot water.

The "B" series boilers main advantages are:

- The simplified and compact design allows the burning of firewood length up to 1000 mm at high efficiency ensures economical operation mode and low cost of heating;
- Ability to burn coal and briquettes;
- Ability to burn agricultural waste such as branches, twigs, maize, industrial wood waste such as bark and trimmings, wood briquettes;
- Standard equipped with thermo valve to automatically adjust the air flow of , ensuring economy in a wide work range;
- Extremely convenient for installation, operation and maintenance;
Possibility for easy and fast mounting of a pellet burners BiSolid GP by "Erato" Ltd.. Haskovo or PB SC of "Simpex BG" Ltd.. Haskovo, which are fully automated - ignition, flame monitoring and easy to service.

The 'B' series boilers technical data are shown in Table 3.

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Table 3
The 'B' series hot water boilers technical data

<i>Title</i>	<i>Dimensions</i>	B40	B50	B90	B120
Nominal power	kW	40	50	90	120
Work pressure	bar	max 2	max 2	max 2	max 2
Efficiency	%	96	96	96	96
Adjustable temperature range	°C	60÷90	60÷90	60÷90	60÷90
Minimum inlet temperature of the water	°C	65	65	65	65
Boiler water volume	l	160	200	370	430
Boiler weight	kg	720	800	1500	2000
Boiler height with hot water nozzle	mm	1270	1270	1700	2000
Boiler depth	mm	1450	1750	2100	2250

The "B" series boilers have the option for mounting a door with flange for easy installation of pellet burner BiSolid GP or PB SC. At customer's request it can be made in front, left or right side of the burning chamber for more convenient installation of the pellet burner. Thus, it can easily pass from one type of fuel (wood, coal) to another type (pellet). Both of the pellet burners use wood pellets with a diameter of 6-8 mm according to standards EN 14961-2:2010 class ENplus-A1.

2. General requirements for exploitation

2.1. Installation requirements

The boiler and the related equipment must be connected to the heating system, in accordance to all legal norms and technical standards. The unit should be used only for the purposes for which it is intended.

"B" series hot water boilers are in compliance with the regulations applicable in the European Union. When the boilers are used outside the EU, all local laws and regulations must be identified.

In case of defect, contact an authorized manufacturer service organization. It is forbidden to make changes on the inside of the boiler installation.

Manufacturer is not responsible for damages caused by failure to comply with:

- ❑ The conditions specified in this MANUAL;
- ❑ The Regulations and standards;
- ❑ The procedures for installation and exploitation;
- ❑ The conditions shown in the warranty card.

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After obsolescence the boiler is disposed in a manner that does not pollutes the environment.

2.2. Safety measures

Important precautions:

- Turn the boiler off when the premises in which is situated, are present flammable or explosive vapors (when painting, gas leak, etc.);
- *When draining the water from the heating system, it should not be with dangerously high temperature;*
- *If there is a leak in the heat exchanger or boiler do not start ignition until full repair of the damage.*

Prevent the use of the boiler by children, adults, people under the influence of alcohol and drugs and people with mental disability.

3. Operation instructions

3.1. Operation

The boiler is operated only by adults initially familiar with it's operation and maintenance. The servicing personal are only putting the boiler into operation and are regulating the temperature by thermostat. **Do Not allow** the presence of children unattended near the boiler. It is forbidden for any activity changing the construction of the boiler which may result in endangering the life and health of the servicing personnel in the premises.

IMPORTANT:

The boiler must be operated at maximum water temperature up to 90° C.

Any activity aimed at increasing the nominal capacity of the boiler(overheating) are prohibited.

Do not allow flammable materials near the boiler.

3.2. Safe operation

The boiler should not be used for purposes other than those specified in this MANUAL. It is prohibited to clean the surface of the boiler with flammable materials. It is not allowed the storage of combustible materials in the premises where the boiler is located.

Removal of solid waste combustion products is carried out through the ashtray, placed under the grill. The ashtray should be emptied promptly, before filling. When handling use gloves as protective aids.

4. Commissioning

4.1. Initial inspection

Before commissioning it is obligatory to inspect:

- Whether the installation is built according to the project;
- If the boiler is filled with water and pressurized;
- Does the heating system leaks;
- Proper connection of the boiler with the chimney;
- Proper functioning of thermostats.

4.2. Filling and draining the heating system

The system can be filled only with water that meets the requirements - the water has to be clean, colorless, without suspended solids, oil and corrosive chemical substances and to be neutral or with slightly alkaline reaction ($rN \geq 7$). Before commissioning the heating system needs to be completely cleaned. The amount of water should not be reduced or drained unless necessity for repair occurs or there is danger of freezing.

During the heating season it is needed to maintain a constant volume of water in the heating system. If refilling water ensure not to suck air into the system. Draining the system and refilling it with new water leads to increased risk of corrosion and limescale accumulation.

4.3. Condensation in the combustion chamber and the flue gas pipes

During initial start of the boiler, on the walls of the combustion chamber and in the front smoke box it is possible condensation to occur. This can cause doubt that the boiler "leaks". After several firings the condensation ceases to occur. When operating with reduced power or cold water and/or cold flue gases (below 65°C), it can also form a condensate on the walls of the combustion chamber and heat exchanger tubes, which appears in front smoke box.

Tar in the combustion chamber can be obtained at low temperature of the flue gases due to poor and incomplete combustion due to insufficient amount of fresh air.

4.4. Service

Regulation of primary air is done by moving the valve located on the door of the combustion chamber. Cleaning the ash from the boiler is done by shovel. Full ash removal takes place after completion of the combustion process.

The boiler should only be used to its nominal power. Therefore, the heating system must be calculated so that the boiler can not work for a long time with the incoming water temperature lower than 65°C . For this reason, during the transitional seasons (spring and autumn), the boiler should run at maximum speed for a short time to prevent the occurrence of water condensation and tar in the boiler and chimney. That way the tar is burned and the chimney dried.

When operating the the boiler with pellets, the pellet burner service for BiSolid GP of "Erato" Ltd. Haskovo or PB SC of "SIMPEKS BG" Ltd. Haskovo is performed in accordance with its instructions.

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4.5. Maintenance

Under continuous operation due to improper conduct of the combustion process, incorrect sized chimney or poor fuel it is possible on the walls of the combustion chamber and heat exchanger tubes to form deposits of ash, tar or soot. Cleaning the boiler is done as required, but not more often than once a week.

The cleaning of the tube bundle is done with cleaning turbulator, and the grill is cleaned with shovel which is supplied with the boiler.

Cleaning of the boiler is recommended to be performed on daily, periodic and year basis.

When daily cleaning, remove ash and clean the ashtray

When periodic inspection is carried out check for:

- ▣ presence of leakages into the combustion chamber and heat exchanger tubes;
- ▣ check the flue gas pipes and chimney;
- ▣ cleaning of the tube bundle from the accumulated soot. The emitted soot is removed through the side panels of the rear smoke box;
- ▣ circulation pump check up;
- ▣ check for leaks in the connections of input and output water;

The annual inspection is carried out before the heating season, check for:

- ▣ leakages;
- ▣ check and clean tube bundle;
- ▣ check and clean combustion chamber;
- ▣ visual inspection of the grills and if necessary replacing them;
- ▣ cleaning of the water filter, check the expansion vessel;
- ▣ check fittings - cranes, manifolds and valves and their eventual replacement;
- ▣ inspection and cleaning of the flue gas pipes and chimney.

Important:

When working with pellet burner cleaning is carried out according to the instructions of the pellet burner.

4.6. Repair

The user may only carry out the replacement of grills.

Larger repairs are carried out by a specialized companies.

4.7. Warranty

Commissioning of the boiler is carried out by a specialized company. Otherwise, the reclamation is not recognized. All reclamation issues need to be signaled immediately upon discovery of the problem.

WARRANTY CONDITIONS

Manufacturer ensures correct and reliable operation of the boiler only when met requirements for installation and use in commissioning.

Boiler warranty begins on the date of purchase, certified by bill.

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Boiler warranty is 18 months.

The warranty is valid only when an invoice is present!

WARRANTY NOT VALID IN THE FOLLOWING CASES:

- Accidents caused by natural disasters (earthquake, fire, flood, etc.);
- Not met conditions for installation, maintenance and service specified in this instruction;
- Construction changes made by unauthorized personnel ;
- Improper project for installation and operation of the boiler;
- Damage due to factors for which the manufacturer is not responsible (has no control over them);
- Faults and failures that are not caused by the boiler itself, but led to the occurrence of a fault in its construction.

Any warranty repairs must be recorded in the warranty card of the boiler.

4.8. Scope of delivery

The "B"-series hot water boilers are delivered assembled and have passed the conducted tests. The scope of delivery of the boiler is given in Table 4

Table 4
"B"- series hot water boilers scope of delivery

№	Description	Boiler on solid fuel	Boiler - front door burner	Boiler - left/right side burner
		pcs.	pcs.	pcs.
1.	HOT WATER BOILER	1	1	1
2.	DOOR FOR WOOD LOGS	1	-	1
3.	DOOR FOR BURNER	-	1	-
4.	STOCKER	-	-	1
5.	GRATES	2	2*	2*
6.	ASH TRAY	1	1*	1*
7.	THERMOMECHANICAL REGULATOR	1	-	1*
8.	SAFETY VALVE	1*	1*	1*
9.	THERMOMANOMETER	1*	1*	1*
10.	WATER INLET VALVE	1*	1*	1*
11.	CLEANING SHOVEL	1*	1*	1*
12.	CLEANING TURBULATOR	1*	1*	1*
13.	INSTRUCTIONS	1	1	1
14.	WARRANTY CARD	1	1	1

* optional - upon order

Upon customer request the door for wood logs can be replaced with door for BiSolid GP burner by "Erato" Ltd. Haskovo or PB SC burner by "SIMPEX BG" Ltd. Haskovo.

The manufacture of boilers with stocker for side burner is done upon preliminary request with "Limes Innovation" EOOD.

5. Boiler operation on solid fuel

5.1. Ignition

Before ignition of the boiler, ensure that:

- ▣ the heating system is filled with water;
- ▣ front smoke box door is fully sealed;
- ▣ the connection between boiler and chimney is good;
- ▣ the draft in the chimney is good.

5.2. Shutting off

Emergency shutdown of the boiler is NOT RECCOMENDED. Leave the fuel in the boiler to burn out and only then perform cleaning and maintenance of the boiler.

5.2.1. Short term shut

After switching off clean the ashes and soot build in the tube bundle of the boiler. Close the door of the burning chamber and front smoke box.

5.2.2. Extended period shut off

After ending of the heating season, clean the boiler completely of all waste - ash, soot, sludge. Otherwise, it is possible to obtain corrosion.

6. Boiler operation when working with pellet burners

6.1. Working with BiSolid GP pellet burner

When operating the boiler with BiSolid GP pellet burner of "Erato" Ltd. Haskovo, the boiler works according to the instructions of the burner.

6.2. Working with PB SC pellet burner

When operating the boiler with PB SC of "SIMPEX" Ltd. Haskovo, the boiler works according to the instructions of the burner.

7. Installation instructions

7.1. Installation

Installation of the boiler is carried out by authorized company. The installation of the boiler is done in accordance to a pre-prepared project in compliance with the regulations and the instructions for installation and use. The manufacturer is not responsible for damages caused by poor installation.

7.2. Choosing the power of the boiler

Appropriately chosen power of the boiler is essential for economic exploitation and optimum performance. The boiler must comply with the heat loss of the heated premises. Improperly chosen power leads to unnecessarily high costs of fuel and hence more expenses for the customers on the one hand, and excessive removal of tar and condensate in the boiler, thus increasing the amount of harmful emissions emitted into the atmosphere.

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7.3. Positioning in the boiler room

The hot water boilers must be installed in suitable areas with constant flow of fresh air required for the combustion process. The air must be clean, free of corrosive vapor, dusty conditions and high humidity. The relative humidity must not exceed 80%.

The minimum distance from the outer walls of the boiler to combustible materials must be 300 mm.

The boiler has to be positioned still on stable non-flammable foundation. For safety reasons when maintaining, the non-flammable foundation in the front part needs to be not less than 300 mm, and on the rear and sides not less than 100 mm from boiler walls.

Сладираното в котленното помещение гориво е необходимо да бъде на разстояние не по-малко от 800 mm.

7.4. Connecting to the heating system

The boiler is designed for use with heating systems with self or forced circulation. To prevent condensation of flue gases and protect the boiler from corrosion, it is recommended that the water temperature does not drop below 65 ° C.

It is recommended that the boiler is filled with softened water in order to prevent the accumulation of limescale.

7.5. Power thermostat installation

Installation of power thermostat is obligatory. Adjustable thermostat is mounted in a pre-made hole G 3/4 ". With chain, the thermostat is connected to the air valve at the bottom part of the door of the combustion chamber

7.6. Installation of the boiler to the flue pipes

The flue gas pipes are fixed to the smoke outlet ducts. Fitting must be done in the shortest possible path from the boiler to the chimney, and also they need to be inclined. The maximum length of the flue gas pipes is 1,5 m and must be with as least curves as possible. The chimney is executed from well matched tubes in the direction of the flue gases.

7.7. Connection of the boiler to the chimney

"B - series hot water boilers are obligatorily connected to a separate chimney, with appropriate chimney draft, which determines the boiler's optimal operation.

The chimney draft is of paramount importance for power, efficiency and continuous operation of the boiler. Upon insufficient smoke draft in chimney, it is recommended to install an additional smoke fan.

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8. Troubleshooting

PROBLEM	CAUSE	SOLUTION
Boiler could not reach nominal power	Unsealed smoke box front door	To verify the closure and, if necessary, replace the seal
	Insufficient chimney draft	To check the chimney draft and, if necessary, correct or set smoke fan
	The fuel used has a low calorific value	To be used fuel with suitable calorific value, especially at low outside temperatures
	Cause in the operation of the burner	Look at: Manual for working with BiSolid GP and PB SC pellet burners
Power of boiler could not be regulated	Unsealed door of the combustion chamber	Close door properly. If necessary, replace the seal
	Excessive chimney draft	Needs to be taken measures to regulate the chimney draft
High water temperature in the boiler and low temperature in the radiators	Large hydraulic resistance in the heating system, especially in a standalone system	Clean the system of layered contaminations, optional installation of circulation pump is preferable
Boiling water in the boiler and low temperature in the radiators	Excessive chimney draft	Needs to be taken measures to regulate the chimney draft

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9. Warranty card

Producer: „Limes Innovation” EOOD

Boiler type	„B” series
Production Year	
Production №	
Power (kW)	
Work pressure	max 2 bar
Fuel	wood, wood logs, coal and pellets and agricultural wastes
Warranty period	24 months
Purchase date	

Client:

NAME:

ADDRESS:

MOBILE and E-MAIL:

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10. Warranty repairs list

<i>Date of repair</i>	<i>Defect description</i>	<i>Date of delivery to the customer</i>	<i>Signature</i>