

# MANUAL

FOR INSTALLATION, OPERATION AND MAINTENANCE OF  
SOLID FUEL HOT WATER BOILER SERIES  
BISOLID AUTOMAT



<http://www.bisolid.bg>



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## 1. SYSTEM OPERATION IMPORTANT INFORMATION

Dear hot water boiler series Bisolid Automat owners,

We would like to congratulate you on your new ecologic boiler system. By purchasing this quality product from the manufacturer, you have chosen a system that ensures high level of comfort and optimized fuel consumption using an environmentally friendly way of saving resources. Your boiler is manufactured under strict ISO 9001 standards.

On the following pages we have provided specific information and important advice about the system operation, its functions and way of maintenance. Please, pay special attention to this manual. Good knowledge of this document content will give you the pleasure of long-term and trouble-free operation of the system.

### 1.1. SAFETY INSTRUCTIONS

Hot water boiler series Bisolid Automat and its accessories correspond to all applicable safety regulations. The hot water boiler and all its accessories operate using alternating current of 230 VAC. Improper electrical installation or its repair may impose risk of life-threatening electric shock on the users. Installation works should be performed only by appropriately qualified technicians.

This manual is intended for authorized service specialists only. It is important to know that:

- Works on the heating installation should be performed only by installers who have acquired such rights by the competent authorities.
- Works on the electrical installation should be performed by qualified electricians only.
- Initial start-up, including inspection of the installation performed, boiler settings and commissioning should be performed by an authorized representative of the manufacturer.

#### Legal provisions

While operating with the equipment please observe:

- Safety legal provisions.
- Legal provisions for environmental protection.
- Provisions for professional installation.
- Applicable provisions of the European community.

#### Safety Instructions



Please observe these safety instructions in order to prevent risks and harm to persons, property damage and damage to the environment.

Safety instructions explanation.

Please, pay attention to the following symbols in this manual:



**Danger**  
This symbol warns for risk of harm to persons.



**Warning**  
This symbol warns for risks of damage to property and damage to the environment.



## Information

Data marked with this symbol contain additional information.

### Works or activities for setting the appliance in proper technical working order



Repairs of technical safety related built-in components may compromise safety operation of the installation. Damaged built-in components should be replaced with genuine parts only, provided by the manufacturer.



After careful reading of the installation and operation manual, you will acquire all necessary information regarding the design, control and safety operation of the system. After unpacking the boiler, check the integrity and completeness of the delivered equipment. Check whether the boiler size corresponds to the intended purpose of use.

Upon detection of any damage, the boiler should be decommissioned and a specialized company should provide troubleshooting of the boiler. For proper functioning, safety and continuous operation of the equipment, systematic checkups and preventive maintenance should be carried out at least once a year. This will guarantee your investment.



Repairs should be performed only with genuine spare parts. In the case of faults caused by unqualified installation, failure to comply with the prescriptions or the operation manual, the manufacturer shall not bear any responsibility and shall not provide any warranty.

## 2. GENERAL BOILER REQUIREMENTS

The boiler and all related equipment should be installed and used in accordance with the designed installation, all applicable legal provisions and technical standards, and the manufacturer's instructions. The boiler shall be used only for its intended purpose.

The boiler shall be installed only for the purpose it has been designed for. If the boiler is delivered to the user and installed by the same person, the latter should provide the user with the entire accompanying documentation of the boiler (in particular, the user's manual). Keep the genuine packaging of the boiler until its commissioning, in case the boiler should be transported again.

After installation, the boiler should be commissioned by a service provider, authorized by the manufacturer.

The boiler complies with the European Union applicable provisions. If the boiler is to be used in countries outside the EU, all deviations from local laws and legal provisions should be identified and corrected.

In case of defect, contact a service provider authorized by the manufacturer. Any incompetent intervention might damage the boiler (and possibly the accompanying equipment).

During initial commissioning of the boiler, the service technician should acquaint the user with the boiler main parts, different boiler systems and how to control the boiler. The technician should acquaint the user with the safety equipment and elements of the boiler, their signals and explain the appropriate reaction of the user. If the boiler is delivered to the user and installed by the same person, the latter should ensure that genuine packaging is available in case the boiler should be transported again.

Check the delivered boiler accessories.

Check whether the delivered model and type of the boiler correspondent to the use requirements.

When you are not sure how to control the boiler read carefully the relevant instructions in this operation and installation manual and proceed accordingly.

Never take off or damage the marks and signs on the boiler. Keep the genuine packaging, until commissioning of the boiler, in case the boiler should be transported again.

Always use, only genuine parts for repairs. It is forbidden to make any changes on the internal installation of the boiler or to change anything in anyway.

At the end of its lifetime, the boiler should be packed and together with its parts disposed of in a manner that prevents pollution of the environment.

The manufacturer is not liable for damages caused by non-compliance with:

- Terms and conditions provided for in this operation and installation manual.
- Applicable regulations and standards.
- Installation and operation procedures.
- Warranty card terms and conditions.

The possible situations that can be possible to occur, and key precautions to be taken:

- Switch off the boiler, if there are any (even temporary) flammable or explosive vapors in the room, from which the combustion air is supplied to the boiler (for example, from paint while painting, from laying and spraying molten substances, from gas leakage etc.).
- If it is necessary to drain the water from the boiler or from the entire system, the water should not be dangerously hot.
- If there is any leakage from the boiler's heat-exchanger or if the heat-exchanger is clogged, do not attempt to start the boiler, until normal operation conditions are restored.

## 2.1. ENSURING SAFETY OF PERSONS AND EQUIPMENT

The boiler and all its parts are in compliance with the safety requirements of the relevant EU norms.

In order to install and operate the boiler, in accordance with its intended actual use (hereinafter referred to only as use), it is necessary to also observe additional requirements, the most important of which (i.e. those should not be omitted) are present in the relevant regulatory documents. In addition to the above mentioned documents, when using the boiler, it is necessary, to act in accordance with this installation and operation manual and the accompanying boiler documentation supplied by the manufacturer.

Any intervention on the boiler operation by children and persons under the influence of narcotic substances, psychiatric abnormalities and other, should be prevented.



When installing a Bisolid Automat boiler on the heating system always observe the requirements indicated in section 9.5 for the installation of the boiler equipment excess heat release.



When operating the boiler Bisolid Automat, always a heating circuit has to be included in which the water is circulated. If the heating radiators are equipped with thermostatic valves (or other control components), which close the circulations water flow. As a result of this process it is possible that the generated heat energy, from the fuel final combustion, can't be adopted by the heating system (can't be unloaded) and to lead to overheating of the appliance. Therefore in case the boiler Bisolid Automat is operated in heating systems with radiator regulation valves, it is necessary not to completely close the radiator valves, but to adjust them to minimum value. Also one of the radiators should not be equipped with regulation valve, in order to ensure adoption of the heat energy generated during the process of final combustion.

## 2.2. DESIGNATION OF THE BOILER

The steel made hot water boiler series Bisolid Automat is a heating source, suitable for heating dwellings, single-family houses, production workshops and other similar sites. The heating system may be implemented with an open or closed expansion tank, with independent or forced circulation of the heating water, with maximum overpressure of 2.0 bar.

The innovative automatic switching of the boiler between preferred fuel (wooden pellets) and other suitable fuel (firewood or wood chips) provides continuous comfort at a reasonable price. The pellet burner with self-cleaning automatically is switching off after adding and unburning of



other suitable fuel, and in its burning, the burner automatically switches on and continues to maintain the set temperature with the preferred fuel.

The optimum functionality of the equipment is determined both by the professionally designed heating installation and by the precise maintenance of the system.



Boilers series Bisolid Automat are offered like product's modifications of boilers Bisolid Automat 25, Bisolid Automat 35, Bisolid Automat 45 and Bisolid Automat 60 standart equipped by tube pellet burners with rotary self-cleaning series Bisolid GP xx R tsc.

The main advantages of heating boilers series Bisolid Automat are:

- Easy and fast switching between the preferred and other suitable fuel. Automatic ignition and unburning of firewood and wood chips.
- Ability to burn firewood and wood chips with high moisture.
- Intuitive self-adjustment of the burner operation according to the moisture of other suitable fuel for better combustion.
- Fully automatic operation of the pellet burner in combustion of the preferred fuel - ignition, control the flame, blowing the combustion chamber.
- Convenient and easy to use graphical LCD display with English menu, showing the current state of the parameters of the combustion process.
- High efficiency of the facility with minimum fuel consumption, thanks to the automatic settings of the required air and fuel, according to the user's chosen temperature.
- Automatic modulation of the combustion process, reducing the number of stops and the ignition respectively consumption of fuel and electricity.
- Control circulation pump according to the coolant temperature.
- Quiet operation and low power consumption of electric energy.
- High level of safety - protection against back fire, freezing and blocking of the coolant circulation pump.
- Control of flue gas fan.
- Operation with room thermostat and weekly programmer at pellets mode.
- Removable cast iron grate for easy cleaning of ash in the combustion chamber of the boiler.
- Convenient and easy to clean ashtray.
- Control of the combustion process at room temperature;
- Ability to control and outside temperature.
- Delayed start.
- Control the burner via GSM module (optional) by sending SMS commands - ability to stop, start and view its current state.

## 2.3. FUEL

The boilers series Bisolid Automat are able to utilize wood pellets as preferred fuel according to standard EN ISO 17225-2:2014, classes A1, A2 and B with the following characteristics (Table 1.):

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Table 1. Standard for wood pellets EN ISO 17225-2:2014

Parameter	Dimension	Class A1	Class A2	Class B
Length (L)	mm	$3,15 \leq L \leq 40$	$3,15 \leq L \leq 40$	$3,15 \leq L \leq 40$
Diameter (D)	mm	$6 \pm 1$ $8 \pm 1$	$6 \pm 1$ $8 \pm 1$	$6 \pm 1$ $8 \pm 1$
Moisture (M)	%	< 10	< 10	< 10
Ash (A), dry matter	%	< 0,7	< 1,2	< 2,0
Buck density (BD)	kg/m <sup>3</sup>	> 600	> 600	> 600
Mechanical durability (DU)	%	> 97.5	> 97.5	> 96.5
Net caloricity (Q)	MJ/kg kWh/kg	> 16,5 > 4.6	> 16,5 > 4.6	> 16,5 > 4.6
Chlorine (Cl)	%	< 0,02	< 0,02	< 0,03
Nitrogen (N)	%	< 0,3	< 0,5	< 1,0
Sulphur (S)	%	< 0,04	< 0,05	< 0,05
Arsenic (As)	mg/kg	< 1	< 1	< 1
Cadmium (Cd)	mg/kg	< 0.5	< 0.5	< 0.5
Chromium (Cr)	mg/kg	< 10	< 10	< 10
Copper (Cu)	mg/kg	< 10	< 10	< 10
Lead (Pb)	mg/kg	< 10	< 10	< 10
Mercury (Hg)	mg/kg	< 0.1	< 0.1	< 0.1
Nickel (Ni)	mg/kg	< 10	< 10	< 10
Zinc (Zn)	mg/kg	< 100	< 100	< 100

The boilers series Bisolid Automat can burn as preferred fuel wood pellets category A, AB, B, BC and C according to the classification of wood pellets developed by the manufacturer methodology (see Table 2).

Table 2. Wood pellets classification depending on the physical properties according to a methodology developed and applied by the manufacturer

Pellets Category	A <sup>d</sup>	DU
A	$A^d \leq 0.6\%$	$DU \geq 97.0\%$
AB	$A^d \leq 0.6\%$	$DU < 97.0\%$
B	$0.6 < A^d \leq 1.0\%$	$DU \geq 97.0\%$
BC	$0.6 < A^d \leq 1.0\%$	$DU < 97.0\%$
C	$1.0\% < A^d \leq 2.0\%$	$DU \geq 97.0\%$
CD	$1.0\% < A^d \leq 2.0\%$	$DU < 97.0\%$
D	$2.0\% < A^d \leq 3.0\%$	$DU \geq 97.0\%$
DE	$2.0\% < A^d \leq 3.0\%$	$DU < 97.0\%$
E	$A^d > 3.0\%$	$DU \geq 97.0\%$
EF	$A^d > 3.0\%$	$DU < 97.0\%$

Where:

A<sup>d</sup> – ash content on dry matter, %.

DU – mechanical durability, %.

Wood pellets must be stored in dry premises, so they can be transported without problems and also in order to achieve trouble-free operation with optimum combustion and maximum efficiency. The preferred fuel (wood pallets) should be stored in dry premises, so that it can be transported without problems thus enabling trouble-free operation with optimum combustion and maximum efficiency.

Boilers series Bisolid Automat can utilize firewood as other suitable fuel with maximum humidity 25%, i.e. in the form of chopped firewood logs with diameter up to 100 mm and length 400 mm, split firewood with bark or without bark. The manufacturer recommends that the fuel be applied transversely in the fuel hopper, so as to achieve gradual combustion and fuel layering.

Boilers series Bisolid Automat can also utilize as other suitable fuel wood chips as well with maximum moisture of 40%.

When using firewood or wood chips with irregular or non-compliant form, additional control should be exercised on the boiler by the service personnel.



Supply of fresh air to the combustion chamber of the boiler through the tube pellet burner fan, which is automatically activated, allowing for burning of fire wood and wood chips with higher moisture.



The mounted to the heating boiler Bisolid Automat pellet burner with rotary self-cleaning Bisolid GP xx R tsc is designed for burning of the approved by the boiler manufacturer solid fuels **ONLY!**



Hot water boilers series Bisolid Automat are not designed to burn coal.

## 2.4. DESCRIPTION OF THE BOILER

The boiler is a welded construction of steel sheet panels and pipes. The inside space is separated by water baffle into a fuel hopper, combustion chamber and heat-exchanger, through which the flue gases are discharged to the chimney neck. A movable two-component grate is located under the combustion chamber and the fuel hopper, which is run laterally using a lever.

The combustion air is supplied by a fan, located in the pellet burner of the boiler, controlled by an electronic device.

Heating water inlet and outlet are secured by nozzles G1<sup>1/2"</sup>. The flue pipe is located on the backside of the boiler along its axis. The exhaust gases (flue gases) discharge valve is controlled from the top of the boiler. The exhaust gases discharge flap (flue gases evacuation flap) serves to evacuate the flue gases during loading the fuel hopper of the boiler. The flap opens during loading other suitable fuel (firewood and wood chips) into the fuel hopper of the boiler and closes immediately thereafter.

Not opening the flue gases flap may result in a smoke in the boiler fuel hopper during loading other suitable fuel.

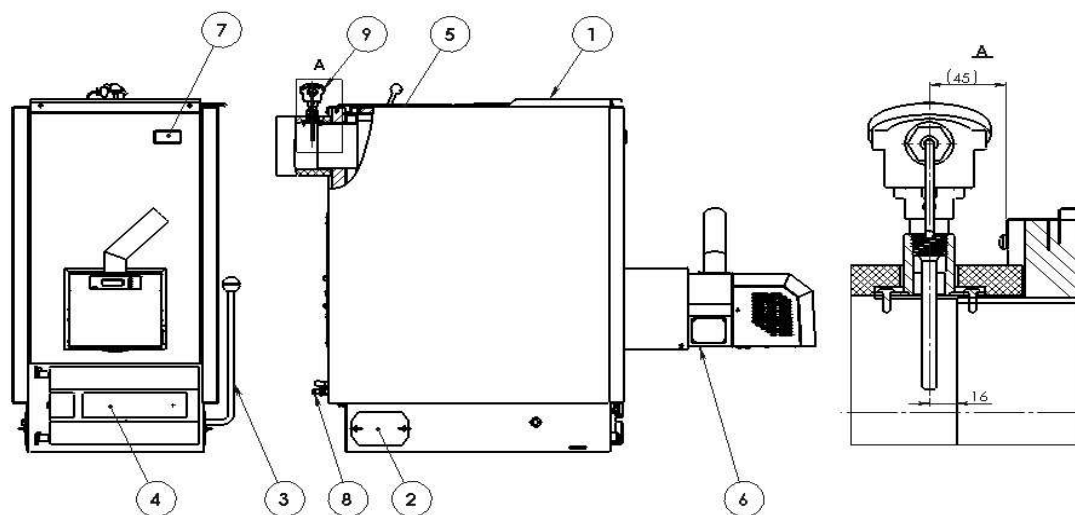


The flue gas discharge flap (flue gases evacuation flap) should be opened only during loading the boiler hopper with other suitable fuel. The flap should be closed immediately after closing the door of the fuel hopper.

## 2.5. CONSTRUCTION AND OVERALL DIMENSIONS OF THE BOILER

The main elements of the construction of hot water boiler series Bisolid Automat are presented in Figure 1. The overall dimensions of hot water boilers Bisolid Automat are presented in Table 3 and Figure 2.

Figure 1. Main elements of the construction of Bisolid Automat boiler

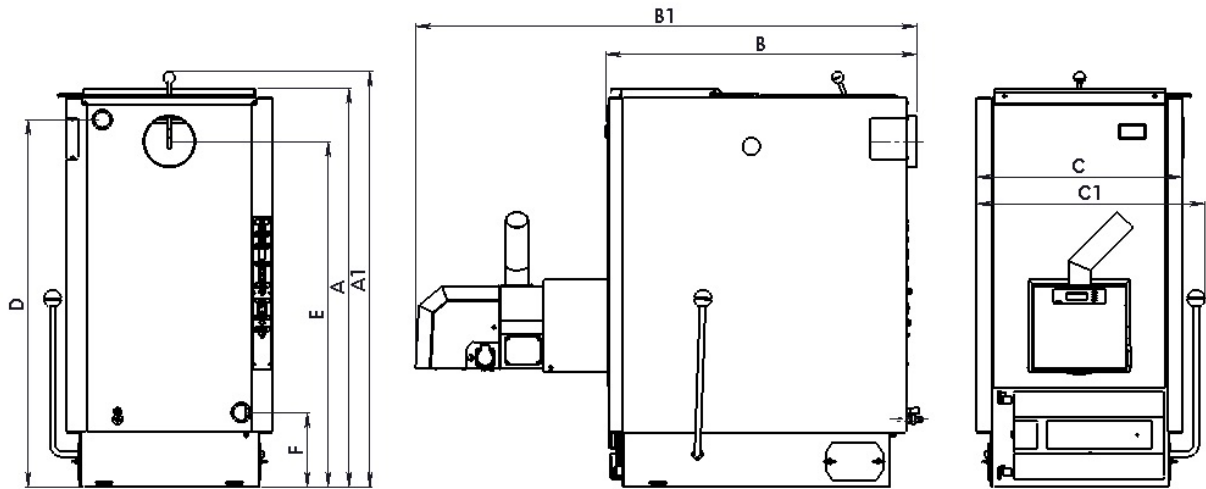


- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1. Other suitable fuel feeding door</li> <li>2. Soot door</li> <li>3. Grate lever</li> <li>4. Ash cleaning door</li> <li>5. Heat-exchanger cover with firing flap</li> </ul> | <ul style="list-style-type: none"> <li>6. Tube pellet burner</li> <li>7. Thermo-manometer</li> <li>8. Drainage valve</li> <li>9. Exhaust (flue) gas sensor</li> </ul> |
|---|---|

Table 3. Overall and mounting dimensions of Bisolid Automat boiler

Parameter	Indication	Dimension	Value			
			Bisolid Automat 25	Bisolid Automat 35	Bisolid Automat 45	Bisolid Automat 60
Nominal heat output	-	-				
Boiler height	A	mm	847	1048	1148	1150
Boiler overall height	A1	mm	894	1094	1194	1249
Boiler length	B	mm	896	896	896	1001
Boiler overall length	B1	mm	1443	1443	1443	1602
Boiler width	C	mm	595	595	595	745
Boiler overall width	C1	mm	657	657	657	805
Height of the hot water flange - outlet	D	mm	763	963	1058	1058
Flue pipe axis height	E	mm	695	895	995	995
Height of the hot water flange - inlet	F	mm	195	195	195	215
Inlet and outlet nozzle	-	G	1 1/2"	1 1/2"	1 1/2"	1 1/2"
Chimney diameter (outer)	∅	mm	150	150	150	150

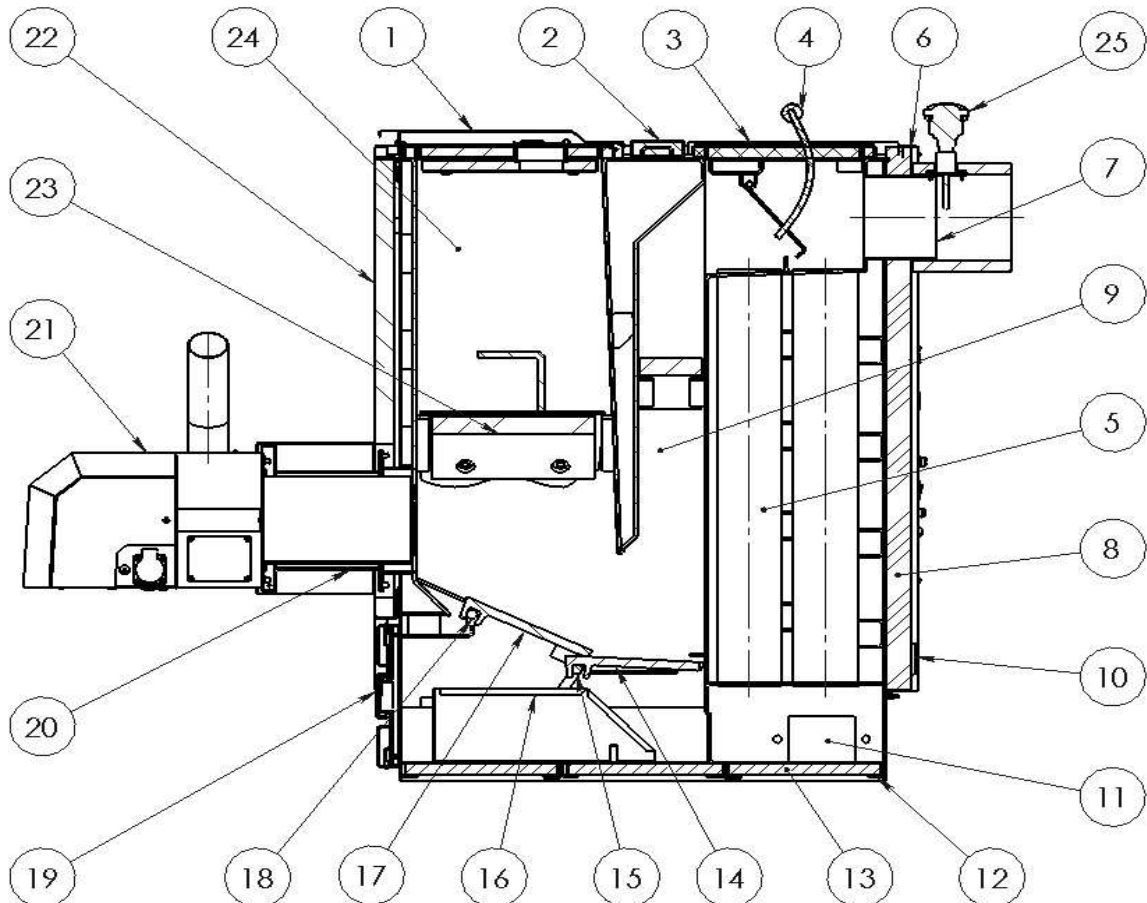
Figure 2. Overall and mounting dimensions of Bisolid Automat boiler



## 2.6. BOILER SECTIONAL VIEW

The main sectional view of Bisolid Automat boiler is presented in Figure 3.

Figure 3. Main sectional view of Bisolid Automat boiler

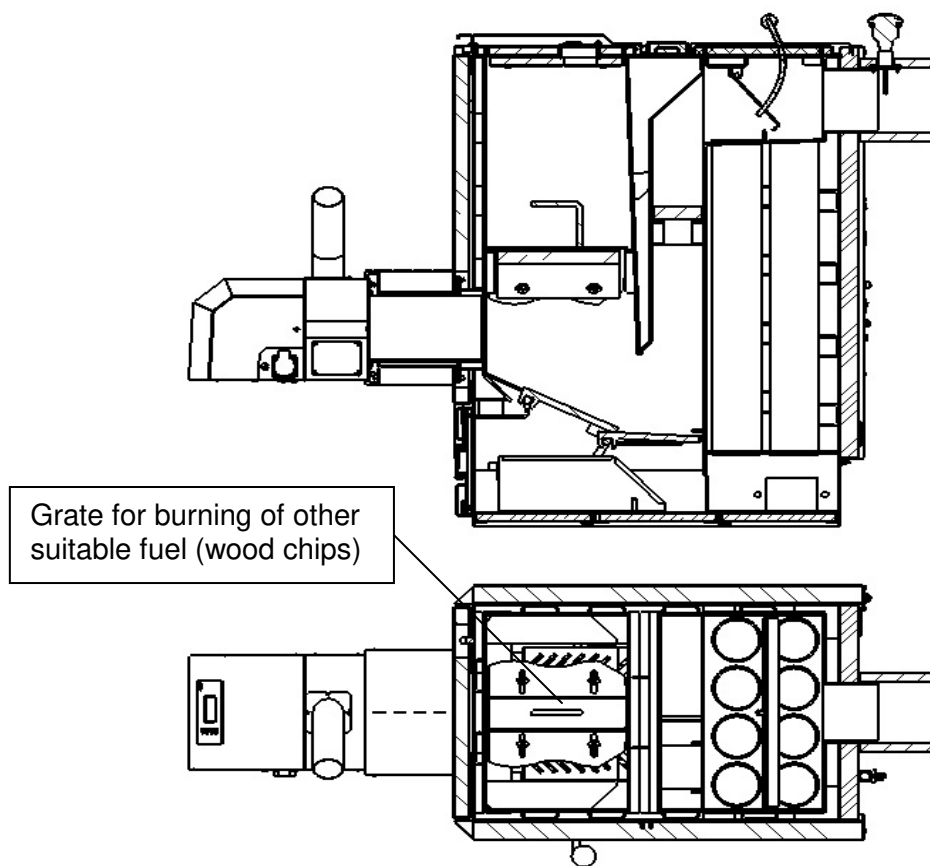


- |                                     |   |
|-------------------------------------|---|
| 1. Other suitable fuel feeding door | 15. Lever axis for operating the grate                                |
| 2. Middle cover                     | 16. Ash tray  |
| 3. Rear cover with a flap           | 17. Rotating grate  |
| 4. Flue gases flap with a handle    | 18. Axis of rotation  |
| 5. Second flue gas pass             | 19. Ash cleaning door   |
| 6. Rear section                     | 20. Burner transition   |
| 7. Chimney neck $\varnothing$ 150   | 21. Tube pellet burner  |
| 8. Insulation surface               | 22. Front cover   |
| 9. First flue gas pass              | 23. Grate for burning of other suitable fuel (wood chips) - optional. |
| 10. Cold water inlet                | 24. Firewood hopper   |
| 11. Cleaning cap                    | 25. Exhaust (flue) gas sensor   |
| 12. Feet bushings                   |   |
| 13. Bottom insulation               |   |
| 14. Movable grate                   |   |



The grate for burning other suitable fuel in the form of wood chips - position 23 of Figure 3, is offered as an option.

Figure 4. Sectional view of Bisolid Automat boiler - way of grate positioning in burning of other suitable fuel (wood chips)



## 2.7. BOILER TECHNICAL DATA

The outer view of hot water boiler series Bisolid Automat is presented in Figure 5.

Figure 5. Outer view of hot water boiler series Bisolid Automat



Technical data of hot water boiler series Bisolid Automat burning preferred fuel (wood pellets) are presented in Tables 4.

Table 4. Hot water boiler series Bisolid Automat technical data in operation with preferred fuel (wood pellets)

Parameter	Dimension	Value			
		Bisolid Automat 25	Bisolid Automat 35	Bisolid Automat 45	Bisolid Automat 60
Boiler model	-	Bisolid Automat 25	Bisolid Automat 35	Bisolid Automat 45	Bisolid Automat 60
Preferred fuel	-	Wood pellets			
Nominal heat output	kW	18	26	30	40
Operating pressure	bar	2.0	2.0	2.0	2.0
Operating draft	Pa	> 20	> 20	> 30	> 37
Efficiency	%	87	90	86	80
Energy efficiency class according to regulation (EU) 2015/1187	-	A <sup>+</sup>	A <sup>+</sup>	A <sup>+</sup>	A <sup>+</sup>
Boiler class according to standard EN 303-5:2012	-	5			
Flue gas temperature at rated power	°C	180	170	194	260
Boiler water volume	l	70	100	105	130
Hopper volume	l	79	105	119	180
Boiler weight including the pellet burner	kg	261	311	324	465
Power supply	-	230VAC, 50Hz			
Electrical protection	-	IP 20			

The technical parameters of hot water solid fuel boilers series Bisolid Automat according to the delegated Regulation (EU) 2015/1187 are presented in Table 5.

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Table 5. Technical parameters of hot water solid fuel boilers series Bisolid Automat according to the delegated Regulation (EU) 2015/1187.

Model identifier: Hot water solid fuel boiler Bisolid Automat 25.		
Stoking mode: Automatic: it is recommended that the boiler be operated with a hot water storage tank of a volume of at least 500 litre		
Condensing boiler: no		
Solid fuel cogeneration boiler: no		
Combination boiler: no		
Fuel	Preferred fuel (only one):	Other suitable fuel(s):
Log wood, moisture content $\leq 25\%$	no	yes
Chipped wood, moisture content 15-35 %	no	no
Chipped wood, moisture content $> 35\%$	no	yes
Compressed wood in the form of pellets	yes	no
Sawdust, moisture content $\leq 50\%$	no	no
Other woody biomass	no	no
Non-woody biomass	no	no
Bituminous coal	no	no
Brown coal (including briquettes)	no	no
Coke	no	no
Anthracite	no	no
Blended fossil fuel briquettes	no	no
Other fossil fuel	no	no
Blended biomass (30-70 %) and fossil fuel briquettes	no	no
Other blend of biomass and fossil fuel	no	no
<b>Characteristics when operating with the preferred fuel:</b>		
Seasonal space heating energy efficiency $\eta_s$ [%]: 84		
Energy efficiency index EEI: A+		



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Item	Symbol	Value	Unit		Item	Symbol	Value	Unit
Useful heat output					Useful efficiency			
At rated heat output	$P_n$ (***)	18,0	kW		At rated heat output	$\eta_n$	87,0	%
At [30 %/50%] of rated heat output, if applicable	$P_p$	9,0	kW		At [30 %/50%] of rated heat output, if applicable	$\eta_p$	89,0	%
For solid fuel cogeneration boilers: Electrical efficiency					<b>Auxiliary electricity consumption</b>			
At rated heat output	$\eta_{el,n}$	-	%		At rated heat output	$e_{lmax}$	0,080	kW
					At [30 %/50%] of rated heat output, if applicable	$e_{lmin}$	0,080	kW
					Of incorporated secondary emission abatement equipment, if applicable		-	-
					In standby mode	$P_{SB}$	0,0048	kW
Contact details					Ekoterm Proekt EAD / ZMM Haskovo AD 6300, Haskovo 67 Saedinie Blvd.			
(*) Tank volume = $45 \times Pr \times (1 - 2,7/Pr)$ or 300 litres whichever is higher, with Pr indicated in kW (**) Tank volume = $20 \times Pr$ with Pr indicated in kW (***) For the preferred fuel $P_n$ equals Pr								

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Model identifier: Hot water solid fuel boiler Bisolid Automat 35.		
Stoking mode: Automatic: it is recommended that the boiler be operated with a hot water storage tank of a volume of at least 700 litre		
Condensing boiler: no		
Solid fuel cogeneration boiler: no		
Combination boiler: no		
Fuel	Preferred fuel (only one):	Other suitable fuel(s):
Log wood, moisture content $\leq 25\%$	no	yes
Chipped wood, moisture content 15-35 %	no	no
Chipped wood, moisture content $> 35\%$	no	yes
Compressed wood in the form of pellets	yes	no
Sawdust, moisture content $\leq 50\%$	no	no
Other woody biomass	no	no
Non-woody biomass	no	no
Bituminous coal	no	no
Brown coal (including briquettes)	no	no
Coke	no	no
Anthracite	no	no
Blended fossil fuel briquettes	no	no
Other fossil fuel	no	no
Blended biomass (30-70 %) and fossil fuel briquettes	no	no
Other blend of biomass and fossil fuel	no	no
<b>Characteristics when operating with the preferred fuel:</b>		
Seasonal space heating energy efficiency $\eta_s$ [%]: 86		
Energy efficiency index EEI: A+		

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Item	Symbol	Value	Unit		Item	Symbol	Value	Unit
Useful heat output					Useful efficiency			
At rated heat output	$P_n$ (***)	26,0	kW		At rated heat output	$\eta_n$	90,3	%
At [30 %/50%] of rated heat output, if applicable	$P_p$	8,0	kW		At [30 %/50%] of rated heat output, if applicable	$\eta_p$	91,3	%
For solid fuel cogeneration boilers: Electrical efficiency					<b>Auxiliary electricity consumption</b>			
At rated heat output	$\eta_{el,n}$	-	%		At rated heat output	$e_{lmax}$	0,080	kW
					At [30 %/50%] of rated heat output, if applicable	$e_{lmin}$	0,080	kW
					Of incorporated secondary emission abatement equipment, if applicable		-	-
					In standby mode	$P_{SB}$	0,0048	kW
Contact details					Ekoterm Proekt EAD / ZMM Haskovo AD 6300, Haskovo 67 Saedinie Blvd.			
(*) Tank volume = $45 \times Pr \times (1 - 2,7/Pr)$ or 300 litres whichever is higher, with Pr indicated in kW (**) Tank volume = $20 \times Pr$ with Pr indicated in kW (***) For the preferred fuel $P_n$ equals Pr								

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Model identifier: Hot water solid fuel boiler Bisolid Automat 45.		
Stoking mode: Automatic: it is recommended that the boiler be operated with a hot water storage tank of a volume of at least 900 litre		
Condensing boiler: no		
Solid fuel cogeneration boiler: no		
Combination boiler: no		
<b>Fuel</b>	<b>Preferred fuel (only one):</b>	<b>Other suitable fuel(s):</b>
Log wood, moisture content $\leq 25\%$	no	yes
Chipped wood, moisture content 15-35 %	no	no
Chipped wood, moisture content $> 35\%$	no	yes
Compressed wood in the form of pellets	yes	no
Sawdust, moisture content $\leq 50\%$	no	no
Other woody biomass	no	no
Non-woody biomass	no	no
Bituminous coal	no	no
Brown coal (including briquettes)	no	no
Coke	no	no
Anthracite	no	no
Blended fossil fuel briquettes	no	no
Other fossil fuel	no	no
Blended biomass (30-70 %) and fossil fuel briquettes	no	no
Other blend of biomass and fossil fuel	no	no
<b>Characteristics when operating with the preferred fuel:</b>		
Seasonal space heating energy efficiency $\eta_s$ [%]: 84		
Energy efficiency index EEI: A+		

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Item	Symbol	Value	Unit		Item	Symbol	Value	Unit
Useful heat output					Useful efficiency			
At rated heat output	$P_n$ (***)	30,0	kW		At rated heat output	$\eta_n$	86,0	%
At [30 %/50%] of rated heat output, if applicable	$P_p$	9,8	kW		At [30 %/50%] of rated heat output, if applicable	$\eta_p$	89,0	%
For solid fuel cogeneration boilers: Electrical efficiency					<b>Auxiliary electricity consumption</b>			
At rated heat output	$\eta_{el,n}$	-	%		At rated heat output	$e_{lmax}$	0,080	kW
					At [30 %/50%] of rated heat output, if applicable	$e_{lmin}$	0,080	kW
					Of incorporated secondary emission abatement equipment, if applicable		-	-
					In standby mode	$P_{SB}$	0,0048	kW
Contact details					Ekoterm Proekt EAD / ZMM Haskovo AD 6300, Haskovo 67 Saedinie Blvd.			
(*) Tank volume = $45 \times Pr \times (1 - 2,7/Pr)$ or 300 litres whichever is higher, with Pr indicated in kW (**) Tank volume = $20 \times Pr$ with Pr indicated in kW (***) For the preferred fuel Pn equals Pr								

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

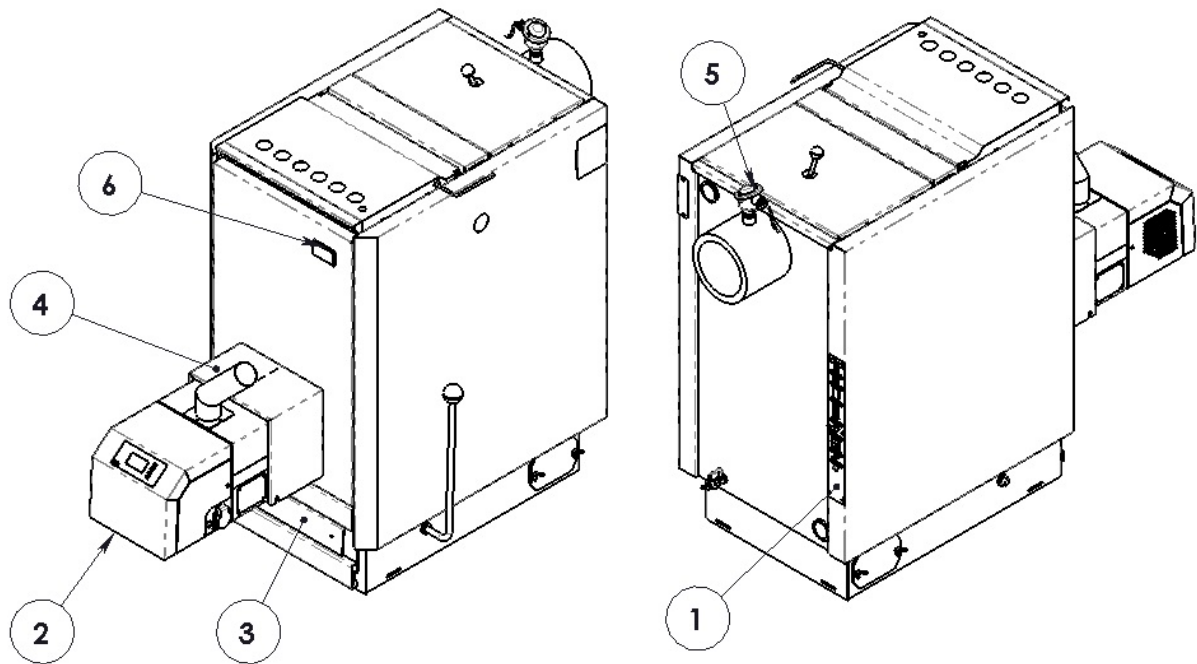
Model identifier: Hot water solid fuel boiler Bisolid Automat 60.		
Stoking mode: Automatic: it is recommended that the boiler be operated with a hot water storage tank of a volume of at least 1200 litre		
Condensing boiler: no		
Solid fuel cogeneration boiler: no		
Combination boiler: no		
Fuel	Preferred fuel (only one):	Other suitable fuel(s):
Log wood, moisture content $\leq 25$ %	no	yes
Chipped wood, moisture content 15-35 %	no	no
Chipped wood, moisture content $> 35$ %	no	yes
Compressed wood in the form of pellets	yes	no
Sawdust, moisture content $\leq 50$ %	no	no
Other woody biomass	no	no
Non-woody biomass	no	no
Bituminous coal	no	no
Brown coal (including briquettes)	no	no
Coke	no	no
Anthracite	no	no
Blended fossil fuel briquettes	no	no
Other fossil fuel	no	no
Blended biomass (30-70 %) and fossil fuel briquettes	no	no
Other blend of biomass and fossil fuel	no	no
<b>Characteristics when operating with the preferred fuel:</b>		
Seasonal space heating energy efficiency $\eta_s$ [%]: 78		
Energy efficiency index EEI: A+		

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Item	Symbol	Value	Unit		Item	Symbol	Value	Unit
Useful heat output					Useful efficiency			
At rated heat output	$P_n$ (***)	40,0	kW		At rated heat output	$\eta_n$	80,0	%
At [30 %/50%] of rated heat output, if applicable	$P_p$	15,0	kW		At [30 %/50%] of rated heat output, if applicable	$\eta_p$	83,0	%
For solid fuel cogeneration boilers: Electrical efficiency					<b>Auxiliary electricity consumption</b>			
At rated heat output	$\eta_{el,n}$	-	%		At rated heat output	$e_{lmax}$	0,080	kW
					At [30 %/50%] of rated heat output, if applicable	$e_{lmin}$	0,080	kW
					Of incorporated secondary emission abatement equipment, if applicable		-	-
					In standby mode	$P_{SB}$	0,0048	kW
Contact details					Ekoterm Proekt EAD / ZMM Haskovo AD 6300, Haskovo 67 Saedinie Blvd.			
(*) Tank volume = $45 \times Pr \times (1 - 2,7/Pr)$ or 300 litres whichever is higher, with Pr indicated in kW (**) Tank volume = $20 \times Pr$ with Pr indicated in kW (***) For the preferred fuel $P_n$ equals Pr								

Standard equipment of hot water boilers series Bisolid Automat is shown on Figure 6 and Figure 7.

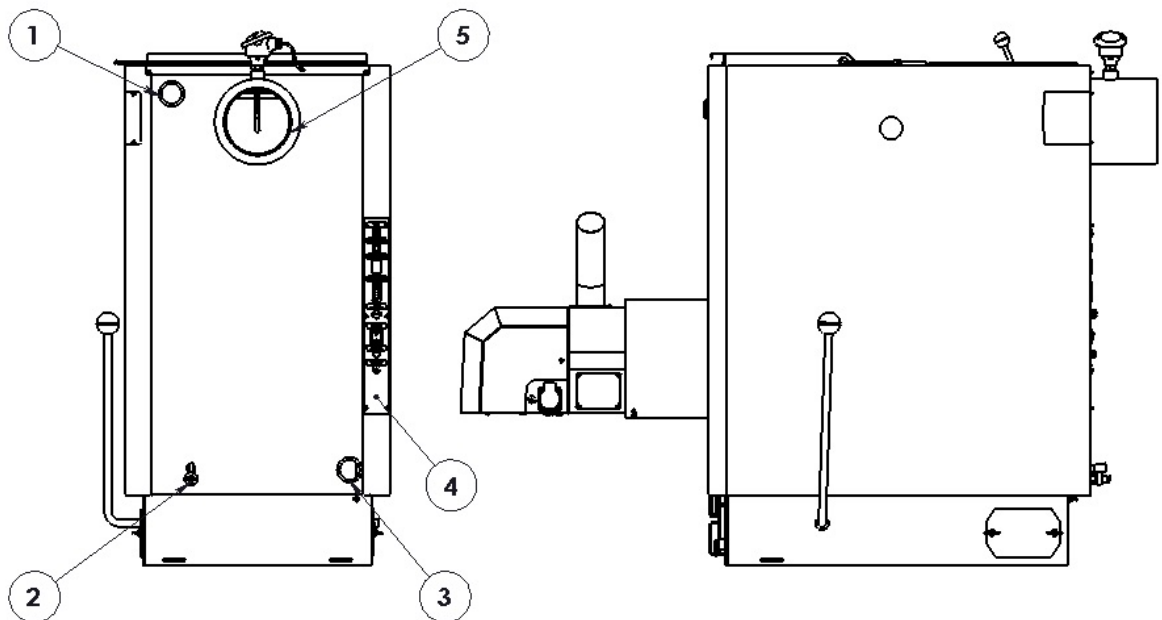
Figure 6. Standard equipment of boilers series Bisolid Automat



- 1. Electrical panel
- 2. Tube pellet burner
- 3. Ash cleaning door

- 4. Safety metal grid
- 5. Exhaust (flue) gas sensor
- 6. Thermo-manometer

Figure 7. Standard equipment of boilers series Bisolid Automat



- 1. Hot water nipple
- 2. Drainage valve
- 3. Hot water nipple

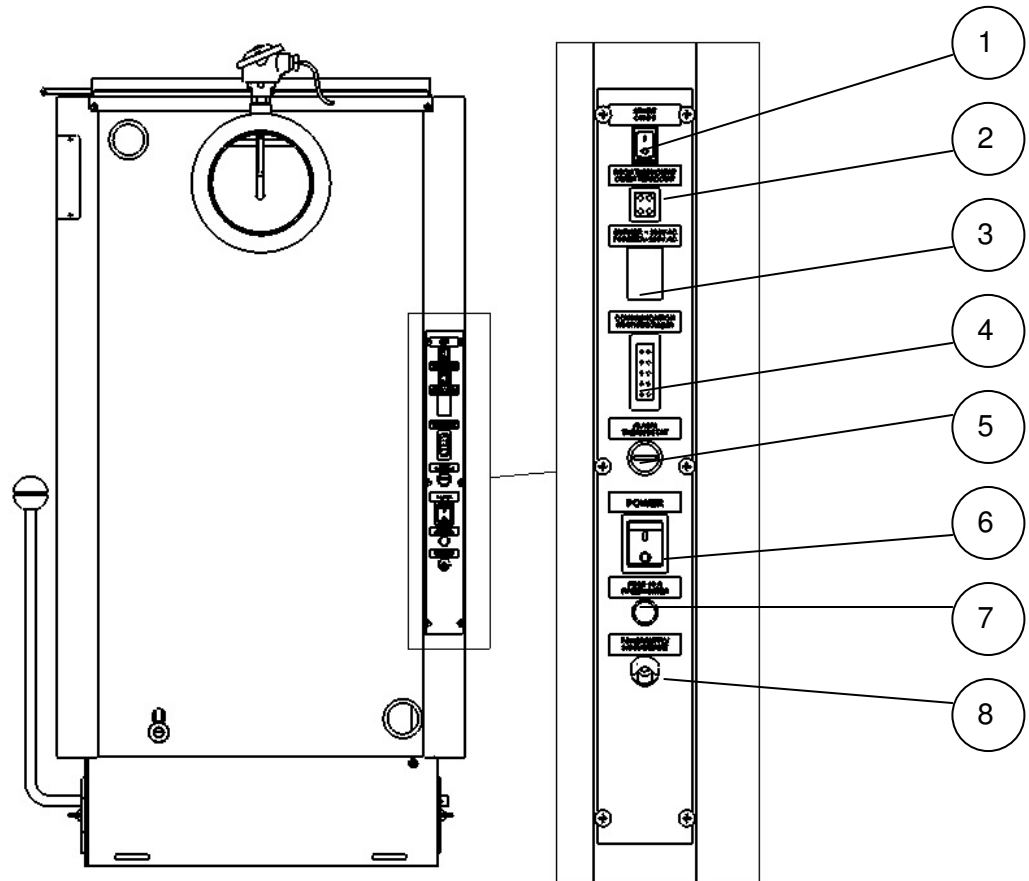
- 4. Electrical panel
- 5. Chimney neck  $\varnothing$  150 mm



# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Figure 8 shows the position of the connectors on the electrical panel of hot water boiler series Bisolid Automat.

Figure 8. Location of the connectors on the electrical panel



1. START switch
2. Room thermostat connector
3. Pellet burner connector - power supply
4. Communication connector

5. Safety thermostat connector 95 °C
6. POWER main switch
7. Fuse 10A
8. Power supply



The room thermostat may be used **ONLY** when operating the boiler with the preferred fuel (wood pellets) without adding other suitable fuel!

## 3. DESCRIPTION OF THE TUBE PELLET BURNER WITH ROTARY CLEANING BISOLID GP XX R TSC

The tube pellet burner with rotary cleaning Bisolid GP xx R tsc is a steel made construction and is designed on the principle of feeding the wood pellets through a feed auger, then through a flexible connection on the grate of the burner's combustion chamber, where the process of fuel and oxidizer (combustion air) combustion takes place.

The burner operates automatically, including: initial wood pellet loading, firing, inflammation, combustion, controlling combustion process parameters when using preferred fuel (wood pellets) and other suitable fuel in the form of firewood or wood chips, controlled stop when reaching the water temperature and (or) receiving a signal from the room thermostat, controlled power reduction in burning other suitable fuel (firewood or wood chips), final blowing when using preferred fuel (wood pellets). In the optimization mode, at the operation with a room thermostat, optimized modulation is carried out based on the thermal performance of the site.

The tube pellet burner Bisolid GP xx R tsc is designed to burn wood pellets according to standard EN ISO 17225-2:2014, classes A1, A2 and B with the relevant quality characteristics and also pellets with categories: A, AB, B, BC and C, according to the methodology prepared and applied by the manufacturer. The fuel and air are mixed in the burner in controlled way and it is a reason for ecological combustion and high efficiency.

The pellet burner is equipped with a display, which indicates the burner's current parameters and/or allows for adjustment of its operating parameters.

The main advantages of the tube pellet burner Bisolid GP xx R tsc are:

- Innovative rotary combustion chamber - stable efficiency and low emissions with minimal user intervention.
- A system for mixing fuel into the combustion chamber, which increases the cleaning of the ash, improves the combustion process and relieves servicing.
- Ability to burn wood pellets with a diameter of 6-8 mm and low quality (high ash content), which is not possible with burners with air cleaning and / or compressed air.
- Completely compatible with automatic control of a wide range of solid fuel boilers. Suitable for installation of furnaces for bakery products.
- Precision modulation of heat output.
- The components of the burner are manufactured by well known and proved European companies from Germany, United Kingdom and others.
- High quality ignition element manufactured in Japan, that ensures over 37 000 ignitions.
- The combustion chamber is produced by special heat resistance steel, which ensures long service life.
- Manual test of all functions.
- Indication of the hot water temperature in the boiler.
- Photosensor for accurately detection and monitoring of the flame intensity.
- Possibility to save the current settings and to reset to factory default settings.
- Automatic start after voltage drop - preserving last settings.
- Password protected access levels - for the service technician and manufacturer.
- Ability to operate with a room thermostat.
- Possibility to control exhaust gas fan, which eliminates the problem with the draught into the chimney and guarantees the safety operation of the product.

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

- Special measures to increase the reliability and safety of the burner.
- A flexible pipe is made of a special plastic material to connect the burner to the auger which melts when there is a danger of back fire and do not supply fuel to the burner - in this case, the fuel is discharged outside from the danger zone.
- The standard equipment includes fuel transport auger for pellets.
- Ability to start and stop using the GSM module (optional).

Figure 9 shows the main view of tube pellet burner with rotary self-cleaning Bisolid GP xx R tsc.

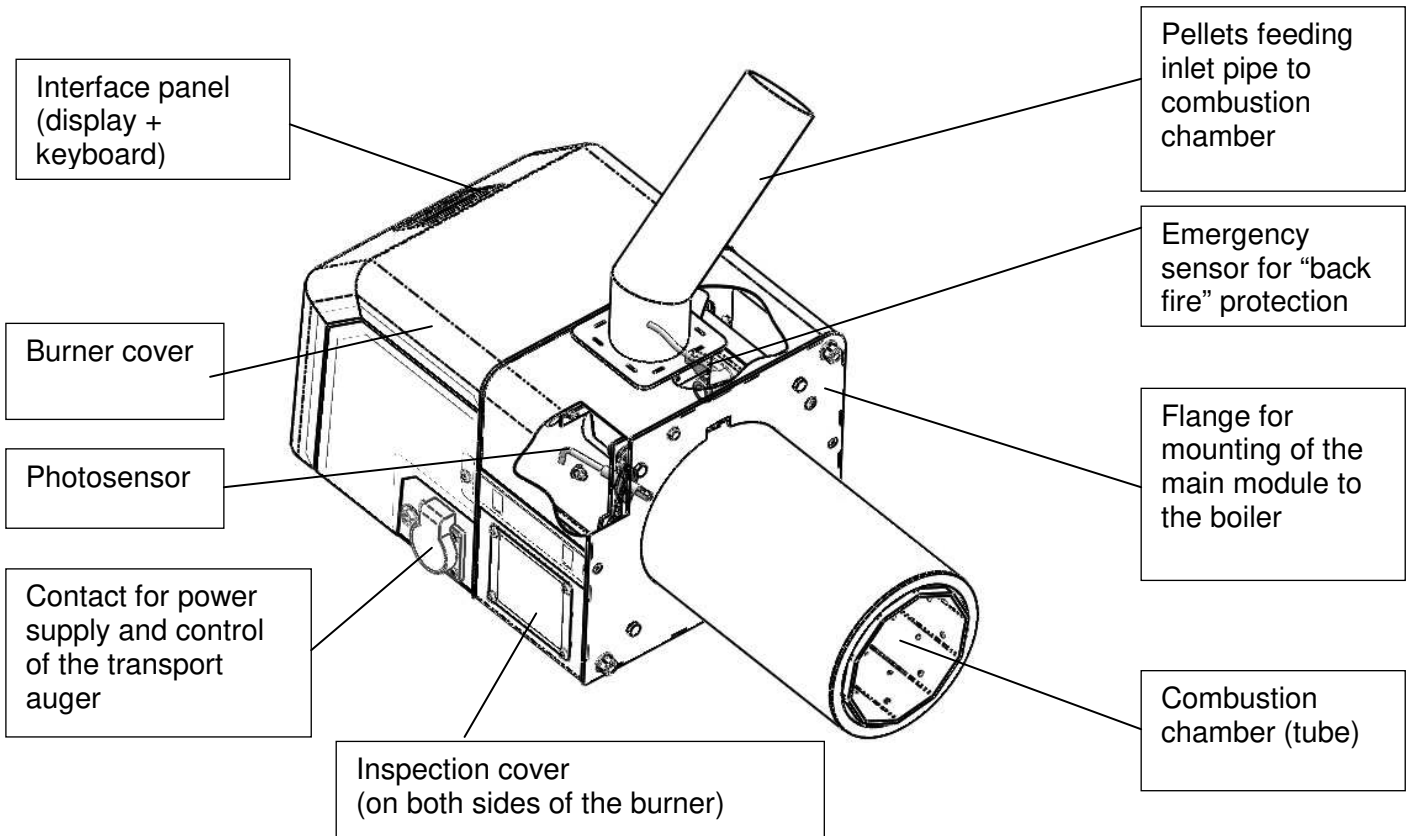
Figure 9. Main view of tube pellet burner Bisolid GP xx R tsc



Figure 10 presents the main module of tube pellet burner Bisolid GP xx R tsc.

# INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Figure 10. Tube pellet burner Bisolid GP xx R tsc main module view



The diagram for mounting and dismantling of the internal and external rotary tube of pellet burner Bisolid GP xx R tsc is given in Figure 11.

Figure 11. Diagram for mounting and dismantling of the internal and external rotary tube

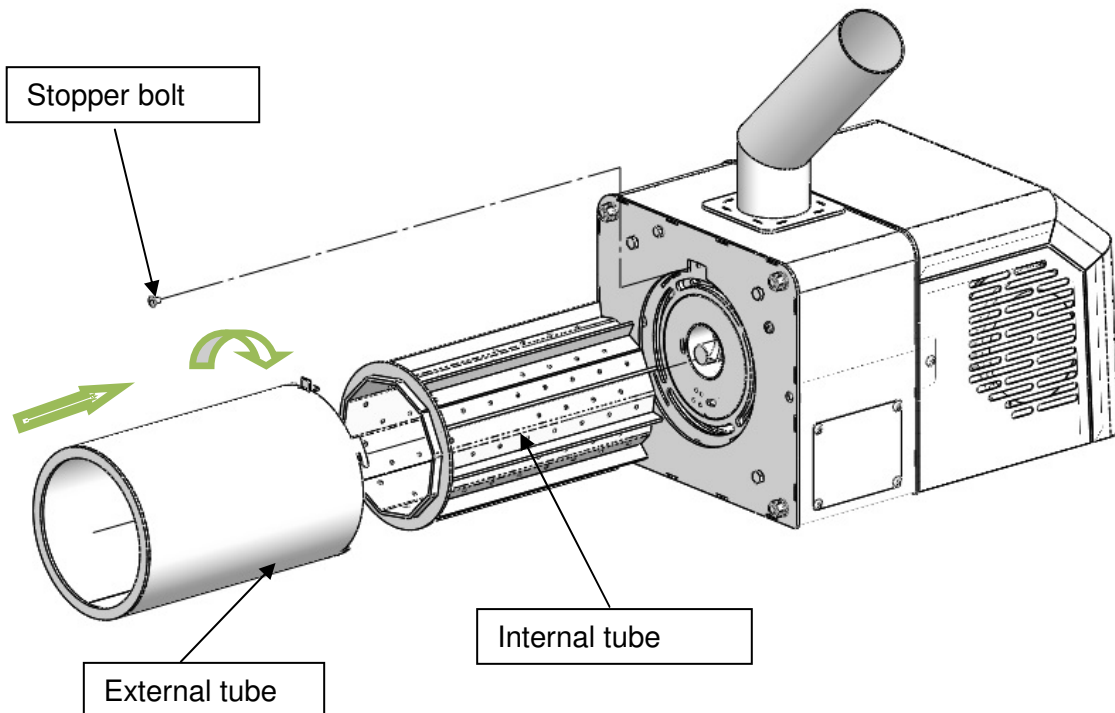
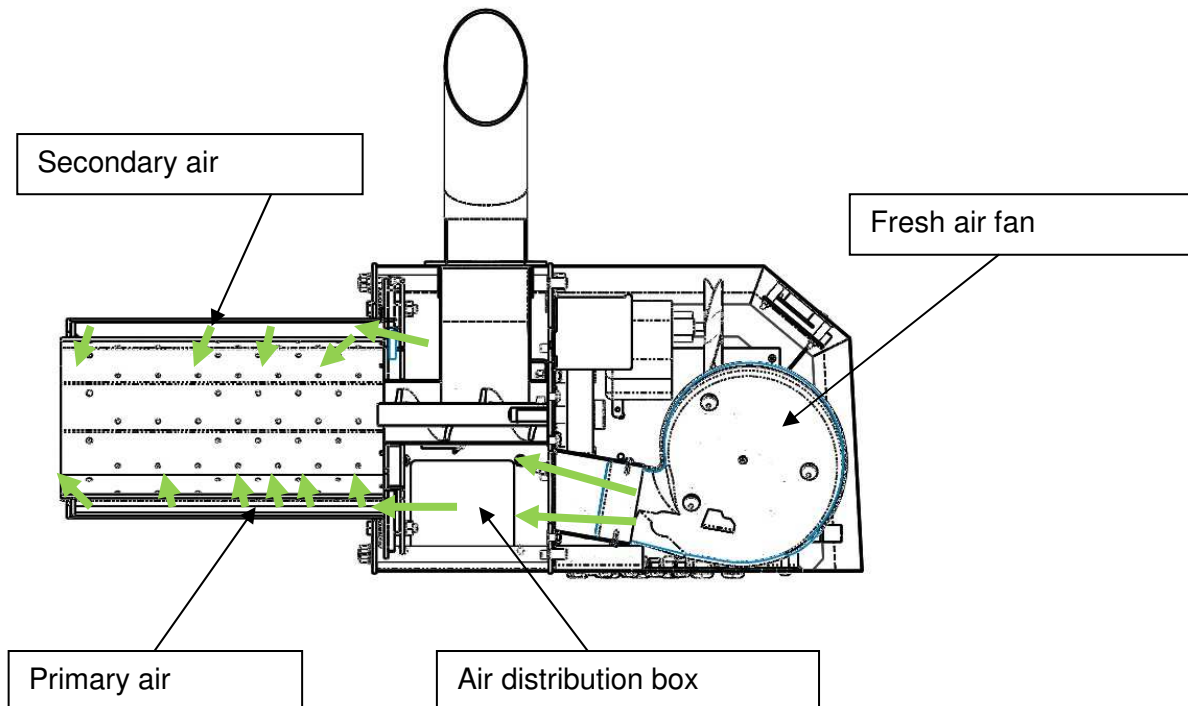


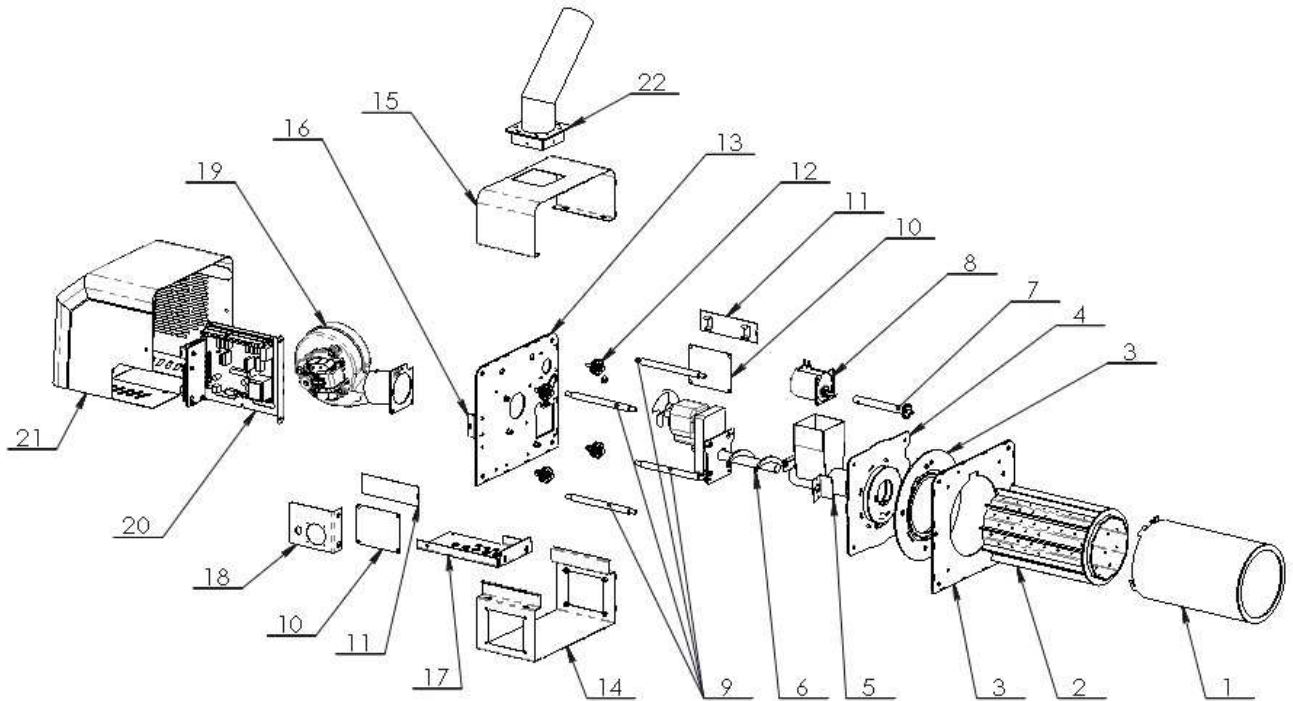
Figure 12 presents the diagram of primary and secondary air supplying in the tube pellet burner with rotary self-cleaning Bisolid GP xx R tsc.

Figure 12. Diagram for firing air supply in the burner



The diagram of the main components of a tube pellet burner with rotary self-cleaning Bisolid GP xx R tsc is shown in Figure 13.

Figure 13. Diagram of the main components of burner Bisolid GP xx R tsc



- |                                  |                                    |
|----------------------------------|------------------------------------|
| 1. External tube - 1 pc.         | 13. Main flange – 1 pc.            |
| 2. Internal tube – 1 pc.         | 14. Main shield – 1 pc.            |
| 3. Front flange – 1 pc.          | 15. Shield cover 1 – 1 pc.         |
| 4. Combustion group – 1 pc.      | 16. Stiffening profile – 2 pcs.    |
| 5. Inlet pipe for pellets – 1pc. | 17. Supporting stiffening – 1 pc.  |
| 6. Feeding group – 1 pc.         | 18. Contact profile – 1 pc.        |
| 7. Drive shaft – 1 pc.           | 19. Fan group – 1 pc.              |
| 8. Motor-gear – 1 pc.            | 20. PC board – 1 pc.               |
| 9. Restrictive axis – 4 pcs.     | 21. Cover– 1 pc.                   |
| 10. Lid – 2 pcs.                 | 22. Transition for pellets – 1 pc. |
| 11. Cover bracket – 2 pcs.       |                                    |
| 12. Poll – 4 pcs.                |                                    |

## 3.1. TUBE PELLET BURNER TECHNICAL DATA

The technical data for tube pellet burner Biolid GP xx R tsc are given in Table 6.

Table 6. Technical data of tube pellet burner Bisolid GP xx R tsc

Parameter		Dimension	Value
Preferred fuel		-	Woden pellets
Wood pellets category according to standard EN ISO 17225-2:2014		-	A1, A2, B
Used pellets categories (according to the manufacture company's classification)		-	A, AB, B, BC, C
Wastes after complete fuel burning		-	The quantity depends on the pellets ash content and on the burner's operation mode
Power supply voltage		-	L1, N, PE, 50Hz; 230VAC;
Electrical consumption	In nominal mode	A	0.3
	In ignition mode	A	5
Electrical power		W	$< 100^{+500}$ (+ at ignition)
Electrical protection		-	IP20

## 4. OPERATION INSTRUCTIONS

### 4.1. OPERATION OF BOILER BISOLD AUTOMAT

The boiler should be maintained only by adult persons, preliminary acquainted with the boiler operation and maintenance. The boiler service and maintenance personnel should strictly comply with the manual and should only commission the boiler, adjust the temperature of the thermal power regulator, decommission the boiler and conduct ongoing monitoring of its operation. After commissioning the boiler, the service technician should acquaint the user with the boiler operation and maintenance. Unattended children are not allowed near the boiler. Any activity on the construction of the boiler, which might endanger the life and health of the maintenance personnel or of persons present in the boiler room, is strictly forbidden.

The boiler should be operated at a maximum water temperature of 90 °C and is subject to ongoing control. Use of flammable liquids for easy firing as well as any activities related to increasing boiler rated power (overloading) are strictly forbidden. Positioning of flammable objects on top or near the boiler is not allowed. The ash should be taken out in fireproof container with cover.



In case of danger from penetration of flammable vapors or gases in the boiler room or any activities that might lead to fire or explosion (bonding flooring, varnishing with flammable paints or others), the boiler should be decommissioned before starting any of these activities.

### 4.2. SAFETY OPERATION OF THE BOILER

Relevant safety instructions should be observed when operating the boiler. Bisolid Automat Boiler should not be used for any other purposes except for those indicated in this manual.



When operating the boiler Bisolid Automat, always a heating circuit has to be included in which the water is circulated. If the heating radiators are equipped with thermostatic valves (or other control components), which close the circulations water flow. As a result of this process it is possible that the generated heat energy, from the fuel final combustion, can't be adopted by the heating system (can't be unloaded) and to lead to overheating of the appliance. Therefore in case the boiler Bisolid Automat is operated in heating systems with radiator regulation valves, it is necessary not to completely close the radiator valves, but to adjust them to minimum value. Also one of the radiators should not be equipped with regulation valve, in order to ensure adoption of the heat energy generated during the process of final combustion.

Boiler surface should be cleaned only with standard inflammable cleaners. Positioning of objects made of flammable materials near the boiler at an unsafe distance is not allowed.

It is not allowed to store flammable materials (wood, paper, oil, diesel oil, petrol and other readily flammable materials) in the boiler room. The minimum allowed distance between boiler's outer parts and the flue pipe and any average or not readily flammable materials (which dye out after firing without any additional heat energy), should be not less than 100 mm.

The allowed distance from readily flammable materials (which continue to burn after removal of the firing source) should be minimum 200 mm.



## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

Removal of solid waste, combustion process products, out of the ash tray should be performed using the ash box. The ash box (ash tray) should be emptied in good time before fully filled. All ash box related activities should be performed using a handle, situated on its front. After removing the box from the boiler the ash should be dumped in a preliminary prepared fireproof container. When handling or operating use gloves as protective equipment.



When installing the boiler and its safety and control components, do not forget that all installation works should comply with the safety at work principles.

## 5. BOILER BISOLID AUTOMAT COMMISSIONING

### 5.1. BOILER INSPECTION BEFORE COMMISSIONING

Before commissioning the boiler, the service technician should check:

- Whether the installation comply with the design.
- Whether the boiler is filled with water and under pressure and whether there are leakages in the heating system.
- The connection of the pellet tube burner to the boiler.
- Boiler connection to the chimney – the pipe connection should be approved by an authorised service specialist.
- Functioning of the heating regulators.



The service technician should train the user how to control the boiler and should fill-in the exact date of commissioning the boiler in the warranty card.

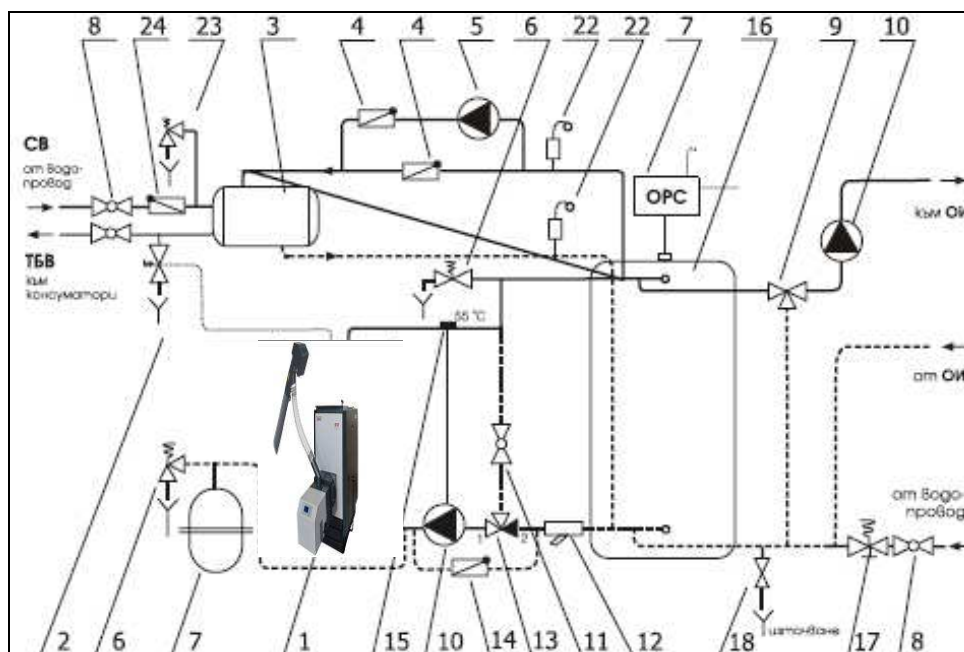


When installing a Bisolid Automat boiler on the heating system always observe the requirements indicated in section 9.5 for the installation of the boiler equipment excess heat release.

### 5.2. EXEMPLARY PRINCIPAL HYDRAULIC SCHEME

Exemplary principal hydraulic scheme for connecting the hot water boiler series Bisolid Automat to the heating system with OPENED expansion vessel is shown in Figure 14.

Figure 14. Exemplary principal hydraulic scheme for connecting boiler Bisolid Automat to heating system



1. Boiler Bisolid Automat
2. Safety valve
3. DHW boiler
4. Non-return valve
5. Circulating pump 1
6. Safety valve
7. Open or closed expansion vessel
8. Ball valve
9. Three-way mixing valve
10. Circulating pump 2
11. Ball valve
12. Water filter
13. Therموvalve TV
14. Non-return valve
15. Contact thewrmostat
16. Heat accumulator
17. Automat for filling of water
18. Tap for filling and draining
22. Automatic air vent with valve
23. Safety valve
24. Non-return valve



The exemplary hydraulic scheme is for information **ONLY**, and can not be used as practically implemented hydraulic scheme.



Completion of the installation and implementation of hydraulic tests of heating boiler Bisolid Automat shall be recorded in the report for commissioning and adjustment where mandatory the fields are filled in with the necessary information.

## 5.3. FILLING AND DRAINING THE HEATING SYSTEM

The system may be filled with water or drained only if the water corresponds to the parameters of the EN standards. The water should be clean, colorless, without suspended particles, oils and chemically corrosive substances, and it should not be acidic (pH factor must be higher than 7.0). First of all a comprehensive washing of the entire heating system should be performed.



Water amount in the system should not be decreased or drained except in the cases when the boiler is being repaired and there is risk of freezing. An antifreeze fluid can be added into the water system representing 15% of the total water quantity (see anti-freezing fluid instructions of the supplier).



Non-fulfillment of the above mentioned instruction might result in clogging the heat-exchanger. During the heating season the water volume in the heating system should be kept constant. When topping up water, be careful and avoid intake of air into the system. Water should never be drained out of the boiler or the heating system, except if it is absolutely necessary, like during repair and other. Draining and refilling the system with water increases the risk of corrosion and boiling stone (scale).

## 5.4. CONDENSATION AND TARS

In boiler initial commissioning the walls of the boiler condensates, which drains into the combustion chamber. Such condensation on the walls might cause doubt that the boiler “leaks”. The condensation disappears after depositing of ash on the inside walls, which is usually achieved after 2 to 4 ignitions. When operating at reduced power, at low water temperature in the boiler and low flue gas temperature, condensation forms on the inside

boiler walls, which drains into the combustion chamber. As the flue gas condensation point is 65 °C, the condensation forms only when the gases cool down in the middle layer of the boiler walls, where the temperature is lower than 65 °C. If condensation affects the combustion chamber as well, this means that the used fuel is too wet. In such a case, the condensate may leak into the combustion chamber even if the water temperature is higher than 65°C. Tar forms under similar conditions - low thermal power, low temperature and in case of improper regulation of the combustion process (insufficient amount of secondary air).

The tar is removed from the walls of the boiler using the provided tar scraper, but only when soft. This can be achieved at boiler water temperature around 90 °C. Such temperature, however, quickly takes the heaters out of their nominal mode of operation. Therefore, quickly burning soft firewood is recommended as optimum fuel.



If you decide to install an expansion tank to prolong boiler life, before that eliminate the possibility of low temperature corrosion along the fuel pass by maintaining boiler temperature above the dew point of 65 °C. This can be achieved by a mixing device. If low temperature corrosion is not limited, the boiler corrodes while the expansion tank, in most of the cases, reduces the life of the boiler body as a result of the pressure and the dynamic load on the boiler walls. Only service providers, duly authorized to perform such activities, have the right to install expansion tanks.



At boiler initial firing condensation may occur. This should not trouble the user as this is normal - especially when burning firewood with higher moisture. The boiler "dries" when reaching normal mode of operation.

### 5.5. BOILER MAINTENANCE

The combustion grate is cleaned by moving the lever forward and backward in a range of 10-15 cm by lifting the control lever. If you want to do a thorough cleaning after completion of the combustion process, the grate is drawn fully forward with the help of the lever of the grate.

The boiler should be used only up to its rated thermal power. Overheating the boiler results in limiting the life of the heat source, this is not recommended by the manufacturer. The boiler and the heating system should be dimensioned so that to avoid continuous operation with inlet water temperature of less than 65 °C - the dew point.

If the boiler works continuously in this mode of operation, its lifetime is reduced, resulting in heavy contamination and tar smearing on the boiler and the chimney, which results in limited chimney draft and creates other preconditions to degrade performance? For this purpose, we recommend during transitional seasons (spring, autumn) to fire the boiler for a short period of time at full thermal power, in order to burn the deposits and to dry the chimney.



The manufacturer does not recommend, under no circumstances, to burn sawdust, which significantly reduce the lifetime of the boiler.

## 5.6. BOILER CLEANING AND MAINTENANCE

After continues operation, soot and ash accumulate on the boiler walls, which reduces the performance of the equipment. The quantity of soot and the eventual tar depend on the operation of the boiler, the type of fuel used, the parameters of the chimney draft and the outlet water temperature. Cleaning of the boiler should be carried out according to need and operating conditions, but at least once a week.

After stopping its operation, the ash from the grate should be cleaned. The smoke damper is adjusted in the upper position and the heat-exchanger cover is taken off. Cleaning of the heat-exchanger is done with the cleaning tools provided with the boiler (steel scraper and brush). The soot fallen under the heat-exchanger is removed through the soot door. After cleaning the boiler, the ash door is returned to its initial position.

During cleaning, it is recommended to check the condition of the ceramic blocks in the combustion chamber. Damaged blocks are replaced with new ones.



Please strongly consider the timely closing of the flue gases flap of the boiler.



The ash must be stored (the ash has to be taken out by using appropriate gloves) in fireproof reliable containers and to be transported to open space. Other waste should not be stored in this container.

Maintenance of boilers series Bisolid Automat is done daily, periodically or annually.

In daily maintenance, the user must clean the unburned residues in the combustion chamber; clean the ash gathered in the combustion chamber and dumps the ash-box (ash-tray).

For effective use, to prevent possible problems with the operation and for optimum life of the boiler, it is very important that the user performs periodic maintenance of the equipment. A periodical check on every 3 months is recommended. Such checks should be performed by authorized service technicians and should include the following activities:

- Check boiler's combustion chamber and flue pipe, including the chimney. They should be cleaned if necessary.
- Check for leakages of inlet - outlet water, in and out of the boiler and water pipe connections.
- Check fittings including valves and flaps.
- Check the fresh air fan of the pellet burner.
- Check the circulation pumps.
- Visual check of the grate.
- Operation and safety control checks of the boiler hydraulic system.
- Check the unloading valve.

The annual preventive maintenance of the boiler should be carried out only by authorized technicians, before the start of the heating season. Before calling the service technicians the user should clean the flue pipe and the chimney. The annual preventive maintenance carried out by authorized service technicians includes the following checks and activities:

- Position of the fuel hopper and the combustion chamber, insulation and insulation ropes.
- Boiler testing at operating pressure for adjustment of combustion by measuring flue gas parameters if needed.
- Checking and cleaning the boiler grate and surfaces from soot and ash.

- Testing boiler connections for leakages.
- Checking fittings including nozzles, valves, pressure valves for reliable opening and closing.
- Testing and cleaning the water filter if needed.
- Checking and cleaning the expansion tank if needed.
- Testing the pressure sensor. Cleaning and replacement if needed.
- Operation and safety control check of the boiler hydraulic system.
- Testing proper operation of the unloading valve.

## 5.7. TUBE PELLETT BURNER CLEANING

The system for cleaning of tube pellet burner with rotary self-cleaning from Bisolid GP xx R tsc consists of:

- Mechanism for tube rotation.
- Motor-gear for mechanism rotation.
- PC board that controls the mechanism.

The cleaning of the rotary tube pellet burner is carried out in a certain algorithm, in the combustion process.



The adjustment of the automatic cleaning system of a rotary tube pellet burner from Bisolid GP xx R tsc must be performed by a certified staff.



In case of a warning alarm message for the failure of the pellet burner, **the user is obliged** to check for possible accumulation of fuel in the burner tube and fuel transport auger and in the presence of fuel to remove it.



The number and frequency of cleaning of the burner depend largely on the quality of the wood pellets. Fuel is necessary to meet the standard EN ISO 17225-2:2014, classes A1, A2 and B.

## 5.8. TUBE PELLETT BURNER MAINTENANCE

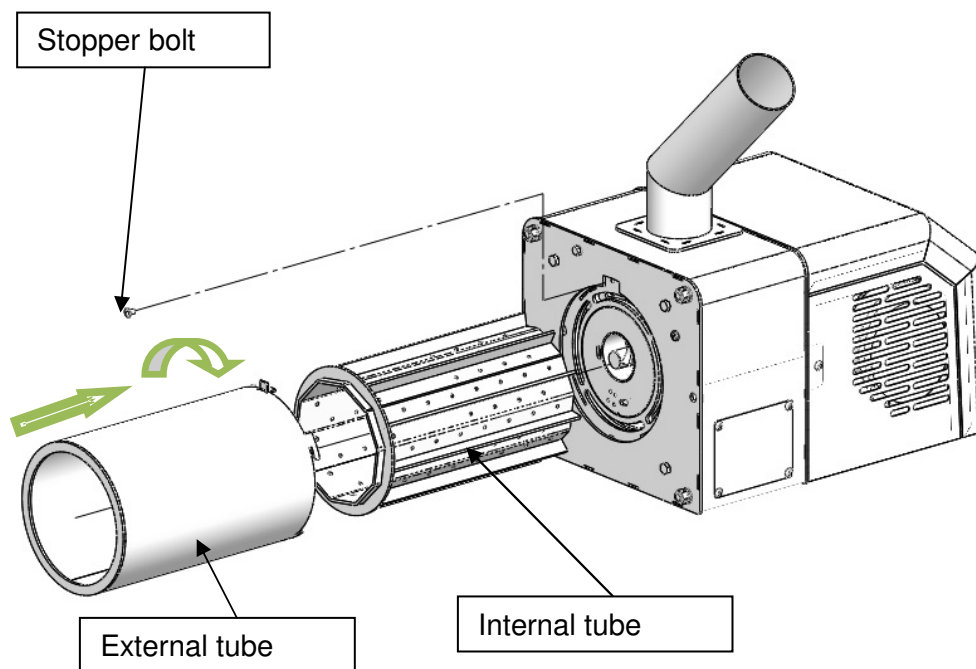
The time for cleaning (rotating tube) of the combustion chamber of rotary tube pellet burner Bisolid GP xx R tsc and cleaning the tube itself depends on the type and quality of the used fuel.



Before taking action on cleaning, servicing and repair, the pellet burner must be switch off from the electricity supply.

When cleaning the tube of pellet burner Bisolid GP xx R tsc need to be removed combustion head of the burner, as shown in the diagram in the following figure.

Figure 15. Diagram of the burner main module with dismantling tube



The tube of pellet burner is removed after cooling of the base module so that be safety in tube handling in its cleaning. During the cleaning should pay particular attention to overall cleaning of the holes through which air supply and that provides efficient combustion process and optimum cooling.

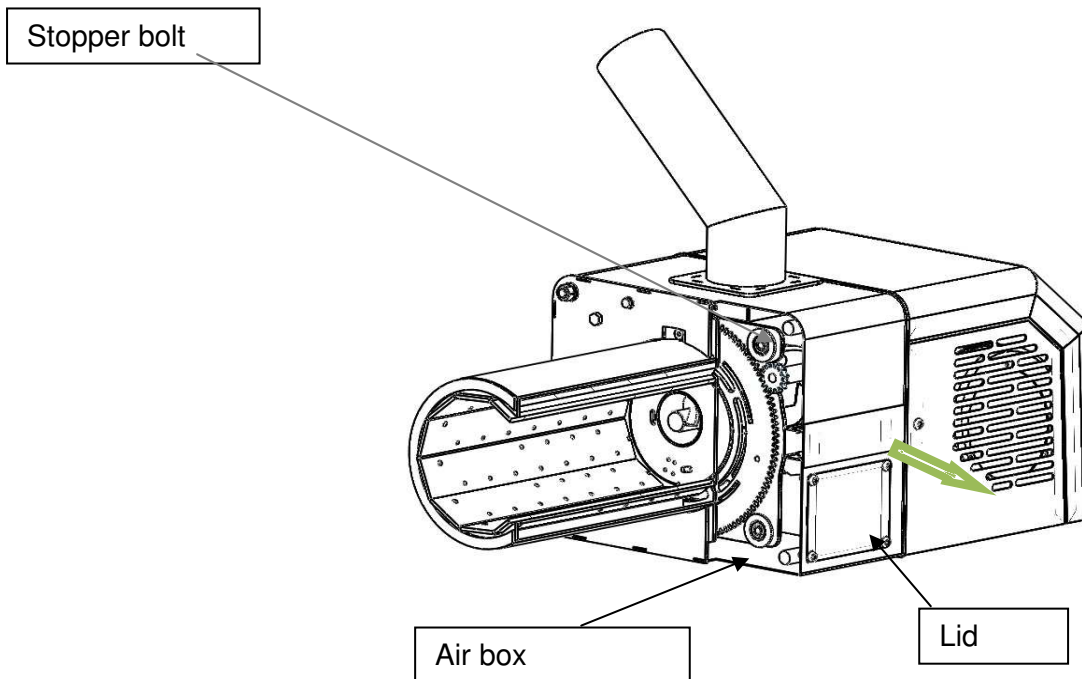


The ash cleaning from the burner and boiler and also removal of the ash container must be performed by personal safety means (cloves and cuffs). We recommend in dismantling and mounting works to be used respective tools.

The burner tube is positioned against the stopper bolt supporting the tube to the main part of the burner. The dismantling of the stopper bolt is done by developing of the bolt, after which the tube is rotated in the direction counterclockwise to the front part of the burner and pull out.



Figure 16. Cross-sectional view of the burner tube, showing the position of the tube relative to the main part of the burner



It is carrying out inspection and cleaning of the air box of the tube pellet burner whose cover is shown in the diagram in Figure 16. Access to the air box is possible from both sides of the burner due to the presence of two lids.



The maintenance of a boiler should only be performed by adult persons who are familiar with the instructions of the equipment operation.



When the tube pellet burner is switched off by the user it is necessary waiting for the complete combustion of residual fuel according to the parameters mentioned in Table 13.

## 5.9. PELLET BURNER SERVICING

The regular tube pellet burner servicing by the user guarantees efficient, economic and reliable operation of the appliance.



Before taking action on cleaning, servicing and repair, the pellet burner must be switch off from the electricity supply.



During the cleaning of a tube pellet burner the user must use personal protective means (gloves and cuffs).



## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

The user has to periodically, at least once per day or longer, depending on the fuel ash content, but no longer than five days of operation, to switch off the burner. This measure guarantees effective after-burning of the fuel and combustion chamber cooling.

After the pellet burner cools down the ash and/or slag must be cleaned from the combustion chamber fire-grate. The flexible pipe connecting the fuel transport auger and the burner fuel inlet pipe must be cleaned from dust at least once per week.



Dust depositing on the flexible pipe walls can lead to distortion of the fuel feeding, igniting the dust as a result of emergency situation, in consequence of which hot flue gasses might pass through it.



It is necessary that the user is fully introduced with the information presented in the current operation manual, in connection with the pellet burner operation, its control and servicing.

### 5.10. BOILER REPAIR

The user may only carry out replacement of spare parts as per the attached list. Large scale repairs should be performed only by an installation or service provider.

Boiler service personnel is entitled to perform only repair activities that do not require special qualification and represent simple replacement of parts such as grates, sealing ropes, ceramic blocks, secondary air pipe and smoke damper. All other failures should be repaired by an authorized service provider.



Only genuine spare parts should be used when repairing the boiler.

### 5.11. WARRANTY AND WARRANTY TERMS AND CONDITIONS

We pay attention to users that commissioning and service maintenance of all Bisolid Automat hot water boilers should be performed by a specialized installation company. Otherwise, any eventual warranty claims shall not be accepted. Warranty issues are claimed immediately after detecting the defect. The warranty period is indicated in the warranty card, which is provided as a basic accessory to the boiler and is determined by precisely following the instructions in the current installation, operation and maintenance manual. The Buyer has to submit a warranty claim in writing to the Seller or to an authorized service provider.



The manufacturer reserves the right to make changes, related to the product technical optimization.

### 5.12. BOILER ACCESSORIES UPON DELIVERY

Bisolid Automat series hot water boilers are delivered fully assembled and functionality tested. Bisolid Automat boilers accessories upon delivery are presented in Table 7.

Table 7. Accessories of Bisolid Automat series boilers

No	Name	Bisolid Automat
		(pcs.)
1	Bisolid Automat hot water boiler	1
2	Tube pellet burner Bisolid GP xx R tsc	1
3	Bisolid pellet auger	1
4	Other suitable fuel loading door	1
5	Ash cleaning door	1
6	Grates	2
7	Ash tray	1
8	Electrical panel	1
9	Cleaning tool - scraper	1
10	Cleaning tool - brush	1
11	Cleaning tool - hook	1
12	Flue gas sensor with transmitter	1
13	Operation manual	1
14	Warranty card	1

Available spare parts at request:

- Sealing rope for the fuel feeding door.
- Cast-iron grate (two identical)
- Sealing rope for the ash cleaning door.
- Ash cleaning door - set.
- Soot door, soot door sealing.
- Flue gases flap.
- Set of heat-exchanger covers.
- Heat-exchanger cover sealing rope.

Special requirements for spare part should be coordinated with the manufacturer.



When sending spare parts requests, please indicate the boiler type, its size, factory number and year of production.

Spare parts and accessories for the boilers can be ordered to the service technician who performed the installation or directly to the supplier.

## 5.13. ACTIONS AFTER COMPLETION OF THE BOILER LIFE-CYCLE

After completion of the life-cycle of a Bisolid Automat series hot water boiler, its destruction should be performed in an environmentally-friendly manner. For this purpose, the boiler and the pellet tube burner are dismantled and the modules are brought to the recycling centers - as secondary raw materials, in compliance with the principles of separate waste collection.

## 6. BOILER OPERATION AND CONTROL USING PREFERRED FUEL (WOOD PELLETS)

### 6.1. PURPOSE OF THE TUBE PELLET BURNER

The purpose of the fully automated tube pellet burner with manual cleaning Bisolid GP xx R tsc as part of the accessories of Bisolid Automat series boiler is to heat sites with small and medium sizes.

The pellet tube burner is a very good heating solution by burning wood pallets. What is more, pellet burner Bisolid GP xx R tsc may automatically fire other suitable fuel, used by the user, like firewood and wood chips, then stop and subsequently, if the boiler other suitable fuel has been burned out to start automatically burn wood pellets.

The automatic electric ignition, the automatic selection of the thermal power (optimization mode with room thermostat) and the multi-functional indicator control panel of the pellet tube burner make it easy and comfortable to use during the heating season.

Pellet burner Bisolid GP xx R tsc is designed to burn wood pallets compliant with standard EN ISO 17225-2:2014, classes A1, A2 and B with the relevant quality characteristics that are shown in Table 1 and Table 2. The fuel and air mix in the burner in a controlled way result in an ecological highly efficient combustion.

The required minimum time for maintenance of tube pellet burner Bisolid GP xx R tsc, depending on the characteristics and the quality of the wood pellets, is once a week.

The optimum functionality of the equipment depends both on the professionally designed heating installation and on the precise maintenance of the pellet tube burner.

### 6.2. PURPOSE OF THE PELLET BURNER CONTROLLER

The controller is designed to provide automatic control of the combustion process and to adjust the power of the pellet burner, depending on the heating needs of the building or the premises.



Hot water boilers series Bisolid Automat are designed to work with preferred fuel (wood pellets) and other suitable fuel (firewood and wood chips). The working algorithm requires the presence of pellets because the ignition of the other suitable fuel and optimal burning is assisted by the pellet burner operation. In principle, it is possible to work only with pellets, but the optimal use of the opportunities of boilers, and heat output becomes both fuels.



It is forbidden directly ignition of hot water boilers series Bisolid Automat using other suitable fuel (firewood or wood chips) without to be switch on the pellet burner controller!  
**Switch on the pellet burner controller before starting operation of the boiler!**

## 6.3. OPERATION OF THE PELLET BURNER CONTROLLER

The device can control the following system modules of the pellet burner:

- Fuel feed auger 1.
- Fuel feed auger 2.
- Fresh air fan and flue gases fan.
- Electric heater to ignite the pellets.
- Cleaner to clean ash.
- Boiler circulation pump.



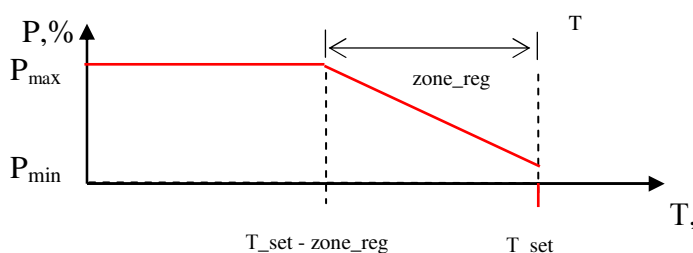
At primary switch on, as well as when switching the power supply off, the burner goes through a stop procedure.

## 6.4. STARTING THE PELLET BURNER

When missing stop signal or in case of emergency situation and there is difference between the adjusted and the measured temperature from the **To** sensor, then the burner starting procedure initiates. The initial fuel doze is loaded and the ignition switches on.

After establishing the presence of flame the burner heating output increases. When the modulation zone „**Zone\_reg**” has been reached the burner heating output decreases and when the desired water temperature or flue gases temperature has been reached the burner operates at its minimum heating output. When higher than the adjusted temperature has been reached, the system responds with stop procedure.

When the burner is in the modulation mode and the power is reduced accordingly, upon temperature decrease the power starts to increase automatically.



## 6.5. STOPPING THE PELLET BURNER

In case of a stop signal, emergency situation or measured temperature above the setup, the system initiates a stop procedure. It waits until last fuel dose is burned. Next is the time for ventilation, during which the combustion chamber cools down and the residual ash from the combustion grate is blown out.

## 6.6. BURNER GSM CONTROL MODULE (OFFERED AS AN OPTION)

The control of the pellet burner through a GSM module is done by sending SMS commands. It allows for stopping, starting and current status monitoring. (See Section "SMS Commands")

## 6.7. METHODS FOR FORMING THE DESIRED TEMPERATURE

### 6.7.1. MANUAL DETERMINATION OF THE HEATING WATER ASSIGNMENT ( $T_b$ set)

In this case, the assigned values are independent of other factors such as external temperature and room temperature, a value is selected to be maintained. (See Section Programming "Service Settings").

There is provided possibility for room thermostat using, and this thermostat to be connected to the the rear panel of the boiler.

### 6.7.2. DETERMINATION OF THE HEATING WATER ASSIGNMENT BY ROOM THERMO-REGULATOR



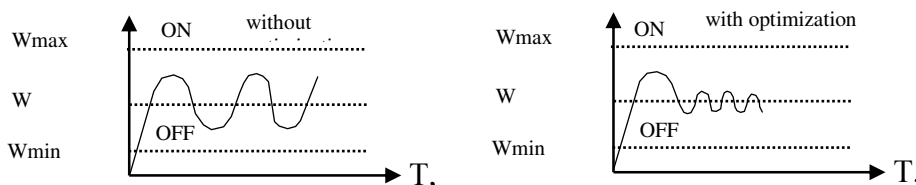
This mode is applicable only if using contact room thermostats with **"independent outlet"**. (See Section Programming "Service Settings").



The room thermostat may be used **ONLY** when operating the boiler with the preferred fuel (wood pallets) without adding other suitable fuel!

#### Time for optimization.

When using optimization time, the number of fluctuations of the setup values of the heating water are decreased, which leads to much better regulation of the heating water. It can be selected from 0 to 60 min, with a pitch of **5 minutes**. (See Section Programming "Service Settings").



When the room thermo-regulator is switched on or off and there is no optimization (0 minutes), the setup values of the heating water are:

- At switching on – maximum.
- At switching off – minimum.

When the room thermo-regulator is switched on or off and there is an optimization (5-60 minutes), the setup values of the heating water are:

- At switching on– an increase starts and the maximum setup values are reached at the end of the optimization time, only if there has been no switching off during that period.
- At switching off – a decrease of the setup values starts, and the minimum setup values are reached at the end of the optimization period, only if there has been no switching on during that period.

## 6.8. TEMPERATURE RESTRICTIONS AND PROTECTIONS

When operating tube pellet burner Bisolid GP xx R tsc it is necessary to consider the following temperature restrictions and protections:

- Minimum setup values of the inlet water temperature.
- Maximum setup values of the inlet water temperature.
- Water freezing protection.
- Boiler overheating and „back-fire” protection.
- Circulation pump blocking protection.
- Maximum setup values of the temperature of the exhaust gases for main inlet fuel and for other suitable fuel.



Freezing protection - starts the burner at temperatures below **5 °C**.

Boiler overheating and „back-fire” protection – blocking thermostat inlet, when opening the signal contact, the burner stops.

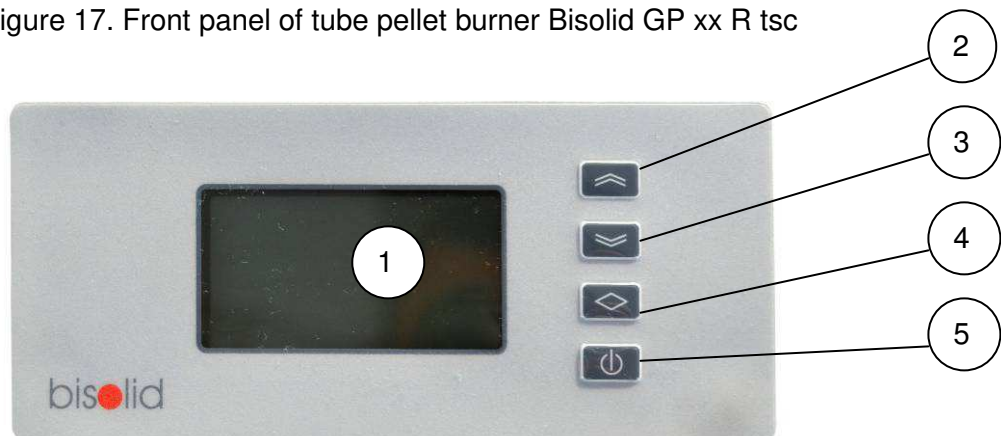
Protection from blocking the circulation pump – drives/rotates the pump for 5 minutes, in case it has not been operating for 24 hours.

The maximum and the minimum setup values of the heating water temperature delimit the water supplied to the premises. (See Section Programming “Service Settings”).

## 6.9. PELLET BURNER FRONT PANEL

Figure 17 shows the front panel - intuitive LCD display of a tube pellet burner Bisolid GP xx R tsc. Parameters indications on pellet burner display are given in Figure 18.

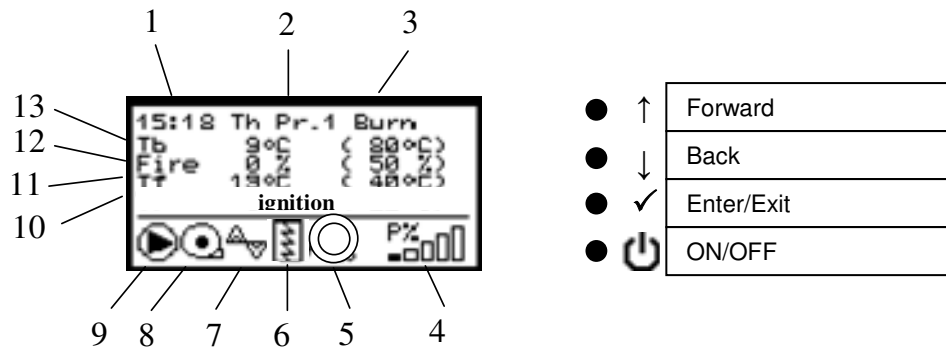
Figure 17. Front panel of tube pellet burner Bisolid GP xx R tsc



1. Front panel indication – intuitive LCD display.
2. Changing button “**Forward**” / or manually switching on/off the pellets transport auger (if holded for 5 sec. together with additionally known conditions described below).

3. Changing button “**Back**”.
4. Button for **Enter/Exit** from programming mode (user settings), switch ON/OFF (if holded for 5 sec).
5. Button **ON/OFF**.

Figure 18. Display indication of pellet burner series Bisolid GP xx R tsc



In the basic state the display shows the following parameters:

1. Time and day of the week.
2. Execution of weekly program N ....
3. **Stop / Start / Burn** - performed procedure.
4. Current exploited power.
5. Indicator room thermostat , alarm or tubus cleaner ;
6. Indicator igniter or for ignition other suitable fuel ;
7. Indicator work auger numbers 1 and 2 blinks in manual switching.
8. Indicator working fans with numbers 1 and 2.
9. Indicator working pump.
10. **Tfg** - temperature flue gas (assignment).
12. **Fire** - light sensor (assignment).
13. **Tb** - water temperature.

## 6.10. OPERATION (FUNCTIONING) OF THE PELLET BURNER



Only user information is presented in this part of the operation manual. The information for service specialists is presented separately.

The controller of the tube pellet burner is switching on and off:

- By pressing and holding the button **ON/OFF**. When the burner is switched off then appears "**Stopped**".
- In the off position when on the display shows one of the above messages by pressing and holding for about 10 seconds on the button „✓” can be switched on and off in manual way pellet auger with aim filling when the auger is empty.



Before manually switching on of pellet burner you have to verify that the burner is burnt out.

With buttons „↑” or „↓” scroll until on the display is shown the menu with the desired parameters, then press „✓”:

- For choice of settings, scroll move the cursor „\*” with buttons „↑” or „↓” to make change and return to choice of settings press button „✓”.

- The setting which changes startsto blink, with buttons „↑” or „↓” you can change the net value.
- After completing the settings, select „EXIT” and press button „✓” to save the changes.



The controller (the pellet burner) may be switched on and off by the front panel or by the remote controller inlet. A **START** key is plugged-in to the remote controller with two stable positions.

**WE RECOMMEND TO START AND STOP THE PELLETT BURNER USING THIS START KEY!** The controller is switched off irrespective of the place where the command **STOP** has been initiated, but can only be switched on when the command **START** appears in both places.



The burner **SHOULD NOT SWITCH OFF** to complete combustion the other suitable fuel (firewood, wood chips) into the combustion chamber of the boiler! While **NOT FULLY BURNT EMBERS OF WOOD OR WOOD CHIPS**, pellet burner **SHOULD NOT BE SWITCH OFF OR DISCONNECT!**

## 6.10.1. USER`S SETTINGS

User's Settings	
Fuel	Pellet&Wood
time&day	08:30 Fr
Language	Eng
EXIT	

Table 8. Parameters of the pellet burner user`s settings

Name	Indication	Limit	Factory settings
Fuel type	Fuel	Pellet&Wood	Pellet&Wood
Current hour and day	time&day	hh/mm/d	
Language	Language	Eng / Bul	Eng

## 6.10.2. WEEKLY TIMER

Weekly timer	
*Program	1
00:00	to 24:00
SuMoTuWeThFrSa	
EXIT	



Table 9. Weekly timer setup parameters

Name	Indication	Limit
Program number	Program	1 - 4
Interval		00:00 – 24:00
Day of the week	SuMoTuWeThFrSa	Su – Sa (from Sunday to Saturday)



To allow operation of the controller, a working interval should be set on one of the four programs at least. When setting up identical starting and closing time of the interval, the program is inactive.

Turning off a weekly program is indicated by **Pr.0**, and when in operation the number of the active program is displayed (**Pr.1 – Pr.4**).

The selection of a flashing period indicates the duration of the program. The selected program can apply for only one day, for a period from Monday to Friday, Saturday and Sunday and for the entire week. The flashing indicator shows the selected option.

### 6.10.3. ALARM MESSAGES

The presence of an alarm message during operation of the pellet burner is indicated by an icon .

Alarm	
No Fire	OK
Low Tb	OK
In BT	OK
In FC	OK

Table 10. Information for the alarm messages

Name	Indication	Status	Recovery
No flame	No Fire	OK / Err	Switch off and on
Risk of freezing	Low Tb	OK / Err	Increasing temperature
Overheating (activated blocking thermostat)	In BT	OK / Err	Switch off and on
No air flow (flow device) - switch off pressure switch or Hall sensor	In FC	OK / Err	Switch off and on

**OK** - normal condition, **Err** - alarm.



In case of a warning alarm message fault of pellet burner, **the user is obliged** to check for possible accumulation of fuel in the burner tube and fuel transport auger and in the presence of fuel to remove it.

## 6.11. SERVICE SETTINGS

When using the controller service settings of the pellet burner, the access is allowed by a password. The password is reactivated after exiting the menu, if within 15 seconds no button is pressed.



The service settings procedures of the pellet burner are password protected and can be applied only by trained service specialists, disposing of additional information.



In the transitional seasons it is recommended to operate the boiler **ONLY** with wood pellets, in order to avoid the danger of overheating when the used fuel is in the form of wood or wood chips.

### 6.11.1. IGNITION SETTINGS

Ignition settings	
Load	90 s
Blowing	2 m
Fire time	8 m
Preheat	100 s
Fan1	48 %
Inflame	120 s

Ignition settings	
T set	70 °C
Zone reg.	10 °C
Tfg set	160 °C
Zone_reg Tfg	20 °C
Tubus work	0 %
EXIT	

Table 11. Ignition settings of pellet burner

Name	Indication	Limit	Factory settings Bisolid Automat 25	Factory settings Bisolid Automat 35	Factory settings Bisolid Automat 45	Factory settings Bisolid Automat 60
Time for loading	Load	2 – 480 s	20 s	20 s	20 s	20 s
Time for blowing	Blowing	0 – 10 m	2 m	2 m	2 m	2 m
Time for flame occurrence	Fire time	1 – 15 m	3 m	3 m	3 m	3 m
Time for preheating	Preheat	0 – 180 s	20 s	20 s	20 s	20 s
Fan for fresh air	Fan1	20 – 100%	70%	70%	70%	70%
Time for inflame	Inflame	60 – 600 s	120 s	120 s	120 s	120 s
Water temperature	T set	0 - 90 °C	70 °C	70 °C	70 °C	70 °C
Zone regulation of Tk	Zone reg	0 - 30 °C	5 °C	5 °C	5 °C	5 °C
Flue gases temperature	Tfg set	100- 400 °C	200 °C	200 °C	200 °C	280 °C
Zone regulation of Tfg	Zone reg Tfg	0 – 30 °C	10 °C	10 °C	10 °C	10 °C
Tubus operation	Tubus work	0 – 100%	0%	0%	0%	0%

## 6.11.2. BURN MODE SETTINGS

Min<Burn>Max		Min<Burn>Max	
Load	2 - 8 s	Tubus per	10 s
Pause	14 - 14 s	Tubus work	10 %
Fan1	48 - 100 %	EXIT	
Feeder 2 +	5 s		

Таблица 12. Burn mode settings of preferred fuel (pellet burner)

Name	Indication	Limit	Factory settings	Factory settings	Factory settings	Factory settings
			Bisolid Automat 25	Bisolid Automat 35	Bisolid Automat 45	Bisolid Automat 60
Time for loading	Load	1 – 240 s	2 – 5 s	2 – 6 s	2 – 7 s	4 – 10 s
Pause-time for burning	Pause	1 – 240 s	17 – 16 s	17 – 12 s	17 – 8 s	15 – 6 s
Fan for fresh air	Fan1	20 – 100 %	40 – 80 %	40 – 85 %	45 – 90 %	50 – 80 %
Extra time for auger 2 operation	Feeder2+	0 - 250 s	18s	18s	18 s	18 s
Tubus period	Tubus per	0 – 240 s	35 s	35 s	35 s	35 s
Tubus operation	Tubus work	0 – 100 %	10 %	10 %	10 %	10 %

## 6.11.3 STOP MODE SETTINGS

Stop settings	
*Burn out	5 m
Fan1	100 %
Cleaning	10 s
EXIT	

Таблица 13. Stop mode settings of pellet burner

Name	Indication	Limit	Factory settings	Factory settings	Factory settings	Factory settings
			Bisolid Automat 25	Bisolid Automat 35	Bisolid Automat 45	Bisolid Automat 60
Time for burn out	Burn out	0 – 15 m	1 m	1 m	1 m	1 m
Fan for fresh air	Fan1	20 - 100 %	60 %	60 %	60 %	60 %
Cleaning	Cleaning	0 – 240 s	90 s	90 s	90 s	90 s



In boilers Bisolid Automat 25, Bisolid Automat 35, Bisolid Automat 45 and Bisolid Automat 60 the fan is equipped by flap closed on ½.

## 6.11.4. COMMON SETTINGS

Common Settings	
FC delay	30 s
Fire set	30 %
Tpump set	40 °C
Pulse/rev	0

Table 14. Common settings of pellet burner

Name	Indication	Limit	Factory settings
Delay of response of the flow sensor	In FC	1 – 240 s	30 s
Assignment of light sensor	Fire set	0 – 99 %	30 %
Assignment pump switch on	Tpump set	10 – 70 °C	40 °C
Pulse revolutions	Fan1 pulse/rev	0 - 12 0 - inactive	1

## 6.12. SMS COMMANDS

The GSM module is optional and it is connected to „**CON7**” of the indication board. When available, the GSM symbol appears on the indication. The SMS commands should be with Latin letters using only capital or only small letters.

Example: BSTOP and bstop - correct, Bstop - wrong.

Table 15. Description of pellet burner GSM control commands

Name	Indication	Action
Stop	BSTOP	Stops the burner - identical to ON / OFF button
Start	BSTART	Starts the burner - identical to ON / OFF button
Current status	BINFO	Sends an SMS with the current status
Emergency phone number	BPHONE	Records the telephone number from which the message has been sent and in case of missing flame, missing air flow or activated blocking thermostat sends a notification.

BSTOP and BSTART commands have the same effect as **ON / OFF** button and when turned on, the weekly program runs. In case of emergency, if no telephone number is recorded, a check is performed for the last telephone number that has sent an SMS and if no such number the notification is not sent. When SMS command is received, a reply SMS is sent to the number that has sent the command.

## 6.13. PELLET BURNER ELECTRICAL CONNECTIONS

When connecting tube pellet burner series Bisolid GP xx R tsc to the electrical installation, it is necessary to bear in mind the following technical characteristics (Table 16).

Table 16. Pellet burner technical characteristics

Name	Parameter
Supply voltage	~230V; 50Hz
Igniter outlet	~230V; 0.30kW
Circulation pump outlet	~230V; 0.35kW
Fan outlets	~230V; 0.25kW
Fuel feed auger outlet	~230V; 0.25kW
Cleaner/tubus rotation outlet	~230V; 0.25kW
Heating water sensor	Pt 1000 (-50 до +250 °C)
Flue gas sensor	Pt 1000 (-50 до +250 °C)
Flame sensor	Photo-resistor
Room thermostat inlet	Independent contact
Blocking thermostat inlet	Independent contact
Flow sensor / revolutions inlet	Independent contact / Hall sensor as an option
Measurement unit	1 °C
Humidity	up to 80.0%
Degree of protection	IP00



All the activities related to connecting the pellet burner to the electrical installation should be performed only by a certified trained person.



The pellet burner should be connected to the electrical installation of the equipment to which it is installed, by observing the safety rules.

## 7. BOILER OPERATION AND CONTROL WHEN OPERATED WITH OTHER SUITABLE FUEL

### 7.1. BOILER FUEL LOADING AND IGNITION



Hot water boilers series Bisolid Automat are designed to work with preferred fuel (wood pellets) and can utilize other suitable fuel (firewood and wood chips). The working algorithm requires the presence of pellets because the ignition of the other suitable fuel and optimal burning is assisted by the pellet burner operation. In principle, it is possible work only with pellets, but the optimal use of the opportunities of boilers, and heat output becomes both fuels.



It is forbidden directly ignition of hot water boilers series Bisolid Automat using other suitable fuel (fire wood or wood chips) without to be switch on the pellet burner controller!

**Switch on the pellet burner controller before starting operation of the boiler!**



The user firstly has to start boiler operation in preferred fuel mode (wood pellets) With purpose to be heated flue gases system (minimum 30 min. in nominal heating output) and after that the boiler to go in the operation mode with other suitable fuel (firewood or wood chips).

Before igniting other suitable fuel in the form of firewood and wood chips in Bisolid Automat series hot water boilers check:

- Water quantity in the heating system.
- Sealing of the heat-exchanger cover.
- Installed pellet tube burner condition.



The flue gases flap should not be left opened except for 1-2 minutes while loading the boiler fuel hopper with other suitable fuel (firewood and wood chips).

The role of the flue gases flap is to bring the flue gases out of the boiler fuel hopper to the chimney only during loading other suitable fuel. The flue gases flap is opened before opening the door for loading the boiler other suitable fuel to enable extraction through the chimney of the flue gases collected in the combustion chamber. This prevents smoke in the boiler room and the risk of inhaling flue gases while loading other suitable fuel in the boiler. The flue gases flap should no be opened for more than one or two minutes i.e. only during loading the hopper with other suitable fuel, and should be closed immediately after that.



Do not start the boiler, before connecting the boiler to the chimney.  
Check chimney connections before starting the boiler.  
Check chimney draft. If the draft exceeds the recommended values install a draft regulator.



In the transition seasons it is recommended boiler operation **ONLY** with wood pellets, in order to avoid the danger of overheating when is used fuel in the type of firewood or wood chips.

Other suitable fuel ignition (firewood and wood chips) is done as follows:

The pellet tube burner may operate both independently and by using other suitable fuel. When starting the pellet burner, in case no other suitable fuel is added, the burner will operate as a standard pellet burner. When starting the burner in the event that other suitable fuel is added, other suitable fuel ignition takes place, then the burner stops and the combustion process continues with other suitable fuel (firewood and wood chips). The other suitable fuel combustion process will continue until other suitable fuel is available in the boiler fuel hopper. In the event that other suitable fuel is exhausted (firewood and wood chips), the pellet burner will continue to operate maintaining the temperature set by burning wood pellets. Other suitable fuel can be added during operation of the pellet burner as well.



The pellet burner **SHOULD NOT BE SWITCH OFF** to the complete combustion of the other suitable fuel (firewood, wood chips) in the boiler combustion chamber!  
 While not completely burnt the embers from wood or wood chips the pellet burner **SHOULD NOT BE SWITCH OFF OR DISCONNECTED!**

Criterion for successful ignition of the other suitable fuel is the temperature of the flue gases. When reaching this temperature, the burner modulates its operation to minimum power until reaching a set water temperature (parameter) and after that it stops. The boiler enters into other suitable fuel combustion mode. This mode continues until reaching the water temperature set. When reached, the fan stops its operation and before that it has been in a modulation mode approaching the temperature set. When the water temperature drops, the fan is switched on again. It is possible that the burner starts again in case the water temperature drops down below a set value (parameter).

At first ignition, to control the optimum condition of the flame, quality combustion control is recommended. It includes monitoring the condition of the smoke from the chimney. Lack of excessive smoke from the chimney is a sign of quality combustion, but if there is such, this means that there is a deficiency of secondary air in the combustion chamber.



Bisolid Automat series hot water boilers are not designed to burn coal.

## 7.2. OTHER SUITABLE FUEL SETTINGS

Other suitable fuel settings	
Tb set	80 °C
dT Fan1	10 °C
Fan1	48 – 100 %
Tfg_lim	60 – 260 °C

Other suitable fuel setting	
* Fan3	48 – 100 %
	EXIT

Table 17. Other suitable fuel settings (firewood or wood chips)

Name	Indication	Limit	Factory settings Bisolid Automat 25	Factory settings Bisolid Automat 35	Factory settings Bisolid Automat 45	Factory settings Bisolid Automat 60
Other suitable fuel assignment	Tb set	5 – 90 °C	75 °C	75 °C	75 °C	75 °C
Zone for revolutions controlling	dT Fan1	0 – 30 °C	10 °C	10 °C	10 °C	10 °C
Fan for fresh air	Fan1	15 – 100 %	40 – 100 %	40 – 100 %	45 – 100 %	40 – 100 %
Range of flue gases temperature	Tfg_lim	10 – 400 °C	60 – 220 °C	60 – 230 °C	60 – 240 °C	60 – 320 °C
Flue gases fan	Fan3	15 – 100 %	48 – 100 %	48 – 100 %	48 – 100 %	48 – 100 %

## 7.3. BOILER SWITCH OFF

We do not recommend accelerating the combustion process of the boiler. The fuel should burn completely by itself on the combustion grate.

After switching off the boiler, clean the boiler, take out all combustion residue, empty the ashbox (ash tray), clean contact surfaces of the feeding door and the ash box, and then close the feeding door of the boiler and the door of the ash box.

### 7.3.1. STOPPING THE BOILER FOR A LONG PERIOD OF TIME

When stopping the boiler for a long period of time (at the end of the heating season), the boiler should be completely cleaned from all unburnt deposits (soot, ash and sludge). Otherwise, the accumulation of moisture in the unburned gases leads to excessive boiler corrosion.



The boiler can be operated only by adult persons who are well acquainted with this operation manual.

Turn the boiler off every time, if any (even temporary) danger of presence of flammable or explosive vapors in the room, from which the combustion air is supplied to the boiler (for example, from paint during painting, from spraying and laying molten substances, from gas leakage etc).

Boiler ignition with explosive substances is strictly forbidden.

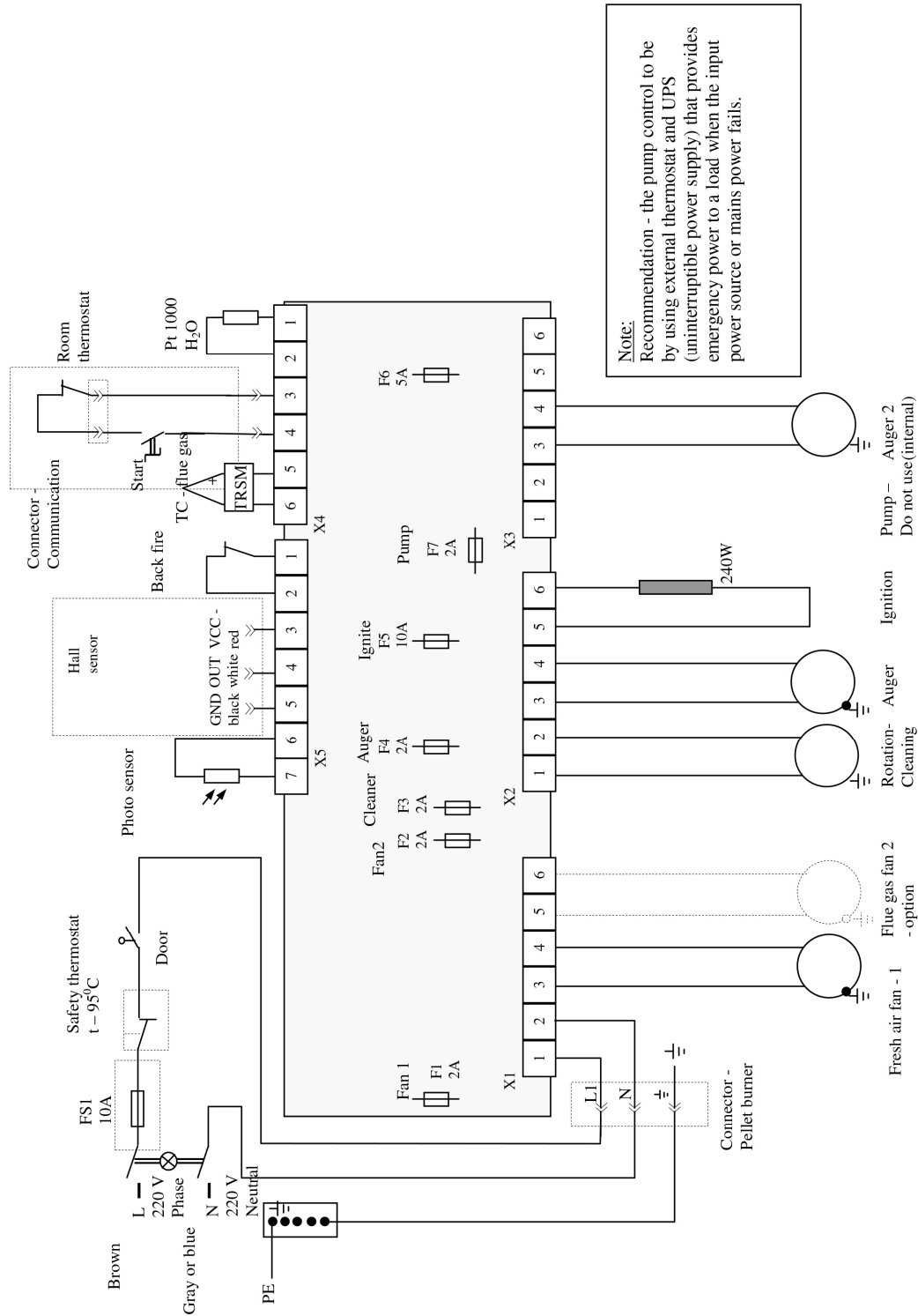
Boiler overheating is forbidden.

The boiler and the chimney should be thoroughly cleaned at the end of the heating season. Grease all hinges, chimney damper mechanism and other moving parts.



## 8. WIRING DIAGRAMME OF THE BOILER WITH THE PELLET BURNER

Figure 19. Wiring diagramme of a boiler with Bisolid GP xx R tsc pellet burner



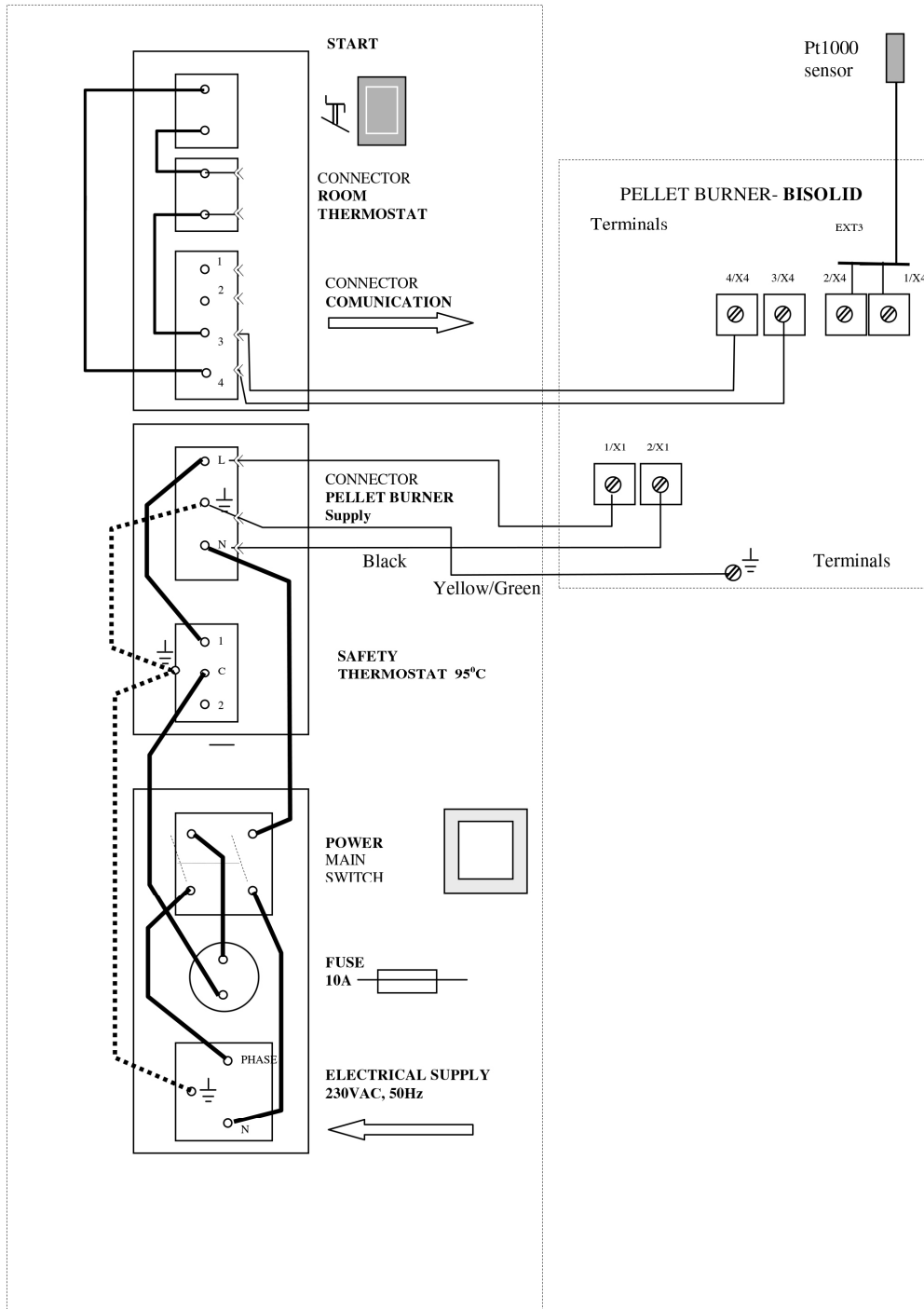
It is recommended the pump's control to be made by using external thermostat and UPS (uninterruptible power supply) that provides emergency power to a load when the input power source or mains power fails.



When boiler operates with preferred fuel (wood pellets) or other suitable fuel (firewood or wood chips) do not interrupting the power supply of the boiler, as circulation pump should operate to cool the boiler. In all diagrams for connection the circulation pump connection should operate whenever the boiler gives heat transfer with the purpose of discharging.

## 8.1. PALLET BURNER CONNECTOR'S PANEL

Figure 20. Connector's panel diagram for electrical connection of tube pube burner Bisolid GP xx R tsc



## INSTALLATION, OPERATION AND MAINTENANCE MANUAL



All activities on the electrical installation of the burner, adjustments, where covers and other items are removed that protect against contact with live parts, should only be performed by a qualified person.



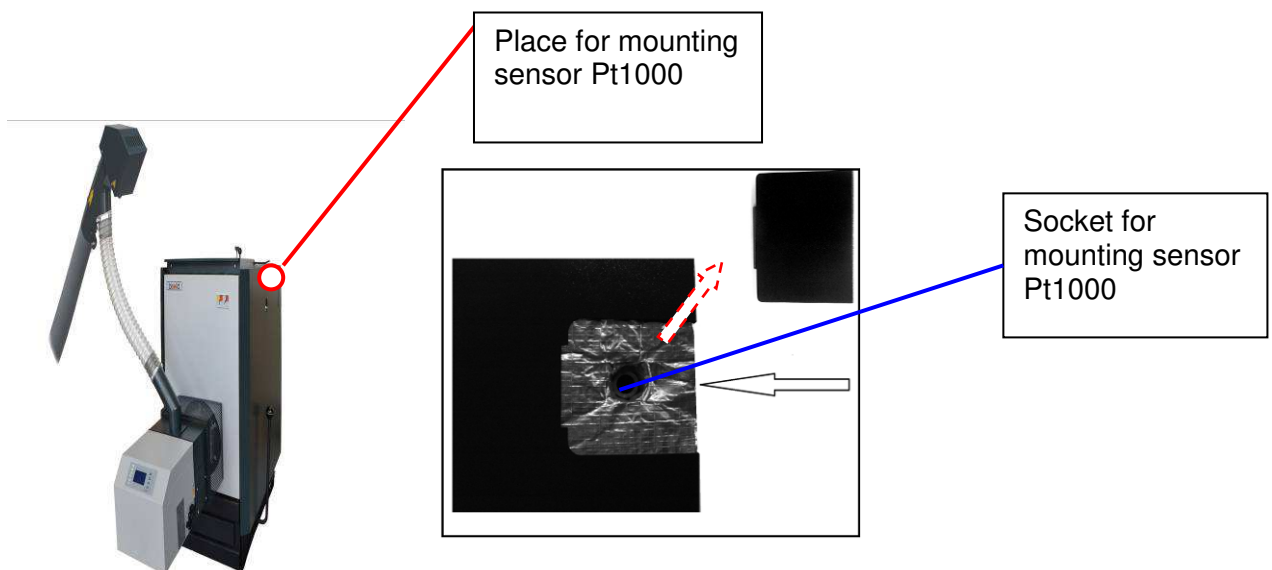
The burner should be connected to the electrical installation of the equipment to which it is installed, complying with the safety rules. Use the power cable and the attached diagram for connection to the supply voltage and to the command module of the burner.



Connection of the room thermostat. It is possible to use room thermostat **ONLY** in case of boiler operation with pellets. Before connecting the room thermostat to the connector (moving part) for ROOM THERMOSTAT (positioned on the back of the boiler's side cover panel), remove the factory installed bridge in the connector. Use only room thermostat contact without external voltage! See electrical connections!

The installation of the socket, respectively the water temperature sensor Pt1000 is carried out according to the diagram shown in Figure 21.

Figure 21. Installation of the water temperature sensor



Installation of the temperature sensor should be performed as shown on the above presented diagram. This is safety related operation and should be performed by a qualified technical person!

## 9. BOILER INSTALLATION INSTRUCTIONS

### 9.1. BOILER INSTALLATION - GENERAL INFORMATION

Bisolid Automat series hot water boilers should only be installed by a specialized company authorized for such activity. Boiler installation should be performed in compliance with the preliminary designed project and the acting legal provisions.

The existing network of authorized service providers, which comply with these conditions, is able to take responsibility for all boiler installations, their commissioning and warranty repairs.

Boiler installation should correspond to the acting prescriptions as well as to the operation and installation manual. The manufacturer is not liable for damages caused as a result of unqualified installation.



All problems (malfunctions) caused by boiler clogging with dirt from the heating system and/or malfunctions caused by clogging are not covered by boiler warranty card.

### 9.2. CHOOSING APPROPRIATE BOILER MODEL

The choice of an appropriate boiler model, i.e. its heating output is a main condition for the economic and optimum operation of the equipment. The boiler should be chosen so that its rated power corresponds to the heat losses of the site.

Choosing a boiler with too high heating output (oversize) leads to increased depositing of tar and condensation. Therefore, it is not recommended to use boiler with higher power than the heat losses of the site.

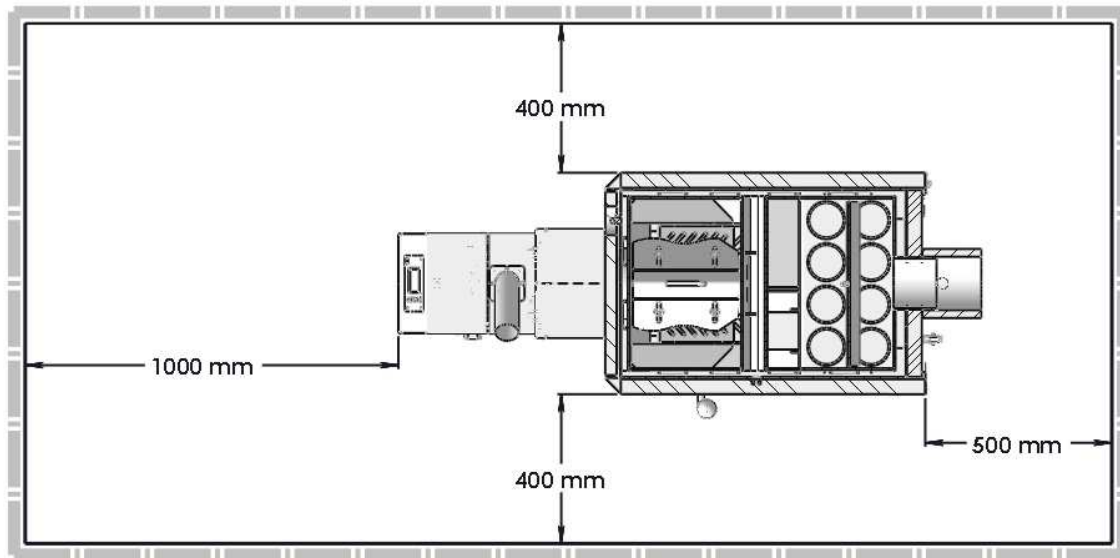
### 9.3. POSITIONING IN THE BOILER ROOM

Bisolid Automat series hot water boilers may be positioned in rooms that comply with local norms in effect. The boiler room should allow constant fresh air inflow, needed for the combustion process. The air should be clean, free of halogenated hydrocarbons, corrosive vapors and should not be too humid and dusty. The room should be protected against freezing and air relative humidity should not exceed 80%.

When installing the boiler, for easy manipulation, it is necessary to pay attention to the following (Figure 22):

- The minimum distance in front of the boiler should be 1000 mm to allow servicing the pellet tube burner and to remove and put back the ashtray.
- The minimum allowed distance between the rear part of the boiler (where the boiler connects to the chimney) and a wall should not be less than 500 mm.
- The minimum distance between the left and right side of the equipment and a wall should be 400 mm to ensure free access to service the equipment.
- The minimum distance of the free space above the boiler should be at least 1200 mm to ensure easy access to the fuel hopper when loading the fuel and to allow for cleaning the accumulated ash on the heat exchanger.
- The minimum allowed distance between the outer parts of the boiler and the flue pipe to flammable materials should be 200 mm.
- A safe distance of 300 mm should be observed in cases the degree of flammability of the material is unknown. The safety distance should be respected when deploying household objects, flammable materials and fuels in the boiler room.

Figure 22. Positioning in the boiler room



The boiler should be steadily fixed over inflammable or heat-insulated foundation, which should exceed the boiler contour with minimum of 300 mm in front and 100 mm in all other sides. For easy service it is recommended that the boiler is positioned on an inflammable foundation 100 - 150 mm high.

The boiler room should ensure constant combustion air flow. Air consumption depends on the power of the boiler, respectively 45 – 60 m<sup>3</sup>/h (the corresponding air opening to allow air flow is 200-300 cm<sup>2</sup>).



When the boiler operates do not touch any hot water connections or the flue pipe.

If there are two boilers in the room, it is not allowed to position any fuel between them. It is recommended to keep minimum distance of 800 mm between the boiler and the fuel, or to store the fuel in a premise different from the boiler room.



Do not put flammable materials on the top of the boiler or near it within the safety distance.

## 9.4. WATER SUPPLY REQUIREMENTS

Bisolid Automat boiler is designed for systems with independent or forced water circulation. To limit flue gas condensation and to increase the lifetime of the boiler at the same time, it is recommended to use devices that do not allow lowering the temperature below 65 °C (flue gas condensation point). For this purpose, for example, a three-way or eventually a four-way mixing valve can be used, or a thermostatic valve.

Clean water should be used as a heat carrier, corresponding to the requirements of the standards. The hardness of the boiler water should not exceed the values of the recommended parameters (Table 18).

Table 18. Boiler water parameters

Parameter	Measurement Unit	Value
Hardness	mmol/l	1
Ca <sup>2+</sup>	mmol/l	0.3
Total concentration of Fe + Mn	mg/l	(0.3)*

\* - recommended value

Liquid with low freezing point and anti-corrosion effect can be used as passive protection of the boiler. In the event, a two-way safety valve is connected to the system, the application of anti-freezing liquid is not recommended.

## 9.5. CONNETING THE BOILER TO THE HEATING SYSTEM

### 9.5.1. BOILER EXCESS HEAT RELEASE

The cooling loop is designed to release excess heat from the boiler to avoid exceeding the maximum allowed boiler water temperature of 95 °C. Connecting the cooling loop to the boiler flanges is shown in Figure 23 and to the two-way safety valve in Figure 25. In the event of boiler overheat (the output water temperature exceeds 95°C), the thermostatic valve switches on and the excess heat is being released by the cooling loop.

The two-way safety valve DBV 1 is used to release the excess heat in order to avoid exceeding the maximum permissible temperature of the water in the boiler i.e above 95 °C. In the event the system is equipped with a protective device against overheating, but nevertheless the boiler overheats (the output water temperature is higher than 95°C), the protective device creates a cold water cycle, which remains active until the temperature decreases below the limit value. At this point, the discharge cooling device and the cold water running through the system close simultaneously.

Table 19. Two-way safety valve technical data  
DBV 1 (Regulus)

Parameter	Dimension	Value
Shutdown temperature	°C	100 (+0-5°C)
Maximum temperature	°C	120
Boiler maximum pressure	bar	4.0
Water maximum pressure	bar	6.0
Nominal flow rate at Δp 1bar	m <sup>3</sup> /h	1.9

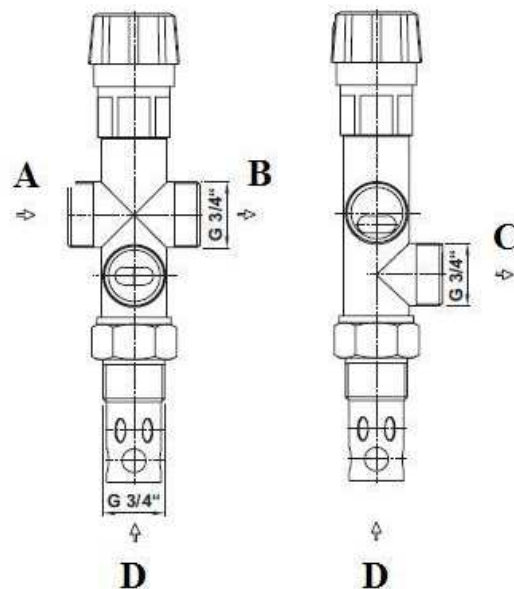
### 9.5.2. PURPOSE OF THE TWO-WAY SAFETY VALVE



It is imperative to install the two-way safety valve. The installation of the two-way safety valve is performed by a qualified and competent specialist!

The two-way safety valve DBV 1 is used for protecting boilers against overheats. Outlet and inlet valves are integrated in the valve body operated by a thermostatic element. Upon reaching the limit temperature, the outlet and inlet valves open simultaneously allowing for cold water to start flowing into the boiler and hot water to start discharging out of the boiler. Upon lowering the temperature to a level below the limit value, the outlet and inlet valves close simultaneously.

Figure 23. Two-way safety valve DBV 1



A - Cold water inlet.  
B - Outlet to the boiler.

C - Draining outlet - pipeline.  
D - Inlet from the boiler.



In the event of activation of the two-way safety valve that might cause inflow of water, not meeting the requirements set out in Table 18, the water in the system should be treated as per the requirements. Furthermore, the pressure in the heating system should be adjusted to the desired value.



The two-way safety valve does not replace the safety valve.

If the pressure in the water pipeline is higher than 6 bar, a reducing valve should be installed on the cooling water inlet. It should also be installed when after an additional cooling the pressure in the heating system is too high. In these cases, it is recommended that the pressure of the reducing valve is adjusted at a value twice the value of the pressure necessary for the heating system, and the minimum is 2 bar.

### 9.5.3. INSTALLATION OF THE TWO-WAY SAFETY VALVE



The installation of the two-way safety valve should be performed only by a qualified person. For optimum operation of the thermostatic two-way safety valve, it is necessary to comply with the prescribed conditions for installation and to observe the flows direction indications marked on the valve body.

The safety valve is always mounted directly on the boiler (in the upper left part of the boiler) or to the outlet pipe. When installing the valve, it should be checked whether the use of a 3/4" tip, which can be either in the pipeline or on the boiler, provides complete immersion of the valve thermostatic element after installation of the valve.

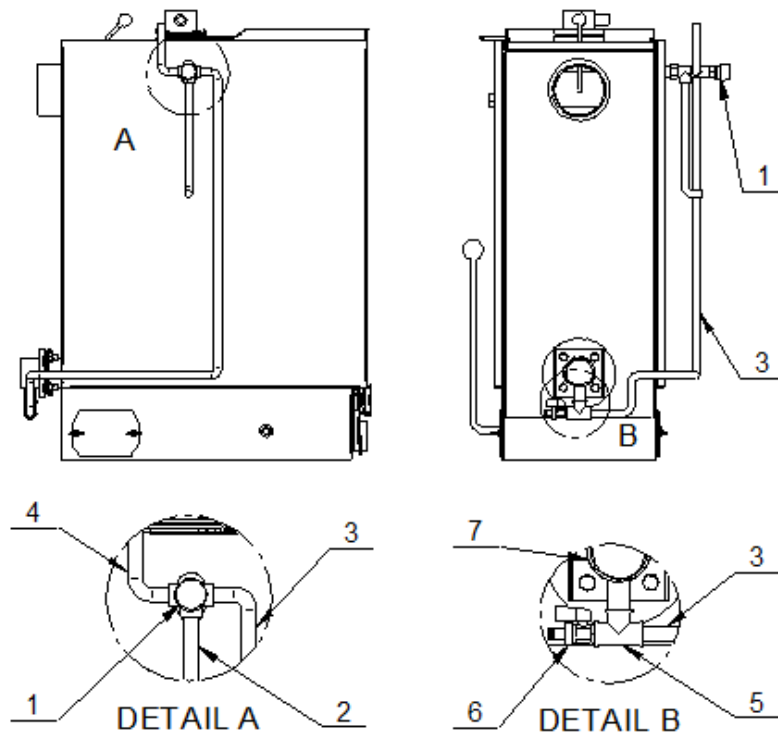
After mounting the tip in position "C" (Figure 23), the draining pipeline, through which the waste water along with the hot water outflow, is connected,

The cooling water supply is connected in position "A" (Figure 23) according to Figure 25, which supplies the boiler with cooling water after commissioning the valve. Particulate filters should be installed in the place from where the cooling water is supplied.

The pipeline, which according to Figure 25 joins the return pipeline of the heating system near the boiler is connected in position "B" (Figure 25),

The valve should be installed to the boiler according to Figure 25 i.e. outlet "C" - the draining pipeline outlet should be positioned downwards.

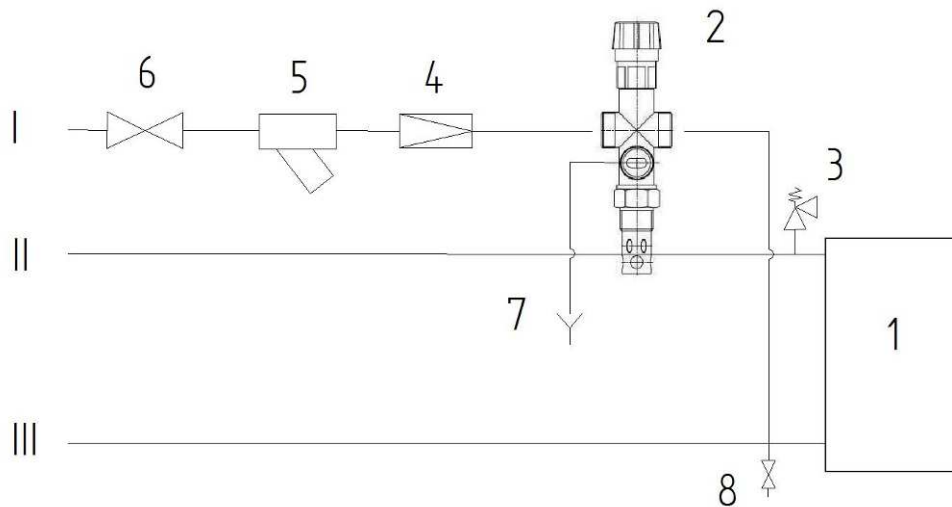
Figure 24. Connecting DBV 1 to Bisolid Automat Boilers



1. Two-way safety valve DBV 1
2. DBV 1 outlet - excess heat removal
3. Connecting pipeline - connecting DBV 1 to the boiler intake pipeline (boiler return pipeline).
4. Intake pipeline for DBV 1 - cooling water supply.
5. T-shape part for connection of the connecting pipeline and the outlet valve.
6. Inlet and outlet valve
7. Boiler return pipeline



Figure 25. Recommended diagram for connecting DBV1 two-way safety valves



- 1 – Boiler.
- 2 – DBV 1 valve.
- 3 – Safety valve.
- 4 – Reducing valve.
- 5 – Filter.

- 6 – Ball valve.
- 7 – Outlet to the drain pipeline.
- 8 - Outlet valve.
- I – Cold water inlet.
- II – Heating water outlet.
- III – Return water inlet.



It is necessary to install a safety valve for maximum overpressure of 4 bar on the system and its dimensions should comply to the rated power of the boiler. The safety valve should be positioned directly behind the boiler. There should not be any shut-off valve located between the safety valve and the boiler. If you have any questions, please, contact an authorized installation and service center.

## 9.5.4. TWO-WAY SAFETY VALVE PERIODIC MAINTENANCE

A control checkup should be performed once a year by appropriate turning of the head of the two-way safety valve to remove any impurities precipitated on the valve. It is also necessary to clean the filter on the cooling water outlet.

## 9.6. BOILER CONNECTION TO THE SMOKE EXTRACTOR

The smoke extractor is fixed to the chimney neck by 5 mm diameter rivets. The shortest possible way should be chosen to connect the flue pipe from the boiler to the chimney at an angle and upwards.

The smoke extractor should be brought to the chimney and should be fixed to the chimney neck not to allow any accidental or arbitrary movement. The smoke extractor should not be longer than 1.5 m and if conditions allow, additional elbows should not be used. All smoke

extractor components should be made of non-combustible materials. Flue pipes for solid fuels are very well adjusted pipes, which are installed in the same direction as the flue gases.

## 9.7. BOILER CONNECTION TO THE CHIMNEY

Bisolid Automat series boilers in central heating systems should be connected mandatory to a separate chimney with appropriate chimney draft, which is a main precondition for optimum operation of the boiler.

The chimney draft affects boiler thermal power, its performance and lifetime. The chimney draft depends on chimney cross-section, height and roughness of the inner wall, and furthermore on the difference between the flue gas temperature and the outside temperature. The most suitable chimneys are the insulated chimneys and those with a chimney insert. The actual draft can be measured by an authorized installation and service company using a special gas analyzer.

The smoke extractor between the boiler and chimney should be insulated with mineral glass wool. The smoke extractor and chimney must be made of steel or equivalent material that can be used at temperatures around 400 °C.

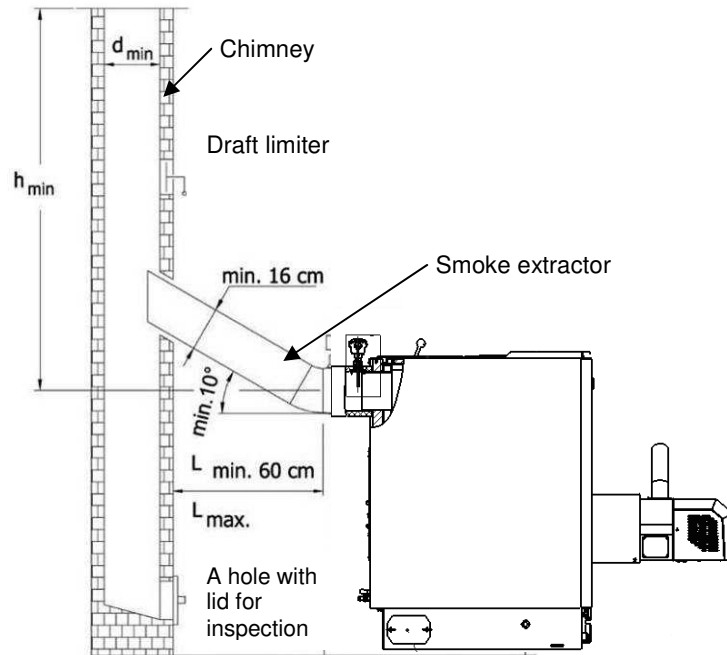
All system connections for the flue gases must be solid and reliable to perform better combustion and achieve high efficiency. The smoke extractor need to be connected to the chimney using the shortest way and in the amounts indicated in Figure 26. The horizontal links and elements that increase the pressure loss such as elbows should be avoided. Should not be used as a single vertical stack steel tube. The chimney must be made of an inner and an outer surface. The outer surface can be made of steel or brick. On the inner surface of chimneys is recommend to use elements of stainless steel to prevent corrosion. The space between the inner and outer surfaces of the chimney should be insulated to prevent condensation of the flue gases.

At the lowest level of the chimney, there must be a hole with lid for cleaning, which is necessary to be made of steel.



These dimensions in Figure 26 are indicative only. The working installation depends on the diameter, height, roughness of the wall of the chimney, temperature difference between the combustion products and the external air temperature. We recommend using of a chimney built-in metal insert.

Figure 26. Recommended chimney system dimensions

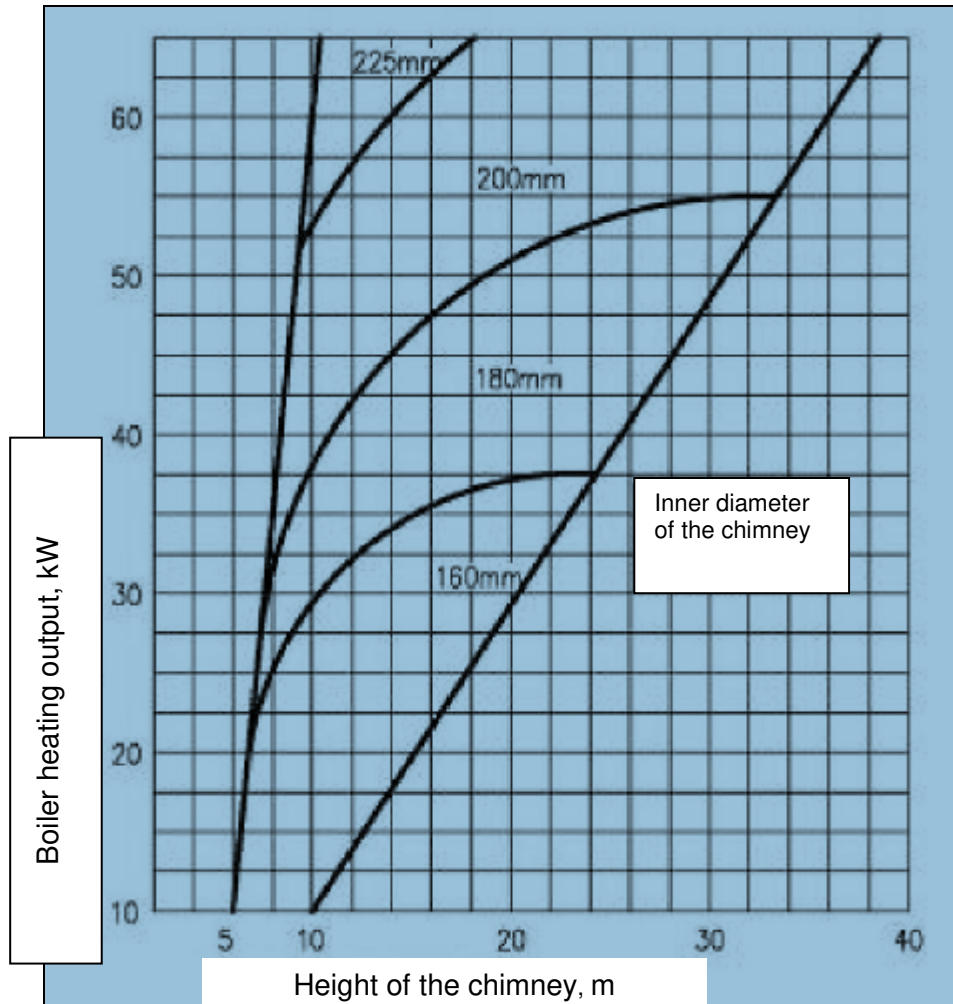


The dimensions of the smoke extractor and the chimney must not be smaller than the chimney neck dimension from the boiler. The diagram in Figure 27 is recommended for dimensioning of the total height and minimum inner diameter of the chimney, depending on the boiler heat output if it is not explicitly stated in the mandatory local regulations.



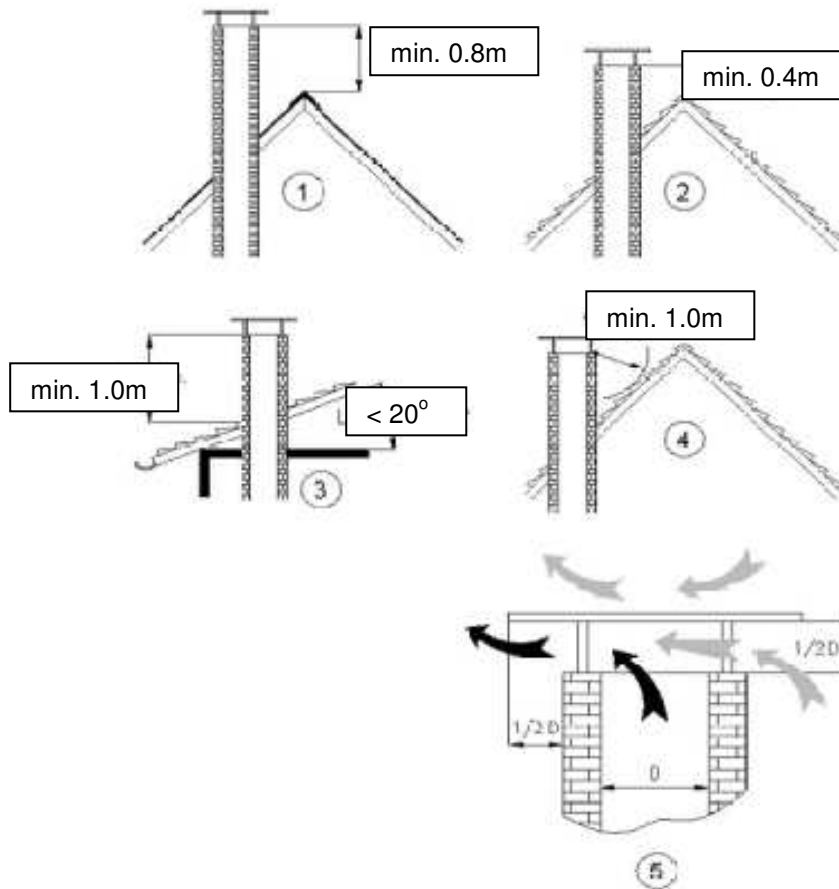
If the chimney draft is insufficient or chimney is not built according to the project (bad condition of the structure, without insulation, blocked etc.) can occur big problems in combustion. In this case, we strictly recommend the chimney condition to be controlled by the technician who will identify and remedy any irregularities.

Figure 27. Diagram for dimensioning of the total length and minimal diameter of the chimney



Above the roof of the building, the highest level of a chimney should be in accordance with the dimensions specified in Figure 28. The construction of the exterior of the chimney must be so as to reduce the harmful effects of fumes in the air and improve the chimney draft.

Figure 28. Requirements for the chimney construction above the roof



## 9.8. TRANSPORTATION AND STORAGE

Upon dispatch, the manufacturer offers the boilers mounted on wooden pallets and fixed against displacement with screws. The boilers should not be transported in position different from their normal operating position.

It is necessary to provide at least normal storage conditions for boilers during their storage and transportation.

Do not apply pressure on the boiler packaging and covers during storage and transportation.



Boilers should not be carried or transported without the use of forklift trucks, trolleys or other wheeled vehicles for transportation.

Packaging is disposed of in one of the secondary raw materials centers or in the municipal landfill.

The disposal of the product (the boiler) after expiration of its lifetime is done in one of the secondary raw materials centers or in the municipal waste landfill.



## 10. TROUBLESHOOTING

### 10.1. BOILER TROUBLESHOOTING

Failure	Reason	Solution
The boiler can not reach its rated power	Unsealed soot door	Fasten all ash door nuts, if necessary replace door sealing
	Unsealed heat-exchanger cover and fuel feeding door	Check sealing ropes, correct sealing ropes positioning, if necessary replace sealing ropes.
	Insufficient chimney draft.	Perform chimney draft checks and take corrective measures.
	Used fuel is with low calorific value.	Use the prescribed fuel type with appropriate calorific value, especially in low outside temperatures.
	Caused by improper pellet burner operation	Refer to the section on description, commissioning and operation of tube pellet burner series Bisolid GP xx_B thc.
Boiler power can not be regulated	Unsealed fuel feeding and ash cleaning doors	Check sealing ropes, correct sealing ropes positioning, if necessary replace sealing ropes.
	Too high chimney draft	Half-close the valve in the chimney pipe, if necessary perform chimney draft checks and take corrective measures.
High water temperature in the boiler and low water temperature in the radiators. Water in the boiler boils.	High hydraulic resistance of the heating system, especially in the standalone system.	Perform system cleaning with rinse, if necessary install circulation pump.
	Too high chimney draft	Reduce chimney draft by using a chimney damper.

## 10.2. PELLET BURNER TROUBLESHOOTING

Failure	Reason	Solution
The burner is installed on a heating boiler, but the temperature in the heated rooms is low.	Insufficient thermal power.	It is necessary to increase thermal power rate of the burner.
	Low water temperature setup.	It is necessary to increase the value of the water temperature setup. It is also necessary to check the circulation water temperature setup, adjusted in the burner controller
	Low setup temperature of the room thermostat (if connected).	It is necessary to increase the temperature setup of the room thermostat.
The burner is installed on a heating boiler, and the temperature in the heated rooms is high.	Thermal power, exceeding the consumption	It is necessary to reduce the burner's thermal power rate.
	High adjusted temperature	It is necessary to decrease the setup value (recommended minimum is up to 60°C) or the circulation water temperature setup, defined in the controller.
	High setup temperature of the room thermostat (if connected).	It is necessary to decrease the setup temperature of the room thermostat.
The burner is switched on, but there is no combustion process.	There is no operation setup.	Check the operation setup from the burner control module
Difficult fuel ignition.	Low quality wood pallets	Their humidity is probably higher than the normal needed for the burner operation, it is necessary to change the pellets.
The fuel ignition is accompanied by strange noises.	Insufficient chimney draft.	It is necessary to check the condition of the chimney and the equipment to which the burner is installed and to clean the ash deposits. Even after cleaning, it may be needed to adjust the system operating parameters – ask for assistance a service provider.
Overheating of the boiler to which the burner is installed	Lack of heat load or incorrect adjustment of the thermal power of the burner or the boiler. Missing or failure of the two-way safety valve.	It is necessary to check the proper operation of the boiler-burner system and to adjust eventually the operating parameters - to be performed by a specialist. After boiler cool-down and failure removal, the emergency thermostat has to be deactivated (unscrew protective cap, press the button and screw the cap back), start the burner by restarting it.
Fuel does not ignite.	No wood pellets in the fuel hopper.	The fuel hopper, from which the burner auger transports the fuel, must be loaded.
	No fuel in the burner combustion chamber.	The process of initial firing can be renewed by restarting the burner
	Presence of fuel on the burner grate, but it is not fired or it has burned out and there is no combustion process	Clean the fuel gathered on the burner grate. If the ignition heating element is out of order or inactive, then it must be replaced



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	Incorrect operation of the photo-sensor used for monitoring the combustion process.	The photo-sensor used for monitoring the combustion process should be adjusted or replaced – to be performed by a service specialist only.
The burner does not start or stop operation.	No power supply.	Check whether the burner display and its indication operate. Check working order of the power supply of the equipment to which the burner is installed and which provides voltage with parameters 220 VAC, 50 Hz – to be performed by a service technician. Check burner proper wiring according to the presented electrical diagram. Check for loose electrical connections – to be performed by service technician.
	No start signal to the burner.	Check whether the burner has received start signal and whether the electric circuits of the module, providing signal for operation to the burner are in good order - to be performed by a service technician. Check for loose connections. Check the working order of the burner operation control module, which provides voltage and necessary signals.
	The burner is not working, although there is an operation signal.	Check for activated emergency alarm – check the list with alarm modes and indications of the controller, presented in the next table.
	Blown fuses.	<b>To be performed by service technician:</b> check the fuses condition and if there is need for replacement, change the fuses with new with corresponding parameters ( <b>Caution:</b> the fuses are fast-reacting)
The flame of the combustion process is "cloudy" and chimney smokes.	Low quality wood pallets	The humidity is probably higher than the normal needed for the burner operation, it is necessary to change the pellets.
	Inappropriate adjustment of the burner parameters	Adjustment of the equipment operating parameters is needed – to be performed by a specialist
Burner starts, but can not enter the set mode	Incorrectly positioned photo-sensor.	Change the position of the photo-sensor for monitoring the combustion process, by rotating it around its longitudinal axis.
	The photo-sensor surface is dirty.	Clean the dirt carefully.
	The photo-sensor is damaged – there are burnout traces on its surface.	It is necessary to replace the photo-sensor with new one – ask for service assistance. Reason – improper burner shut down.
Unstable operation of the burner.	Photo-sensor failure.	Check photo-sensor working order.
	Controller operation settings are changed.	Check the burner thermal power rate setting. Check the controller settings – to be performed by a service technician

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Excess heating of the pellet feeding pipe.	Insufficient chimney draft or contaminated equipment.	Clean the equipment and the chimney, if necessary. Possible solution is to install additional flue gas fan and/or change the chimney.
Heating the pellet feeding pipe and emergency thermostat activation	Low chimney draft or contaminated with ash particles equipment.	Clean the equipment and the chimney if necessary. Restart the burner Possible solution is to install additional flue gas fan and/or change the chimney line.
Polluted and/or melted photo-sensor.	Improper shut down of the burner	Clean the photo-sensor surface or replace it with new one. Observe the burner shut down procedure, presented in the manual.
Presence of unburned fuel over the combustion chamber grate.	Inefficient fuel combustion.	Adjust operation parameters of the equipment - adjustment is needed and/or consultation with an authorized technician.
Slag deposits on the combustion chamber grate.	Fuel used is with high ash content and does not comply with the equipment requirements.	Change the fuel with a new one complying with the requirements for reliable operation of the burner.
	Burner operation mode exceeding the rated thermal power.	Reduce the burner thermal power by changing its thermal power rate.
Error message, displayed on the controller display	Problem in the burner operation.	It is possible to seek consultation / intervention by a service technician
The burner has stopped, but after new start it operates.	The photo-sensor sends wrong information to the controller.	Check the amount of the fuel on the grate. Seek assistance by a service technician for consultation or adjustment.
High temperature of the flue gases (if a thermometer is installed)	Dirty heat-exchanging surfaces depending on the equipment type and operation mode.	Clean the heat-exchanging surfaces of the equipment.
Smoke in the boiler room after a certain period of operation	Dirty or clogged with ash flue line for extracting the flue gases from the heat consuming equipment.	Clean the heat consuming equipment from the ash deposits.
Failure of the burner cleaning device.	The cleaning cannot be done properly	Competent consultation and / or intervention by a service technician is needed.
Other failures not described above		Competent consultation and / or intervention by a service technician is needed.

In all other cases, the repair of any failure and damage should be performed by the manufacturer or an authorized service provider.



An obligatory condition for the normal operation is the presence of pellets, as main fuel. Loading wood chips, as other suitable fuel **to be made in operating burner** at steady state (presence of stable flame). Loading of firewood can be made as in already operated burner, and in the absence of equipment start. The requirement for the second case is loading with wood to be realized in the way to is not to close burner tubus, i.e. to provide normal flame output. There is possibility to realized start delay of the equipment – the preliminary loaded boiler with wood is automatically ignites by external start (for example GSM) or with или by simply pressing of the switch START. This is significant advantage if this facility – automatic ignition of the other suitable fuel (even wood with high moisture, difficult to burn in, hard flammable at normal boiler). The other suitable fuel loading is made in open flue gases flap to the chimney with purpose to limit smoke forming at the cover opening for loading.



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**We reserve the right to make technical changes!**