MANUAL

FOR INSTALLATION, OPERATION AND MAINTENANCE OF A TUBE PELLET BURNER WITH SELF-CLEANING FROM SERIES „GREENECOTHERM GP XX R TSC”

EN 01

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The manufacture company thanks you for your choice.

The manufacture company submits this manual to help the team that will install, adjust and service the pellet burner, as well as to the customer that will operate it.

The manufacturing company requires that the technicians, performing the above mentioned procedures, had successfully passed the product’s technical training.

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page.

1. USERS SAFETY INFORMATION.

The manual for installation, operation and maintenance of the rotary tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc" is designated for end users and authorized servicing specialists.

The users must know that:

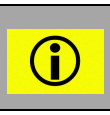
- All activities regarding installation of the pellet burner should be performed only by an authorized installers, which have acquired legal rights by the legal authorities;
- All activities regarding the electrical installation must be performed only by electrical-technicians;
- The primary technical initialization to operation, including visual check of the entire heating installation, adjustments and start of the pellet burner must be performed by a person that is authorized by the manufacturer.

Please observe the following conditions during installation, start, adjustment and initialization to operation of the rotary tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc":

- All legal provisions regarding safety;
- All legal provisions regarding environment protection;
- Provisions regarding installation, start and adjustment;
- All harmonized provisions of the European Union, applicable for your country;

Please strictly observe the presented safety instructions, in order to avoid any risks or harms to people, properties and environmental polluting.

Please pay attention to the following symbols in the present manual book:

	Danger This symbol warns the users about possible health risks.
	Warning This symbol warns the users about possible risks and harms to properties and environment.
	Information This symbol presents texts with additional information for the users.
	The current manual book uses notation „GreenEcoTherm GP xx R tsc", which includes the models of rotary tube pellet burners with self-cleaning „GP 25 R tsc", „GP 35 R tsc", „GP 45 R tsc" and „GP 60 R tsc".
	For your personal safety and before taking any actions regarding the appliance installation and operation, it is highly recommended to read carefully this manual book. Non-compliance to the instructions presented below might lead to fatal consequences, for which the manufacture company will not be responsible.

2. DESCRIPTION AND ADVANTAGES OF THE TUBE PELLET BURNER „GREENECOTHERM GP XX R TSC".

The modulating rotary tube pellet burner with self-cleaning from series "GreenEcoTherm GP xx R tsc" utilizing wood pellets is designated for mounting to hot water boilers. The burner utilizes wood pellets, as the generated heat energy is adopted by the boiler body's heat exchanging surfaces, to which it is mounted.

The rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" delivery kit consists of:

- Main module – 1pc;
- Fuel transport auger – 1pc;
- Flexible pipe – 1pc, with locking brackets – 2 pcs;
- Manual for installation, operation and maintenance of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" – 1pc.

The automated pellet burner from series „GreenEcoTherm GP xx R tsc" can utilize wood pellets with diameter Ø 6-8mm, from classes A1, A2 and B according to standard EN ISO 17225-2:2014, or categories A, AB, B, BC and C according to the manufacture company's classification methodology.

The rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" is equipped with:

- Microprocessor controller managing the burner's modules;
- Display panel with keyboard, used to manage the burner's modules;
- Fan for fresh firing air supply equipped with Holl sensor, which controls the rotation frequency;
- Ceramic electrical heating element used for ignition of the fuel;
- Auger for automatic fuel transportation from a hopper to the burner;
- Horizontal feeding auger built into the combustion chamber;
- Combustion chamber, in which an optimal burning process is realized;
- Automatic cleaning system of the combustion chamber;
- Safety system that blocks the burner if the feed tube of pellets is heated as a result of emergency situations;
- Modulation system of the pellet burner operation mode, which ensures optimal operating modes and fuel savings;
- Photosensor for dynamic control of the burning process.

The advantages of the rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc are following:

- 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 6-8mm 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, automatic calibration to the selected from the user heat output;
- The components of the burner are manufactured by well known and proved European companies from Germany, United Kingdom and others. Modern and multifunctional control module manufactured in Sweden. High quality ignition element manufactured in Japan, that ensures over 37 000 ignitions;
- Automatic test of all functions;

- Automated modulation - adjustment of the quantity fresh air according to the chosen capacity by the user. Automated self-adjustment according to the productivity of the fuel transport auger and the calorific value of the fuel;
- 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;
- Ability to control circulation pump for hot water (optional) and buffer tank;
- Ability to control circulation pump;
- Possibility to control exhaust gas fan, which eliminates the problem with the draught into the chimney and guaranties the safety operation of the product;
- Easier and faster service diagnostics, thanks to the function "LOG - Alarm history";
- 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;
- Simplified installation and adjustment of the burner, which accelerates the installer’s work;
- High efficiency;
- Low harmful emission;
- Automatic fuel feeding from a hopper, which can be build according to the local conditions (it is not included in the burner’s standard delivery kit);
- Simplified maintenance and servicing;
- Minimum operation costs.

3. TECHNICAL DATA OF BURNER „GREENECOTHERM GP XX R TSC”.

The technical data of the rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc”, operating with wood pellets, is presented in Table 3.1.

Table 3.1. Technical parameters of the tube pellet burner „GreenEcoTherm GP xx R tsc”.

Parameter	Dimension	Value			
Pellet burner	-	GreenEcoTherm GP xx R tsc			
Model	-	GP 25 R tsc	GP 35 R tsc	GP 45 R tsc	GP 60 R tsc
Nominal heating output	kW	25	35	45	60
Heating output adjustment range	kW	8-25	10-35	15-45	20-60
Used fuel	-	Wooden 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	Ash	The quantity depends on the pellets ash content and on the burner’s operation mode			

The rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc” is designed for utilization of wood pellets complying with the classification of standard EN ISO 17225-2:2014, classes A1, A2 and B, and also with the developed classification by the manufacture company.

The dimensions and technical parameters of the tube pellet burner from series „GreenEcoTherm GP xx R tsc” are presented in Table 3.2.

Table 3.2. Dimensions and technical parameters of a tube pellet burner „GreenEcoTherm GP xx R tsc”.

Parameter		Dimen-sion	Value			
Pellet burner		-	GreenEcoTherm GP xx R tsc			
Model		-	GP 25 R tsc	GP 35 R tsc	GP 45 R tsc	GP 60 R tsc
Weight	Main module	kg	21.3	21.4	25.5	27.5
	Fuel feeding auger	kg	8.5			
Overall dimensions (WxLxH)	Main module	mm	283.5x620x243	283.5x620x243	283.5x675x243	283.5x709x243
	Fuel feeding auger	mm	184x1520x107			
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			

Classification of wood pellets depending on the physical properties developed by the manufacturer is given in Table 3.3.

Table 3.3. Wood pellets classification depending on the physical properties according to a methodology developed and applied by the manufacturer.

Pellets Category	A^D	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^d - ash content of dry mass, %;
DU - mechanical resistance, %.

With the adoption of the new standard for wood pellets (EN ISO 17225-2) in 2014 there are introduced a new classes for wood pellets used in domestic heating boilers (Table 3.4.).

Table 3.4. Standard for wood pellets EN ISO 17225-2:2014.

Parameter	Dimension	Class A1	Class A2	Class B
Length (L)	mm	3,15 ≤ L≤ 40	3,15 ≤ L≤ 40	3,15 ≤ L≤ 40
Diameter (D)	mm	6±1 8±1	6±1 8±1	6±1 8±1
Moisture (M)	%	< 10	< 10	< 10
Ash (A), dry	%	< 0,7	< 1,2	< 2,0
Buck density (BD)	kg/m^3	> 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

4. CONSTRUCTION DESCRIPTION OF THE BURNER „GREENECOTHERM GP XX R TSC".

4.1. GENERAL CONDITIONS.

The rotary tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc" is consists of:

- Combustion chamber (profile tube), which forms conditions for optimal burning process and is made of high quality stainless steel;
- Horizontal feeding auger built into the combustion chamber;
- System for automatic cleaning of the combustion chamber;
- Air distribution tract, which provides equal firing air feeding and also cooling of the burner's components;
- Electric ceramic heater located under the feeding auger, which ignites the fuel;
- Fan for firing air equipped with a sensor to capture the fan' revolutions according to the diagram in Figure 4.3;
- Photosensor, which monitors the combustion process;
- Emergency temperature sensor for protection from the so called "back fire" in the main module's pellets feeding pipe;
- Control module, which monitors and manages the burner's operation;
- Display panel with keyboard, which visualizes the burner's operation mode and is used to perform the necessary adjustments;
- Connector for the fuel transport auger, used to supply the auger with electrical power;
- Flexible pipe, made of special transparent high temperature resistant material (in case of fire it does not separate toxic substances), used to connect the auger and the main module of the burner.

Figure 4.1 presents a view of the main modules of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc".

Figure 4.2 shows the diagram for mounting and dismantling of internal and external rotary tube of the pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc".

Figure 4.1. View of the main module of tube pellet burner „GreenEcoTherm GP xx R tsc”.

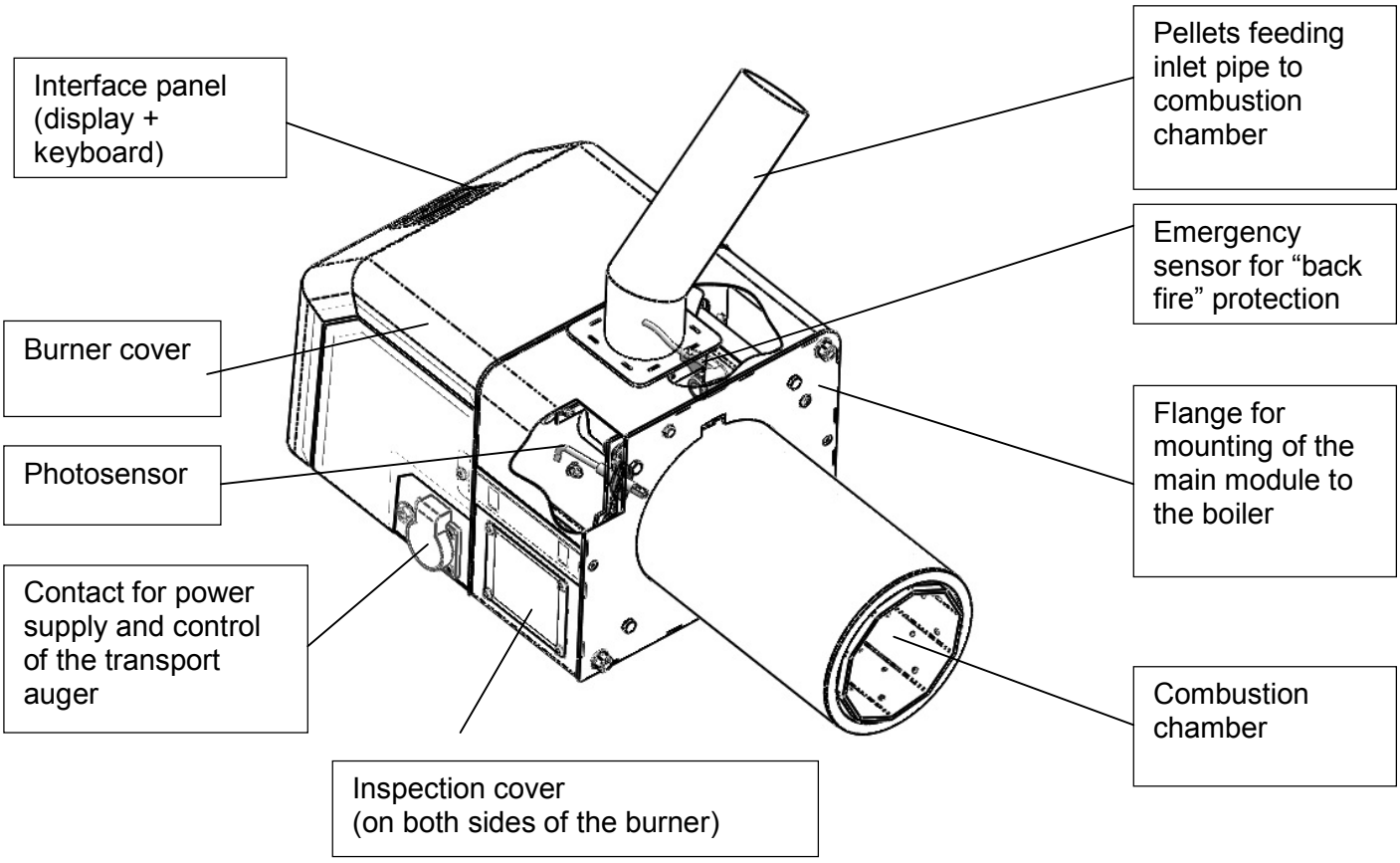


Figure 4.2. Diagram for mounting and dismantling of the internal and external rotary tube.

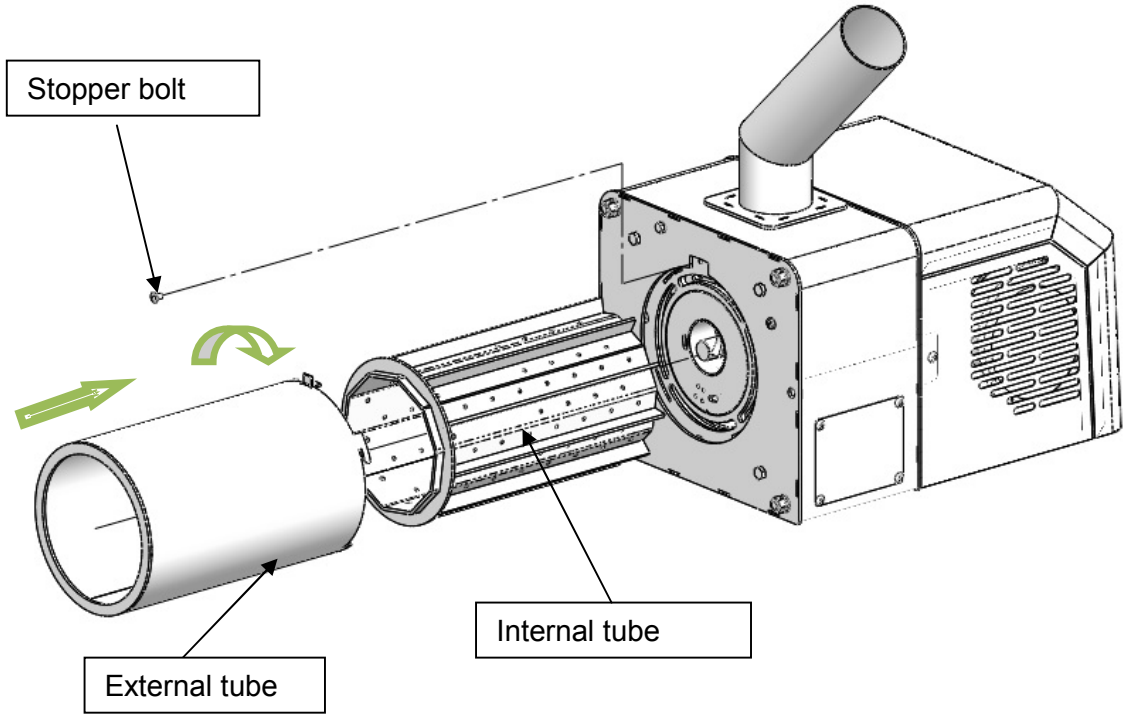
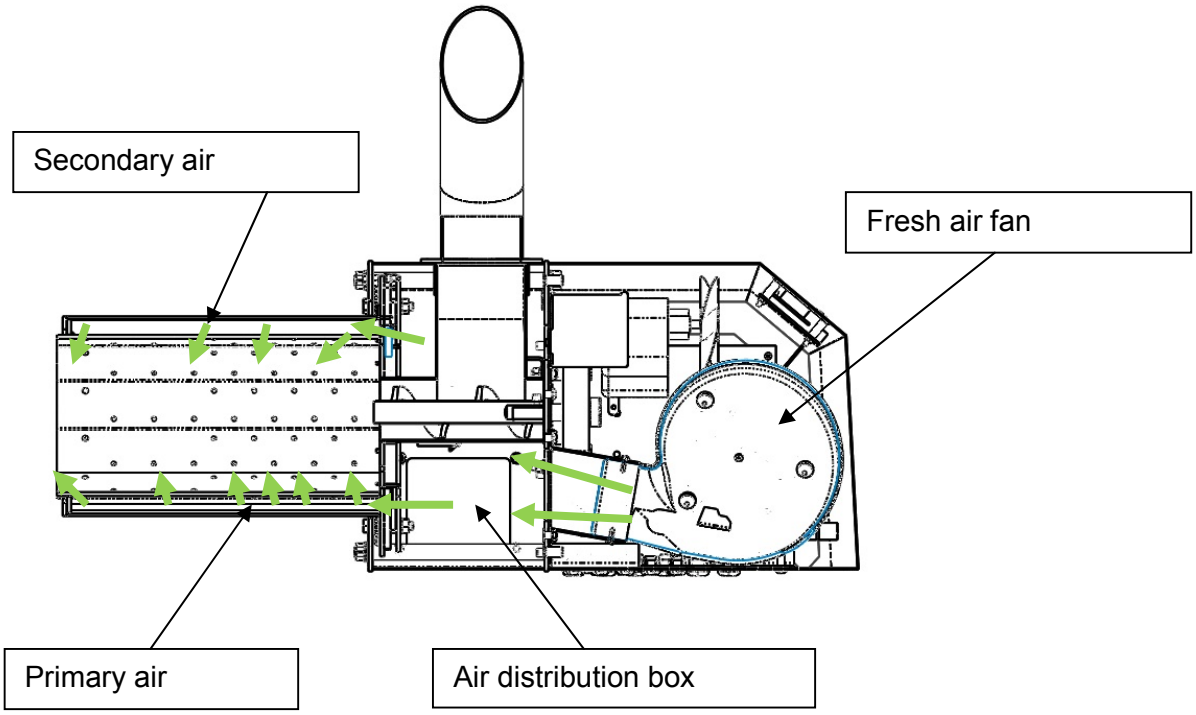


Figure 4.3 presents the diagram of primary and secondary air supplying in the rotary tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc”.

Figure 4.3. Diagram for firing air supply in the burner.



5. MOUNTING AND INSTALLATION OF THE PELLET BURNER.

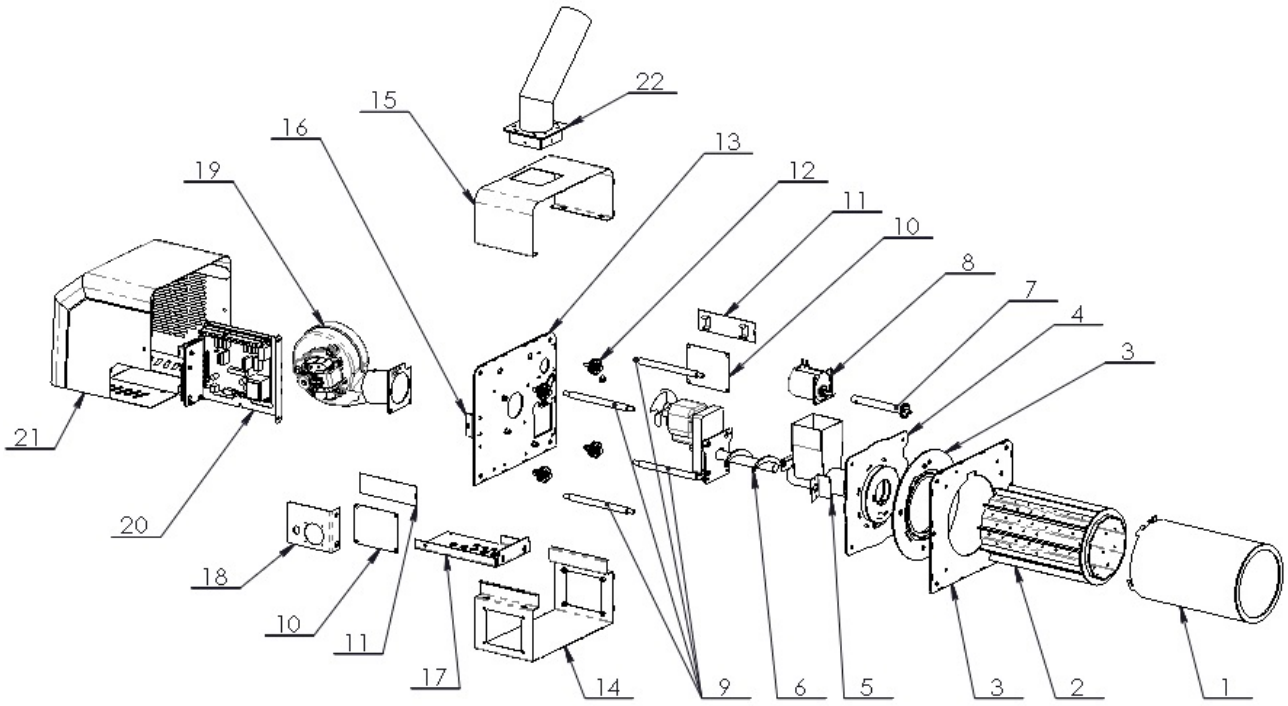
5.1. MAIN REQUIREMENTS FOR INSTALLATION OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

The following requirements must be observed during installation of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc":

- The burner must be positioned in a way providing enough free space for its cleaning and maintenance;
- The burner must be mounted to appliance (hot water boiler, or other heat energy consumer) in a way providing availability for easy maintenance and cleaning of the appliance;
- The premises provided for the installation of pellet burner must provide a constant flow of fresh air required for combustion and good ventilation;
- It is not allowed to mount the burner to appliance, which has been installed in living premises, including corridors;
- The installation and mounting of the burner to appliance must be performed only by a qualified technician;
- The tube pellet burner from series „GreenEcoTherm GP xx R tsc" must be connected to the electrical supply installation only by an authorized electrical technician;
- Before initiation of the burner to operation, the heat energy consuming appliance's operational condition must be checked;
- The burner attendance must be performed only by adult persons, which are well familiar with the appliance's manual for operation.

The diagram of the structure components of a rotary tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc" is shown in Figure 5.1

Figure 5.1. Diagram of the structure components of burner „GreenEcoTherm GP xx R tsc".



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

The installation and maintenance of the rotary tube pellet burner must be performed by the specialized companies which have acquired legal rights for such activities.

The mounting of the burner to a boiler (consumer-appliance) can be performed through bolts (or studs) and nuts. The tightening of the burner has to be performed by a tool (for example wrench). It is not allowed to fix it through handles or others. The fixing and dismounting operations of the burner must be performed by a qualified person equipped with proper tools.

5.2. INSTALLATION OF THE TUBE PELLET BURNER WITH SELF-CLEANING.

The installation of the tube pellet burner from series „GreenEcoTherm GP xx R tsc" to appliance requires preliminary prepared technical project, complying with the acting provisions and regulations:

- In case the consuming appliance is a hot water boiler, then the requirements presented in standard EN 303-5:2012 - "Heating boilers. Part 5: Heating boilers for solid fuels, manually and automatically stoked nominal heat output of up to 500 kW. Terminology, requirements, testing and marking.;
- Fire safety provisions;
- About the electrical supply network – EN 60335-1/1997 – "Securing of electrical domestic appliances".

When installing a pellet burner to a hot water boiler, please observe the relevant chimney draught requirements, presented in the boiler's technical data sheet.

5.3. OVERALL DIMENSIONS OF THE BURNER'S MAIN MODULE.

Figure 5.2 and 5.3 present the overall dimensions of the rotary tube pellet burner and main module, which have to be taken in mind during the mounting and installation of the appliance.

Figure 5.2. Overall dimensions of a tube pellet burner „GreenEcoTherm GP xx R tsc”.

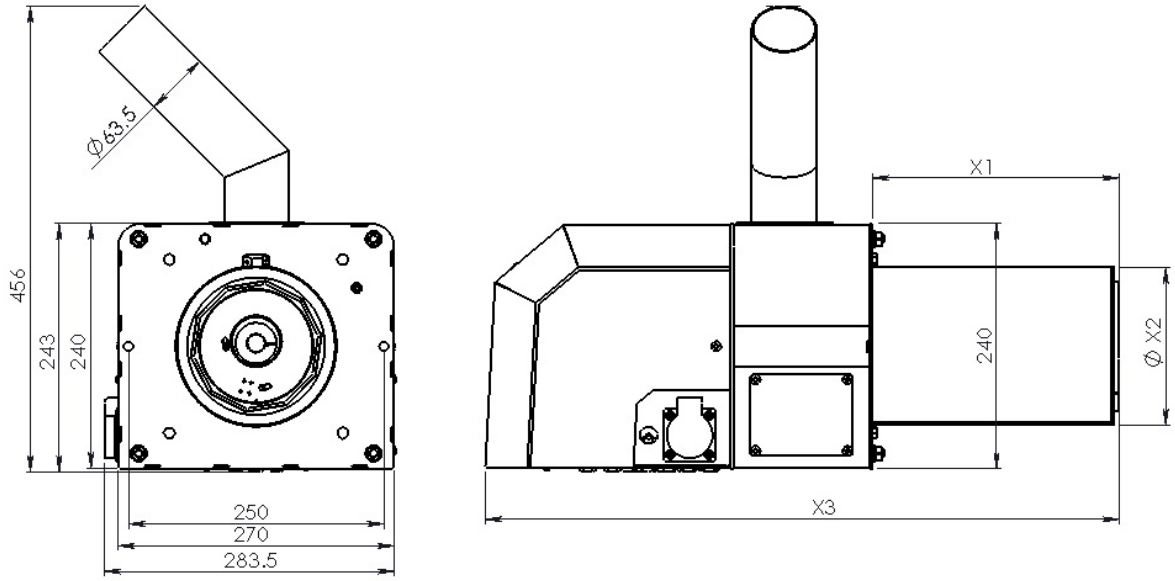
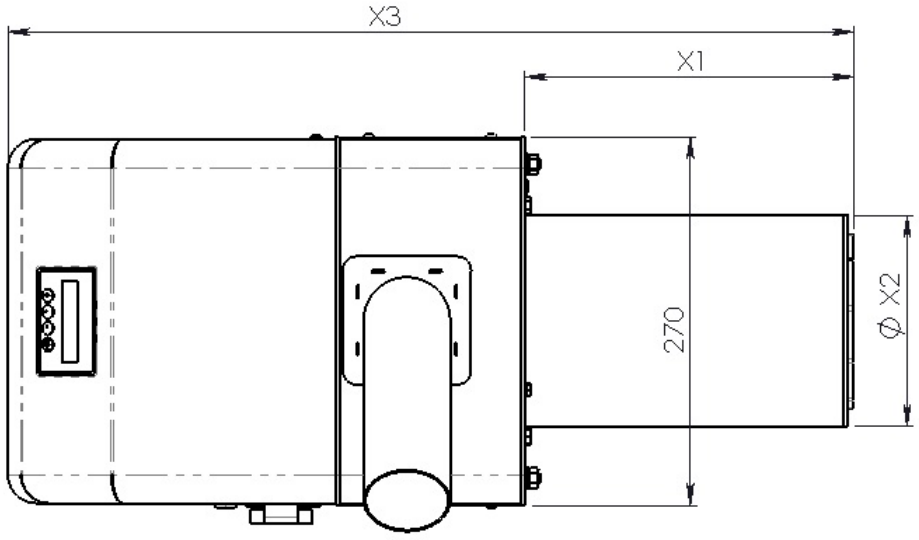


Figure 5.3. Overall dimensions of the tube burner’s main module.



The dimensions of the rotary tube X1 and ∅X2 and total length X3 for the different models of rotary tube pellet burners with self-cleaning from series „GreenEcoTherm GP xx R tsc” are shown in Table 5.1.

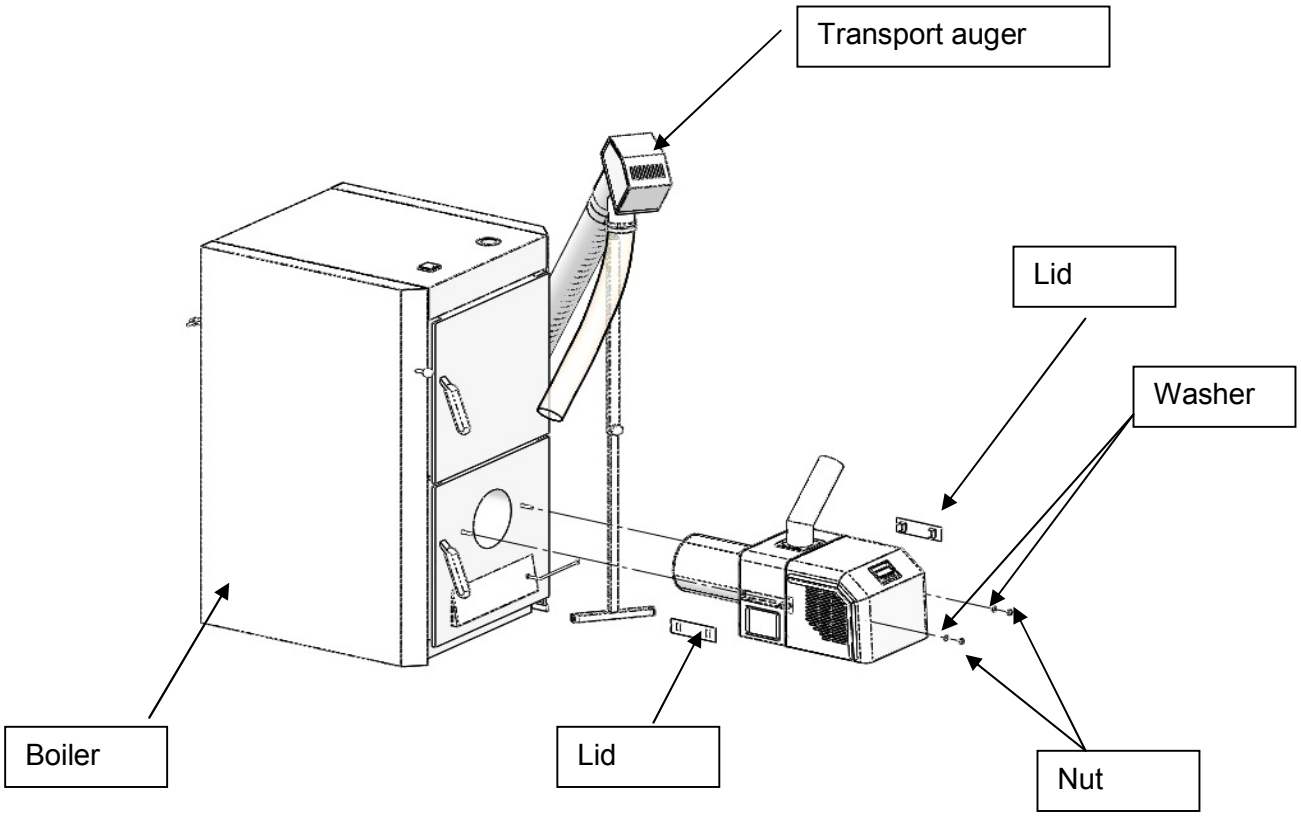
Table 5.1. Overall dimensions of the rotary tube pellet burners from series „GreenEcoTherm GP xx R tsc”.

Pellet burner model	Heating output kW	X1 mm	∅X2 (Diameter) mm	X3 (Length) mm	Height (With transition for pellets) mm	Height mm	Width mm
GP 25 R tsc	25	241	154.5	620	456	243	283.5
GP 35 R tsc	35	241	154.5	620	456	243	283.5
GP 45 R tsc	45	261	180	675	456	243	283.5
GP 60 R tsc	60	295	180	709	456	243	283.5

5.4. POSITIONING AND MOUNTING OF THE BURNER’S MODULES.

The tube pellet burner’s main module from series „GreenEcoTherm GP xx R tsc” is mounted in the position which is shown in Figure 5.4 to the consumer of heat energy. The required inclination of the main module must be 3° to the horizontal plane of the earth in the direction of the appliance of which will be installed

Figure 5.4 Installation diagram of rotary pellet burner „GreenEcoTherm GP xx R tsc”.



Depending on the equipment it is necessary to be prepared technical evaluation of the project for installation of the main module, so as to ensure its reliable operation, easy cleaning, servicing and maintenance. The main module of pellet burner is mounted to the equipment - heat consumer using thermal insulation.

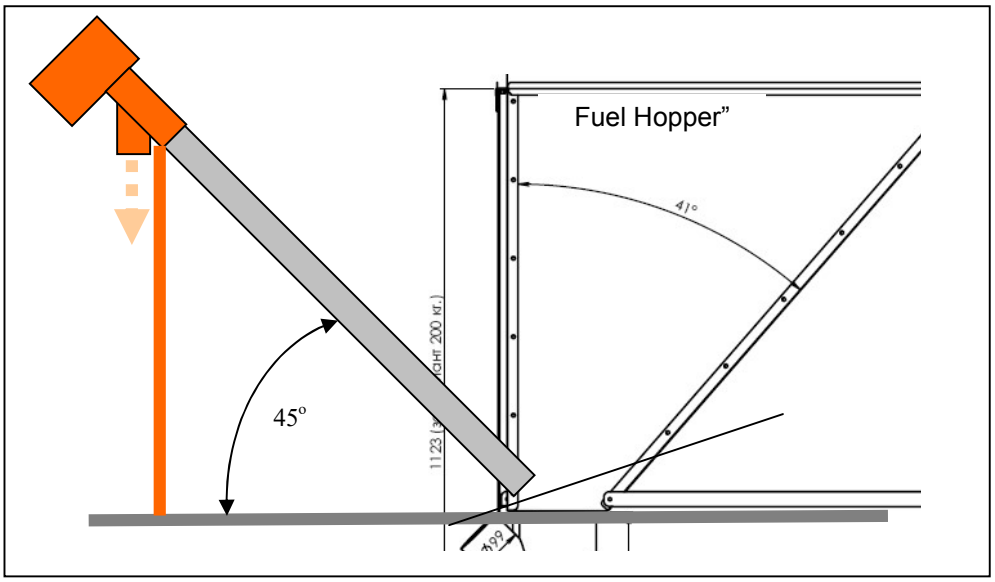
The transport auger for fuel is placed near the burner so that it can be connected to the main module by the flexible pipe through which the fuel from the auger will be transported. It is also advisable to position the angle between the horizontal plane and the axis of the auger is 45°, which will ensure optimal operating conditions for the electric motor of the auger and the combustion process.

Change of the auger's tilting angle leads to changes in the fuel consumption and respectively to the burner's heating output:

- Decreasing the auger's tilting angle leads to increased fuel consumption, respectively to increased heating output;
- Increasing the auger's tilting angle leads to decreased fuel consumption, respectively to decreased heating output.

Figure 5.5 presents a diagram for installation and positioning of the fuel transport auger.

Figure 5.5. Diagram for installation and positioning of the fuel feeding auger.



In case of changing of the fuel feeding auger inclination it is necessary to make new adjustment of the pellet burner.

5.5. INFORMATION ABOUT INSTALLATION AVAILABILITIES OF BURNER „GREENECOTHERM GP XX R TSC" AND ITS CO-OPERATION WITH HOT WATER BOILERS.

The tube pellet burner with self-cleaning from series „GreenEcoTherm GP xx R tsc" is a standalone module (requires power supply and signal – assignment for operation), which can be mounted to a heat energy consuming appliance. The practice shows that the heat energy consuming appliance is most frequently a hot water boiler, used in local heating installation.

6. INITIATION TO OPERATION OF BURNER „GREENECOTHERM GP XX R TSC”.

The modulating tube pellet burner from series „GreenEcoTherm GP xx R tsc” has to be initiated to operation only by a specialized company, authorized for such activities.

6.1. MAIN REQUIREMENTS ABOUT THE USED FUEL TYPES.

During initiation to operation of a pellet burner from series „GreenEcoTherm GP xx R tsc” the following main requirements about the used fuel types must be observed:

- To achieve complete fuel burning it is necessary to use only dry fuels. It is recommended to store the fuel in dry and ventilated premises;
- It is forbidden to store the fuel next to the appliance to which the burner is mounted. The distance must be considered according to the requirements of the relevant fire protection regulations;
- The optimal recommended distance between the appliance (to which the pellet burner is mounted) and the fuel is at least 1000 mm. It is preferable to store the fuel in a neighbor room;
- It is the most convenient and safe to install fire extinguisher.

When installing the burner to the equipment (a boiler) to which it is mounted and in the fuel storage all activities must be respected local fire protection requirements.

6.2. INITIATION TO OPERATION OF A PELLET BURNER „GREENECOTHERM GP XX R TSC”.

When initiating to operation a pellet burner from series „GreenEcoTherm GP xx R tsc”, the following main requirements must be observed:

- Maintenance and attendance of the burner must be performed in accordance to the manual for maintenance and operation;
- The operation mode of the system: a pellet burner „GreenEcoTherm GP xx R tsc” and a heat energy consumer, must provide minimum under-pressure (pressure lower than the atmosphere’s) in the appliance’s combustion chamber;

Non-compliance with the above requirement might lead to emergency modes or to ineffective operation of the burner. The value of the under-pressure in the heat energy consuming appliance’s combustion chamber depends on the chimney draught and on other modules (for example a flue gas extraction fan). Operation modes, non-complying with this requirement might be ascertained through the temperature value indicated by the reversible temperature sticker.

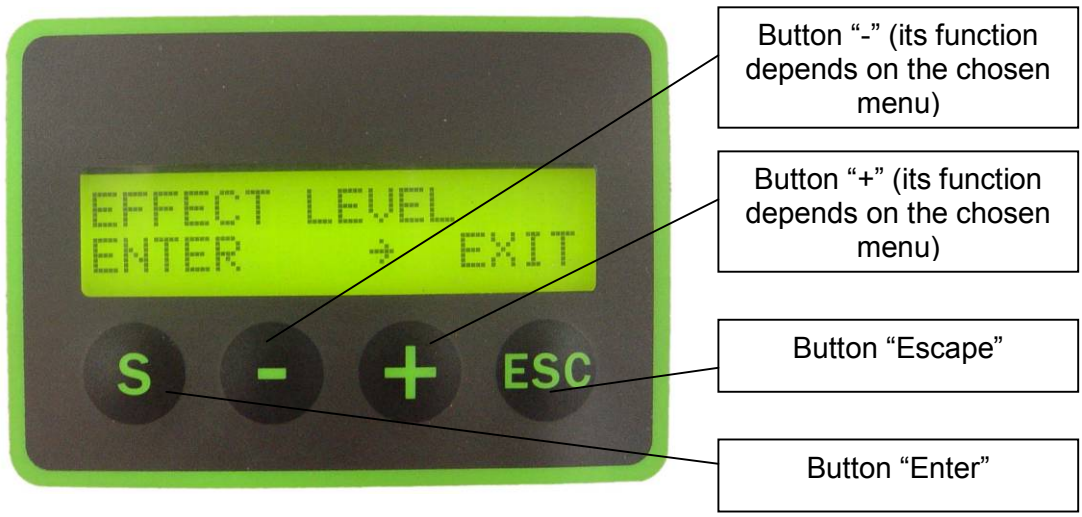
- Any interference to the operation of the appliance that might lead to risks for the health of the servicing/attending personal or to other indirectly linked people is strictly forbidden;
- During operation the burner has to be periodically checked by the user/attending staff;
- The user must not perform any repairs over the system’s modules. If a failure or a problem occurs during operation then the users must ask for technical assistance by a servicing company;
- It is forbidden to increase the burner’s heating output above the nominal output;

- The ash residues from the burning process must be gathered in proper fire-proof container and after cooling to ambient temperature it has to be dumped to proper for the purpose places.

6.2.1. INTERFACE PANEL OF A BURNER „GREENECOTHERM GP XX R TSC".

Figure 6.1 presents a view of an interface control panel equipped with display and keyboard, used to manage the automated pellet burner from series „GreenEcoTherm GP xx R tsc".

Figure 6.1. Interface panel of a pellet burner from series „GreenEcoTherm GP xx R tsc".



Components of the interface control panel and their functions:

- Button "**S**" – is used to choose a submenu and to confirm the performed adjustments;
- Button "**-**" – is used to decrease a currently changing parameter value from the controller's menu;
- Button "**+**" - is used to increase a currently changing parameter value from the controller's menu;
- Button "**ESC**" – is used to cancel a change of chosen parameter from the controller's menu and to exit a chosen operational menu.

The above presented buttons of the burner's interface control panel might have another function, which will be described on the display panel.

6.2.2. CONNECTING AND POWER SUPPLYING OF THE BURNER.

All activities over the burner's electrical installation, adjustments requiring dismounting of cover panels or other components, which protect from direct contact with electrical parts, must be performed only by qualified staff.

The burner must be connected to the electrical installation of the appliance to which it is mounted, by observing all technical safety rules. Use the power supply cable and the attached wiring diagram for connecting to power supply voltage and to the burner's operation control module.

The fuel feeding auger is mounted to the hopper and is positioned in a way providing the required fuel feed rate, as it is also filled with fuel.

The sensitive component of the circulations water temperature sensor has to be mounted in a sleeve for measuring of the outlet water temperature of the hot water boiler or has to be screwed in a threaded orifice (depending on the sensor type).

6.2.3. SWITCHING ON THE PELLET BURNER „GREENECOTHERM GP XX R TSC".

The burner switching ON has to be performed through the power supply of the appliance, to which it is mounted. If the burner has been in operational mode (or in "hot reserve") but the power supply has been interrupted, then when the power supply restores the burner will continue its operation automatically.

In case the appliance to which the burner is mounted is not properly sealed and the burner is operating, smoking of flue gasses through the unsealed sections is possible to occur, as well as through the fuel feeding flexible pipe. It is recommended to seal these sections and to adjust the burner's heating output in order to avoid such smoking. The same effect might be monitored during the transition seasons – autumn and spring, when the natural chimney draught is decreased due to higher ambient temperatures.

During the burner's ignition mode the ceramic heating elements activate, which are positioned under the combustion chamber's fire-grate. This zone is heated to high temperatures and could be dangerous in case it is touched.

When initiating the burner to operation for the first time the auger (fuel feeding) device must be filled with pellets – this is continues process requiring time. Therefore the auger must be connected to external power supply, through its standard plug and to wait until the fuel starts to drop from its top orifice. After that it must be connected to the power supply socket of the burner's main module.

The burner's main module constantly checks if the feeding auger is connected to its socket and if this condition is not fulfilled the system will transit to emergency mode, until the auger's power supply cable is connected properly. After that it is necessary to restart the burner's main module in order to transit to normal operational mode.

If the power supply cable of the transport auger has been disconnected from the burner's main module socket (this situation is treated by the controller as an emergency mode – i.e. there is no motor connected to the socket) and the burner has been operating at that time, then an emergency mode activates and the burner operation stops. To reset the alarm it is necessary to connect the auger's plug back to the burner's main module and to switch the burner's power supply button to position OFF and then back to ON (restart).

The burner operates through a preliminary set algorithm, which is installed in its control module. The optimal operation parameters are adjusted in the manufacture company's factory and **their change is generally not required**.

6.2.4. ALGORITHM OF OPERATION OF BURNER „GREENECOTHERM GP XX R TSC".

The tube pellet burner starts operation when the following conditions are observed:

- The burner's main module is mounted to the appliance to which it will operate;
- Presence of electrical power supply;
- Activated start through the display panel;
- Installed circulations water temperature sensor – in case such method is used to regulate the burner's operational mode;
- Lack of emergency signals;
- The fuel hopper and the transport auger are filled with fuel.

When the above conditions are fulfilled the control module executes the following algorithm:

- Submits power and the external transport auger, the heating element and the firing air feeding fan switch ON;
- After expiry of the preliminary set (by the manufacturer) time, which provides loading of the combustion chamber with the so called "ignition" fuel doze, the auger's power supply cuts off and it stops;
- After the photosensor in the burner registers presence of burning process the heating elements power supply cuts off. For a defined period of time the burner reaches the assigned heating output. If the photosensor does not register a flame within a set period of time, the controller performs new attempt for ignition through the above presented algorithm. The ignition attempts are limited to two;
- In case of successful fuel ignition the system transits to nominal operation mode of the burner, which is realized through periodical fuel feeding and pauses for burning. The times for fuel feeding and pauses are adjusted in the control module's software. The burner heating output can be changed by selecting one of its output levels;

The maximum heating output level - 5^{-th} of the burner is not recommended. This level should be chosen only in cases when the used fuel type is with lower caloricity value or when higher heating output is temporarily needed. The recommended output levels are from 1 to 4, as normally level 4 reaches the nominal heating output (see Table 6.1.).

- A NTC sensor is used as control device for determining of the circulations water operational temperature:
  - When the assignment is nearly reached the burner's control module decreases its heating output (so called modulation of the operation mode);
  - If the circulations water temperature decreases the burner restores its heating output.
- If the operation signal drops out during operation (for example by room thermostat), then the burner will switch off through the above presented algorithm;
- If during rest the operation assignment changes and it receives signal for operation, then it will start operation through the above presented algorithm. The same condition is valid in case the circulations water temperature is lower than the adjusted in the burner's control module;
- If the fuel does not ignite within the first attempt a new attempt is automatically performed, as the ignition attempts are maximum two (defined by the manufacturer). In case of second unsuccessful ignition there is possibility of presence of unburned

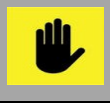
fuel over the main module's fire-grate. It is necessary to find and remove the reason for unsuccessful ignition and also to clean the combustion chamber's fire-grate from the fuel residues;

If the gathered fuel from the burner's internal tube has not been removed, after successful ignition (for example after restarting the burner) it might lead to difficult firing of relatively larger amount of fuel, to separation of inflamed gasses and respectively to their explosive ignition. Such explosive ignitions might lead to mechanical damages of the appliance, to which the burner's main module is mounted.

- If the photosensor does not register a burning process during operation, then the fuel ignition algorithm starts again;
- If two unsuccessful attempts for ignition have been performed, for example in case the fuel has been depleted, then the burner stops the main algorithm and transits to emergency mode, which is shown on the display panel and should be considered as a necessity for intervention by the user, as the failure reason requires removal. After the failure has been removed the new start has to be performed through consecutive switching OFF and then back ON (restarting) of the appliance's common power supply, to which the burner is also connected.

Before starting the burner the user have to check if in the internal tube of the burner has been left unburned fuel and ash and
the residues f such to be removed to be cleaned ash.

- If the power supply has been interrupted the burner will start automatically when the supply restores.



During operation the burner might transit to final combustion and blowing, if the relevant option for cleaning during operation is switched ON – parameter **"Max.comb.time".** This parameter is in **"Advance menu"**, as the access to it is password protected.

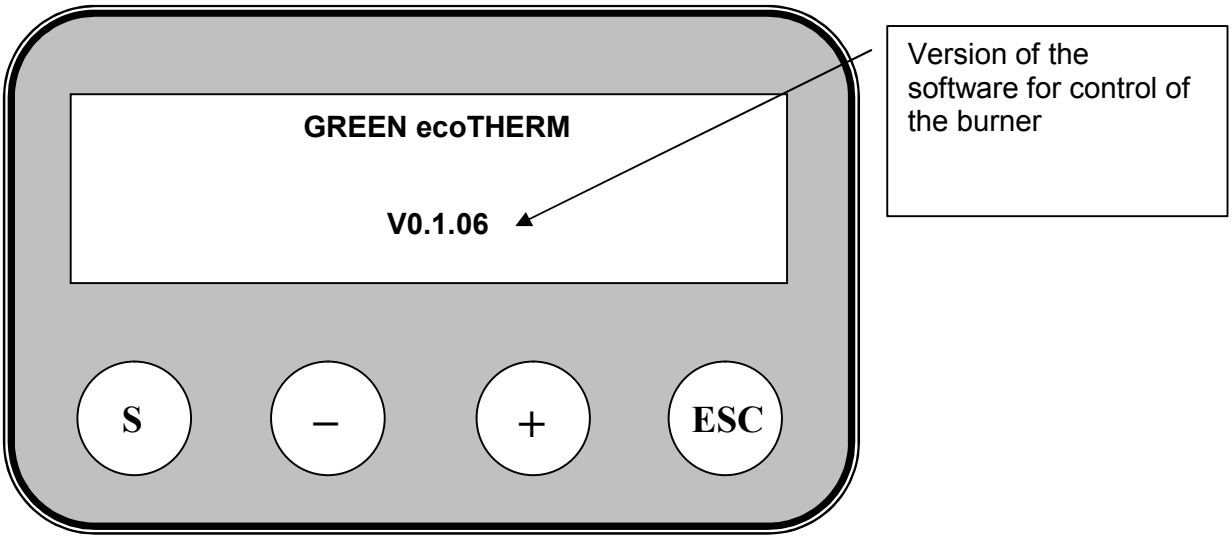
6.2.5. OPERATIONAL PARAMETERS FOR ADJUSTMENT OF A BURNER „GREENECOTHERM GP XX R TSC".

The operational parameters are preliminary set in the burner's control module by the manufacturer, as the user and/or other attending staff are not required to perform changes. In order to achieve optimal and economic operational conditions of the burner it is necessary to assign such heating output that will provide optimal operation and low fuel consumption. The practice shows that the constant operation of the burner provides optimal fuel consumption.

The controller's display panel and the keyboard are used to show information about the burner's operation mode. The operational parameters adjustments have to be performed by trained specialist.

6.2.6. DESCRIPTION OF THE PRIMARY MENU, THE METHODS OF STARTING AND OPERATIONAL PARAMETERS ADJUSTMENT OF A PELLET BURNER „GREENECOTHERM GP XX R TSC”.

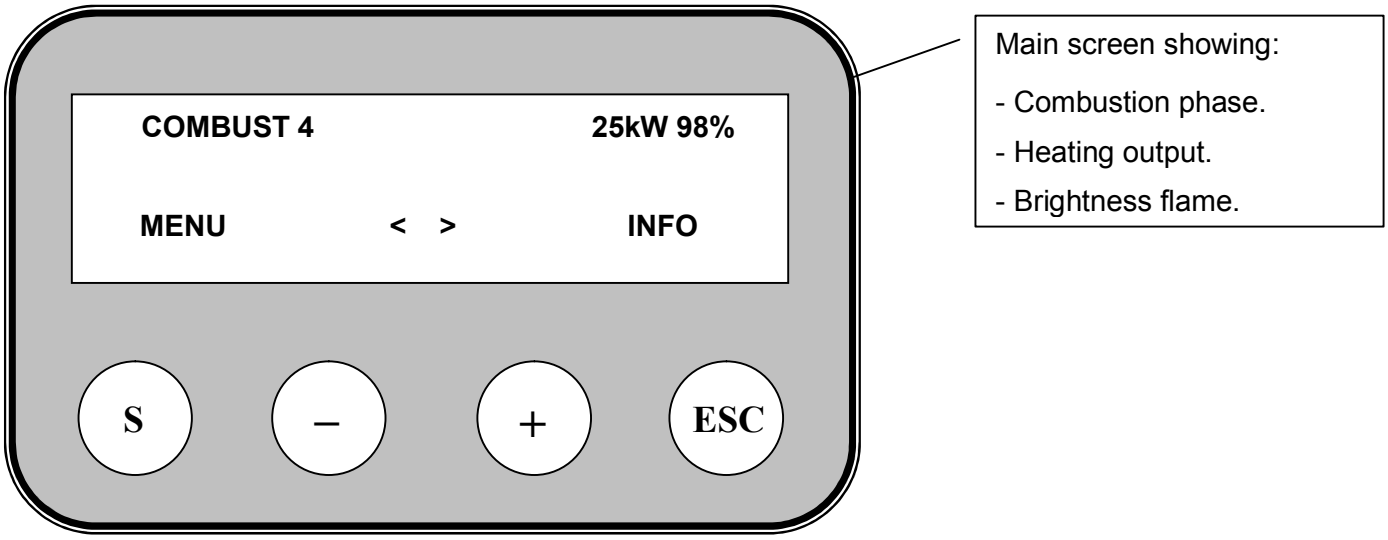
Figure 6.2. Starting display, shown when starting a rotary tube pellet burner with self-cleaning „GreenEcoTherm GP xx R tsc”.

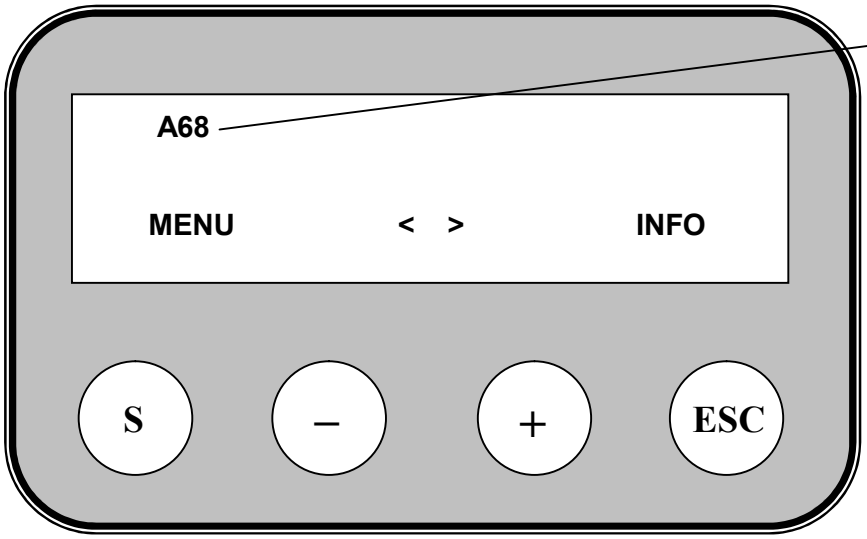


After the software has been loaded (after a few seconds) the display panel shows a question: whether to start the burner? (**Activate?**):

6.2.7. MAIN DISPLAY SCREENS IN THE PELLET BURNER CONTROL MENU.

Figure 6.3. Main display screens in the pellet burner control menu.



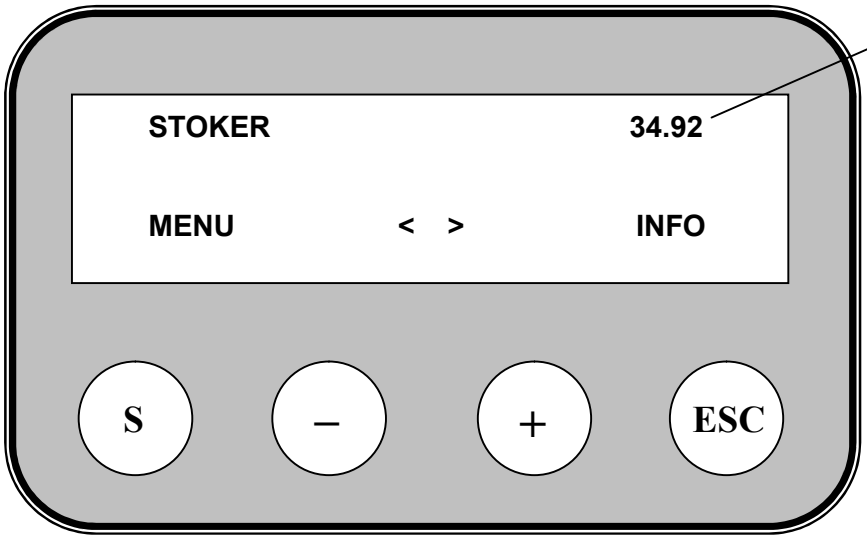


A xx – water temperature in a boiler.

B xx - water temperature in buffer - up (option).

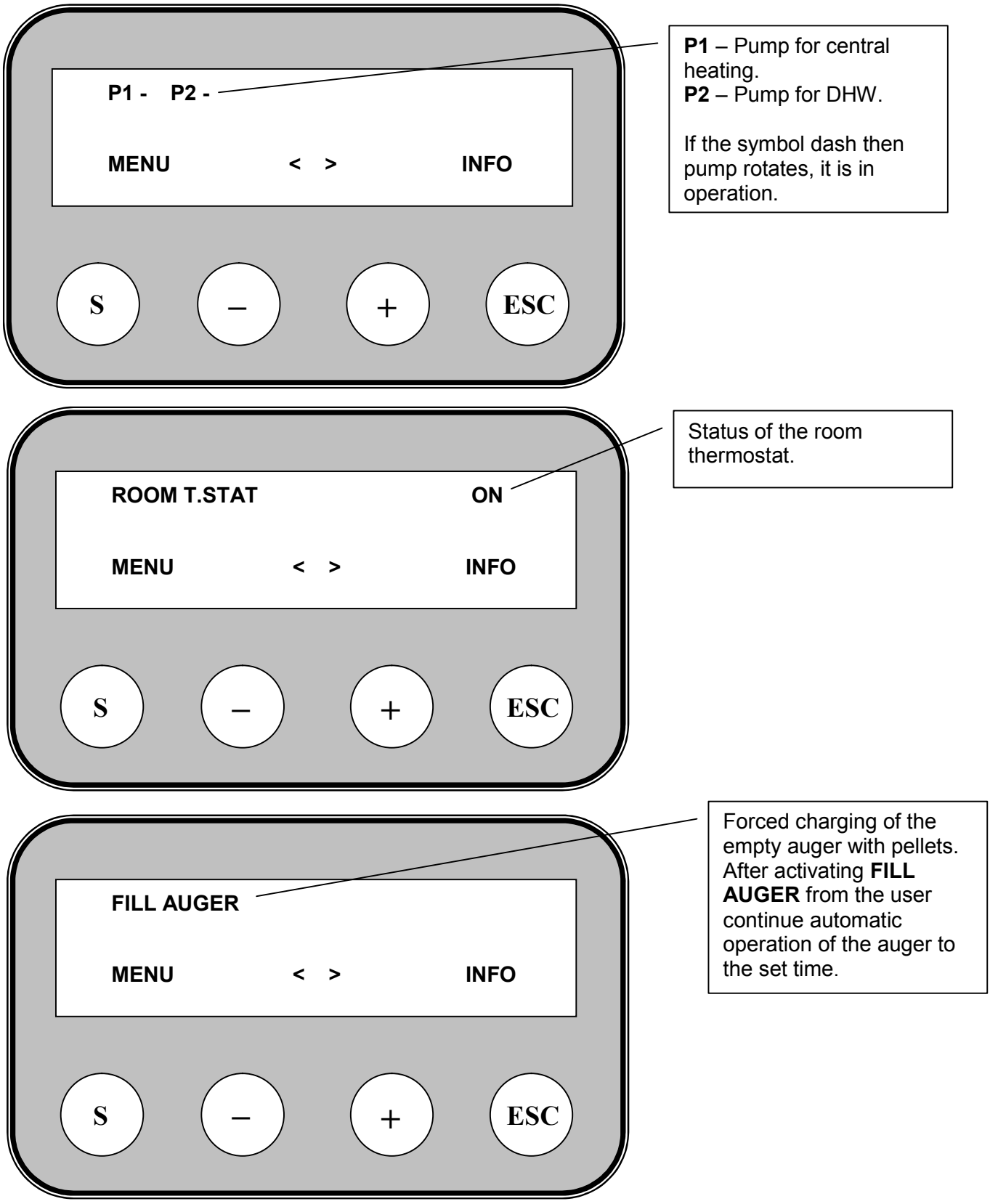
C xx – water temperature in buffer – down (option).

D xx - water temperature in reservoir for DHW (option).



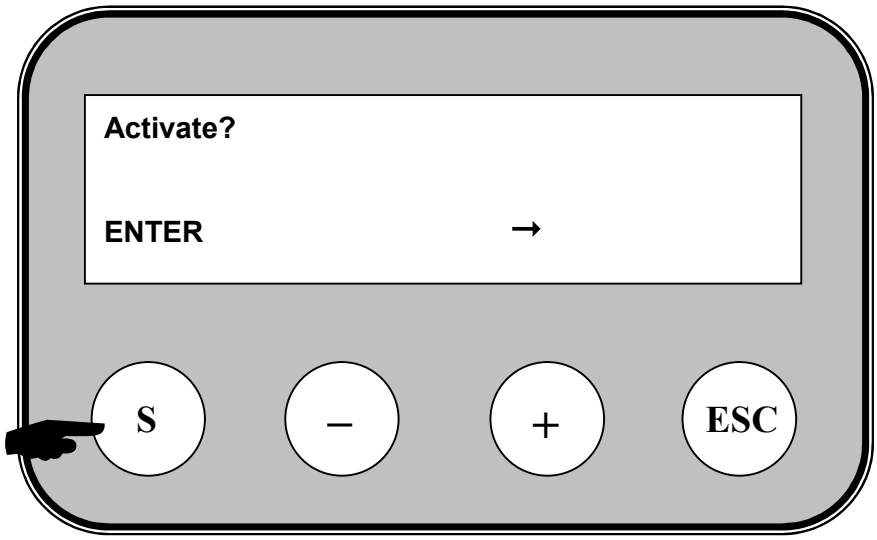
STOKER xxxx - total operating time of the auger (statistical parameter).

Figure 6.3. Main display screens in the pellet burner control menu (continued).



The time for charging of the fuel auger must be preset in advance in „**ADVANCE MENU”**.

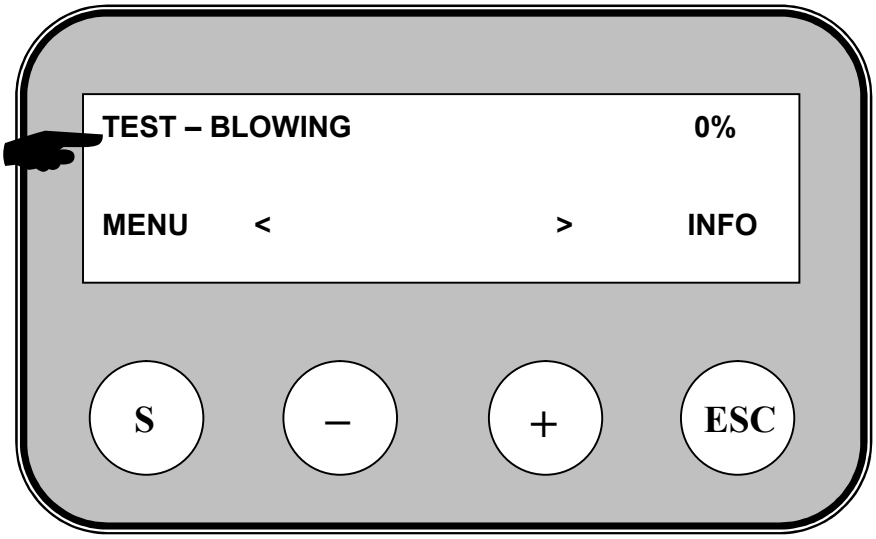
Figure 6.4. Menu for starting a pellet burner from series „GreenEcoTherm GP xx R tsc”, through inviting question.



To start the burner’s operation press the button “**S**”, as presented on the figure.

After starting the burner’s operation a message is shown on the display panel, as presented on the next figure.

Figure 6.5. The display shows information about the operation mode of the burner’s controller – in this case it checks the operation of the firing air feeding fan.

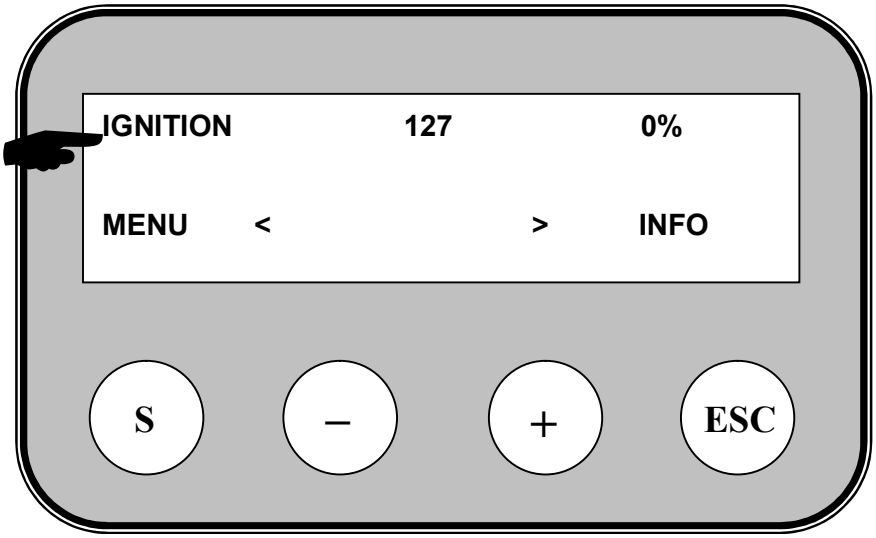


TEST – BLOWING: – shows the operation mode – a starting blowing of the burner’s tube through the fan is processed (shows the current phase from the burner’s ignition).

„MENU” – access to the menu.
„INFO” – access to the messages.
„<” „ >” - switching to the next screen.

„0%” – shows the intensity of the photo sensor brightness in percentages .

Figure 6.6. The display panel shows information about the burner's operation mode – in this case ignition of the primary fuel doze.



After the starting blowing by the fan, the burner feeds primary fuel doze and starts the process of ignition. The display panel shows **”IGNITION 1”** – first attempt for ignition, which has to be completed within a period of time, defined in the controller's software.

The burner's controller is factory programmed with the optimal operation mode adjustments. Discrete number of heating output levels are set, through which the burner operates. The last, maximum level of the heating output is adjusted in a way that provides higher heating output than the burner's nominal output – these modes is designated for situations when the used fuel caloricity is lower than the normal or when the heat energy consumption exceeds the burner's nominal output (see Table 6.1.).

The practice shows that the factory adjusted parameters of the burner do not need additional corrections, even if different fuel types are used.

The manufacture company reserves its rights to change the settings of the appliance, without obligation to inform the end users.

The values of the parameters, which define the heating output of the pellet burner from series „GreenEcoTherm GP xx R tsc”, are determined under the following conditions:

- The utilized wood pellets are with diameter Ø 6-8mm, quality classes A1, A2 and B, according to standard EN ISO 17225-2:2014 or category: A, AB, B, BC and C (see Tables 3.4 and 3.5);
- The tilting angle between the longitudinal axis of the transport auger and the horizontal plane is 45^{o};
- Table 6.1 presents the factory settings of the heating output levels, through which the burner achieves optimal operation performance;
- The presented heating output levels define the heating output and the operation modes of the burner;
- The primary adjustment of the burner at the customer's site is performed by trained servicing technician, after that the user is not required to perform more changes.

The next texts below describe how to define the fuel consumption and to calculate the burner's heating output:

- Switch the burner ON;
- Dismount the flexible pipe, that connects the auger and the main module, from the burner and direct the free end to a container (for example plastic bag or other), so the dropped pellets by the auger gather inside;
- Then an authorized technician chooses the menu **"Advance menu"** and activates the parameter **"Stoker adj"**;

The access to this menu is protected by password!

- Leave the auger operating for 6 minutes. The pellets quantity gathered in the container have to be measured and registered in the controller through the relevant buttons, as directing information is shown on the display panel. After that activate the burner operation. The pellets caloricity value can be also entered in the controller, but only in case that it is necessary and the available information is correct. The factory adjusted wood pellets caloricity is 4.8kWh/kg. After the data has been entered it must be saved through the relevant button from the menu – the information on the screen provides directions about the required steps for completion of the procedure for primary adjustments. After completing this primary adjustment the burner heating output is guaranteed.

The parameter **„Stoker adj"** from menu **„ Advance menu"** has to be activated in pellet burner fuel replacement , for example if the fuel is delivered by other manufacturer.

6.2.8. BURNER ADJUSTMENTS ACCORDING TO THE CONSUMED HEATING OUTPUT.

For optimal, reliable and efficient operation of the rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" and of the heat energy consuming appliance, to which it is mounted, is recommended to adjust the burner according to the needed heat consumption. This can be performed by changing the burner's heating output level, as presented in Table 6.1.

When changing the burner's heating output level it is not necessary to adjust the firing air fan flow rate. It is performed automatically through the program installed in the burner's control module.

6.2.9. NOMINAL OPERATION MODE OF THE BURNER.

After completion of the burner's starting process (the fuel in the burner's combustion chamber is successfully ignited) and the consuming appliance, to which the burner is mounted and which utilizes the generated heat energy, has been tempered it can be accepted that the system is in nominal operation mode. Adjustments and checks of the burner have to be performed in nominal operation mode (as well as of the consuming-appliance depending on its operation mode). For the burner it is necessary to assign the operational heating output, which has to comply with the consumed heating output of the appliance in nominal operation mode.

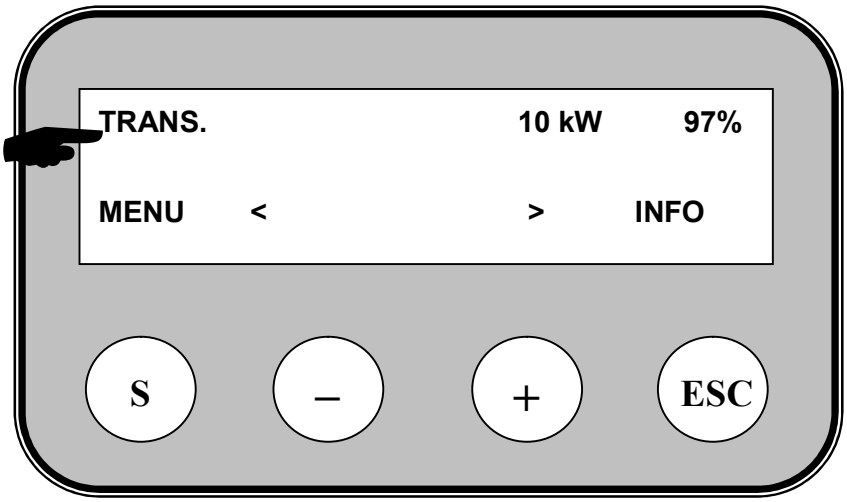
In nominal heating output mode the so called “hot test” of the system has to be performed, according to the acting legal provisions.

The firing air flow rate is significant for the operation mode and the efficiency of the system – burner and appliance. When the air quantity is less than the optimal, it might lead to incomplete fuel burning. Also when the air consumption is higher than the optimal, it leads to cooling of the burning zone and again to incomplete fuel burning. Therefore it is important to provide free access to air (to the burner as well as to the room where the system is installed), which to be fed from the fan to the burning zone, in order to ensure optimal work parameters and economic operation.

6.2.10. OPERATION MODES OF A BURNER „GREENECOTHERM GP XX R TSC”.

After successful fuel ignition the burner transits through a mode for stabilization of the burning process, as the display panel shows the following information (Figure 6.7):

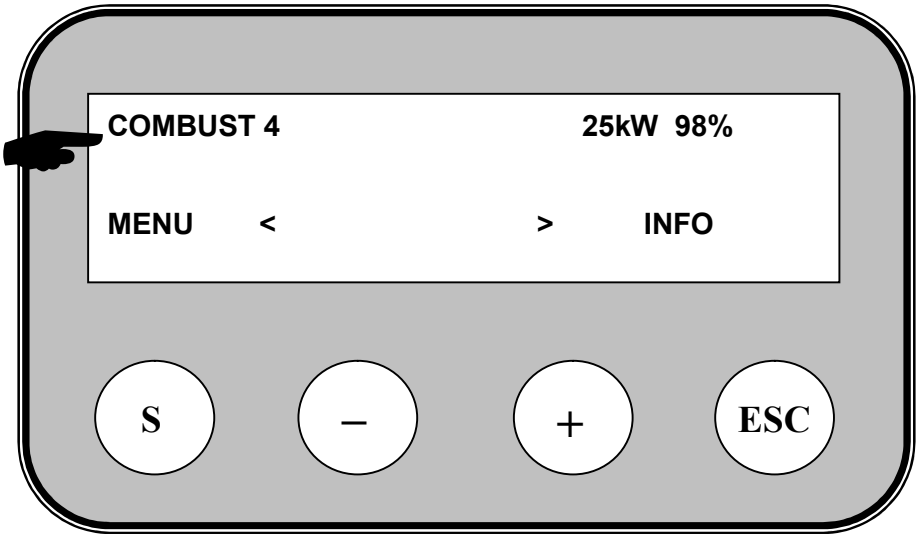
Figure 6.7. The display panel shows information about the burner’s operation mode – transition mode – transition from ignition to stabilization of the burning process in minimum heating output mode.



”TRANS.:10kW” – indicates that the burner is in transitional phase for stabilization of the burning process, with heating output of 10kW.

After completing the transition mode the burner transits directly to normal operation mode, as presented on Figure 6.8.

Figure 6.8. The display shows information about the burner's heating output level, as in this case it is the maximum heating output mode.

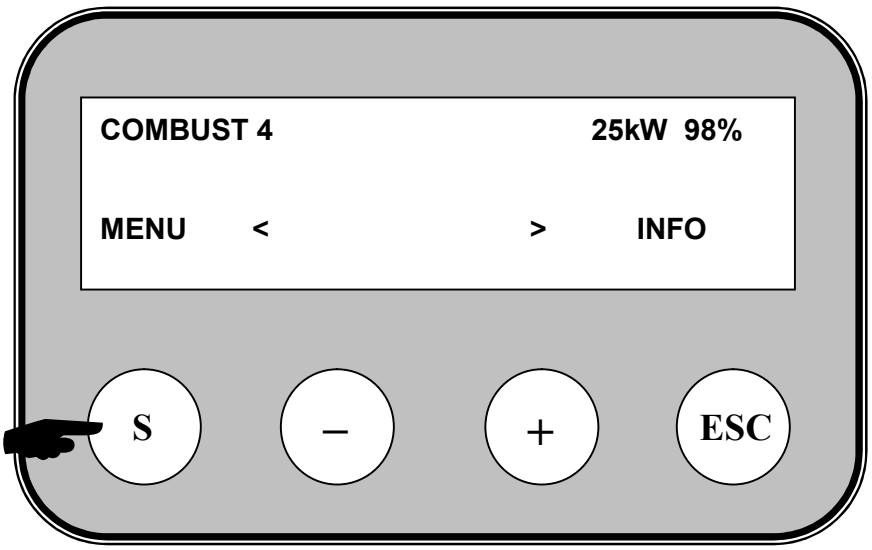


"COMBUST 4 – 25kW" – indicates the burner's heating output level (in this case 4th level providing heating output of 25 kW);
"98%" – indicates the brightness intensity by the photo sensor, %.

6.2.11. USER MENUS IN THE CONTROL MODULE OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

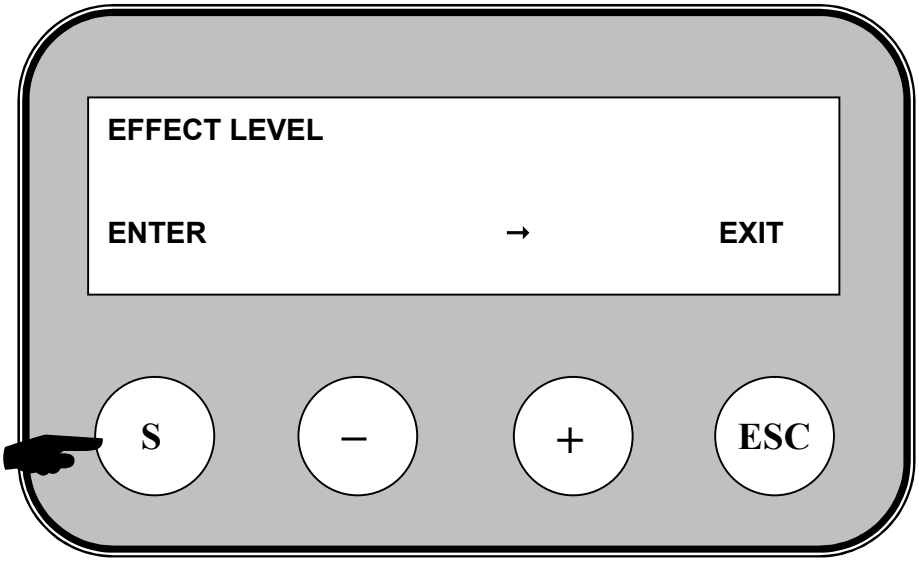
To enter the burner's menu press and hold the button "**S**". To exit already entered submenu press the button **"ESC"**.

Figure 6.9. To choose a submenu from the burner's controller press the button "S".



6.2.12. MENU “EFFECT LEVEL”.

Figure 6.10. Menu **”EFFECT LEVEL”** – choice of a heating output level of a tube burner „GreenEcoTherm GP xx R tsc”.



This menu is used to choose the heating output level for operation of the burner. The heating output levels values achieved by the burner are presented in Table 6.1

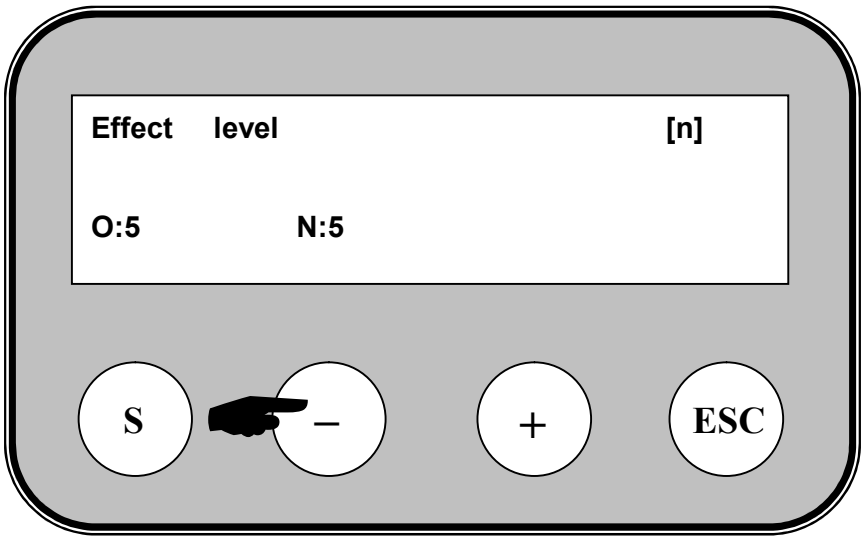
Table 6.1. Heating output of a rotary tube pellet burner „GreenEcoTherm GP xx R tsc”, depending on the heating output level.

Parameter	Dimension	Value			
Pellet burner	-	GreenEcoTherm GP xx R tsc			
Model	-	GP 25 R tsc	GP 35 R tsc	GP 45 R tsc	GP 60 R tsc
Heating output level	kW	-	-	-	-
1	kW	8	10	15	20
2	kW	10	15	20	30
3	kW	15	20	25	40
4	kW	20	25	35	50
5	kW	25	35	45	60

It is recommended to operate the burner up to 4th level - including, as the 5th level should be used exceptionally, but only for short periods of time.

To enter the menu **”EFFECT LEVEL”** press the button under **ENTER** – “**S**”. To switch to another menu press the button “+” under the arrow on the display. The button “**ESC**” is used to exit the menu and to return to the main menu. When entering the menu **”EFFECT LEVEL”** the user can choose one of the 5 levels of heating output for operation of the burner.

Figure 6.11. Choice of heating output level of a tube pellet burner „GreenEcoTherm GP xx R tsc”.



Through the buttons “**+**” and “**–**” choose the desired heating output level of the burner. After that press the button “**S**” to confirm the changes. To exit the menu press the button “**ESC**”.
“O” – it means “old” – old value, and **„N”** – it means “new” – new value.

6.3. ADJUSTMENT OF THE BURNER’S HEATING OUTPUT.

The burner’s heating output adjustment can be performed through adjustment of its heating output level. Information about the burner’s heating output within all different levels is presented in Table 6.1.

In case the used fuel type has been changed (for example change in the wood pellets quality category) it might be necessary to re-adjust the burner’s heating output level.

6.3.1. DECREASING THE BURNER’S HEATING OUTPUT.

It can be performed through decrease of the burner’s heating output level, as the heating output assignment decreases and respectively the fuel consumption decreases too.

6.3.2. INCREASING THE BURNER’S HEATING OUTPUT.

It can be performed through increase of the burner’s heating output level, as the heating output assignment increases and respectively the fuel consumption increases too.

When changing the heating output, respectively the fuel consumption, the controller’s algorithm automatically changes the firing air flow rate supplied by the fan, which feature ensures optimal operation modes within wide heating output range.

6.4. STOPPING THE OPERATION OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

Stopping the operation of the tube pellet burner from series „GreenEcoTherm GP xx R tsc" can be performed through:

- A switch "**START**";
- A menu from its controller keyboard;
- An external control module (room thermostat).

6.4.1 STOPPING THE OPERATION OF A PELLET BURNER FROM SERIES „GREENECOTHERM GP XX R TSC" THROUGH THE SWITCH "START".

Through the switch **"START"** (which has to be installed by the servicing technician during the burner mounting and in accordance with the attached wiring diagram) the burner can be started to operational mode and respectively can be switched OFF. When switching the burner OFF its display panel shows a message "**FINAL COMBUSTION**".

The switch „START" is obligatory to be mounted from qualified person (service technician).

The burner switching OFF must be performed only through the switch "START" and not through stopping the appliance's power supply. The reason is because through the switch "START" the burner performs controlled stopping, which includes cooling of the appliance and complete fuel combustion, as this process preserves the appliance's reliability.

The way of the pellet burner operation stopping through the switch „START" is recommended by the manufacturer.

6.4.2. STOPPING THE BURNER OPERATION „GREENECOTHERM GP XX R TSC" THROUGH A MENU FROM ITS COTROLLER KEYBOARD.

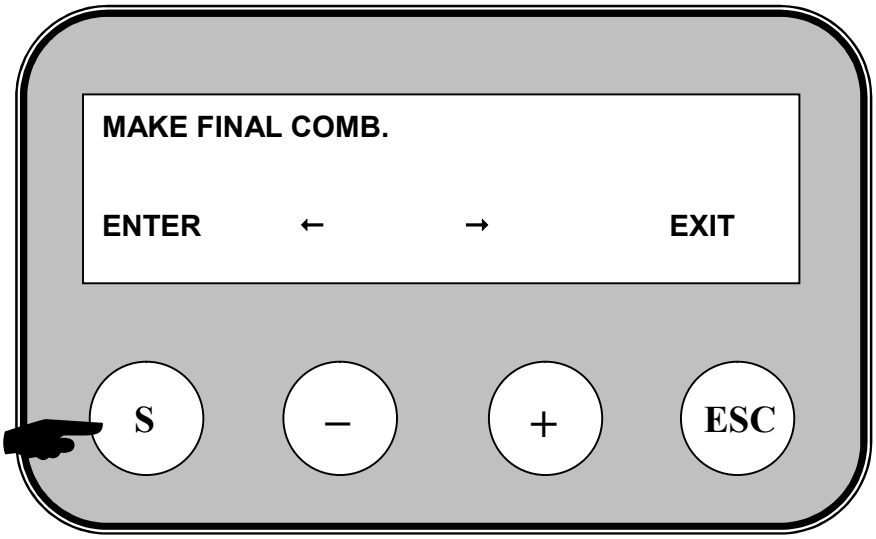
The following actions have to be performed in order to stop the burner's operation:

- Press and hold the button "ESC" (for more than 5 seconds);
- Choose the answer "YES" when the display shows - **"Make final combustion?"**.

When the choice for stopping is confirmed a message **"Final combustion"** is shown on the display panel and the burner performs stopping procedure.

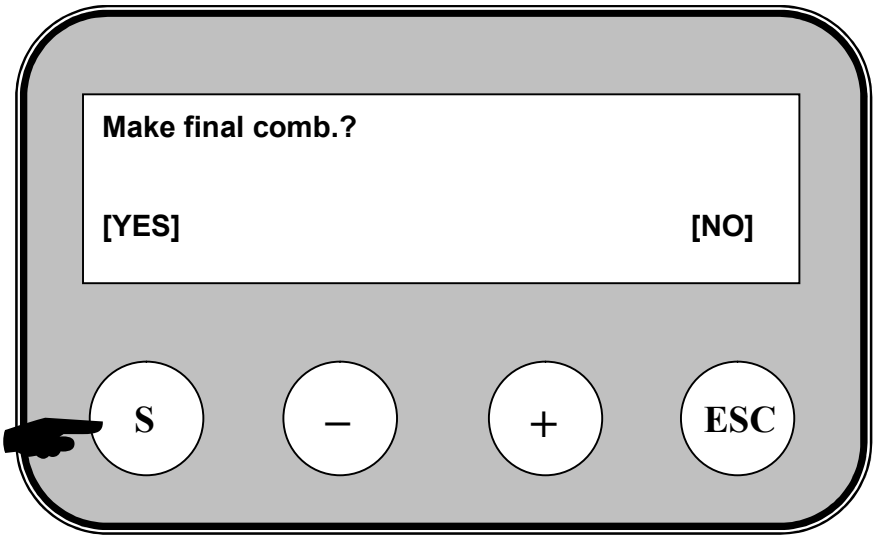
There is also another method for stopping the burner's operation: through the menu "**MAKE FINAL COMB."** from the burner's controller.

Figure 6.12. Choice of the menu **”MAKE FINAL COMB.”**, which is used to stop the operation of a tube pellet burner „GreenEcoTherm GP xx R tsc”.



To enter the menu **”MAKE FINAL COMB.”** press the button “**S**” and to exit (cancel) press the button “**ESC**”. The buttons “**+**” and “**-**“ are used to scroll through the other menus.

Figure 6.13. The controller’s display panel shows a message, asking to start the stopping process of a tube pellet burner „GreenEcoTherm GP xx R tsc”.



To perform fuel final combustion press the button “**S**”, positioned under the message **[YES].** To cancel the process of final combustion or to return to previous menu press the button “**ESC**”, positioned under the message **[NO]**.

Although it is possible to stop the operation of the burner keyboard controller and the manufacturer recommends stopping (starting) to be made through the key "START" in the manner described in section 6.4.1. In this case the main advantage is independence from electricity supply and speed.

When the control module receives signal to stop the operation of a pellet burner from series „GreenEcoTherm GP xx R tsc" the fuel supply stops, but the firing air feeding fan continues to operate. Therefore after confirmation of the stopping procedure the burner continues to operate and to generate heat energy, which makes it inert, respectively the system in which it operates is also inert. This specific feature has to be taken in mind especially 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 pellet burner from series „GreenEcoTherm GP xx R tsc" 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.

6.4.3. STOPPING THE BURNER OPERATION „GREENECOTHERM GP XX R TSC" THROUGH AN EXTERNAL MODULE CONTROLING ITS OPERATION (ROOM THERMOSTAT).

Stopping the burner is done by removing the signal operation, which is fed into the burner of an external module or execute the procedure for exclusion of its work described in the previous section. When the burner passed from burning mode to a standby or "off-mode", the controller carries out its management so called **"Controlled stopping"** during the time in which operates the fan air supply for combustion and also monitor emergency signals. After cooling the burner, it must be disconnected from the power supply. It is also recommended the system: burner - boiler to be cleaned of ash.

6.5. EMERGENCY SHUT DOWN OF A TUBE PELLET BURNER.

During operation of the burner emergency situations might occur, as the burner will transit to emergency mode. Such types of situations are indicated by the burner's control module, which automatically performs prevention procedures. The burner's control module transits to emergency mode, which is indicated with a relevant failure code message on the burner's display panel. Descriptions of the failure codes and other messages are presented in Table 7.2. Description of the possible failures, shown on the control module's display panel, of a tube pellet burner from series „GreenEcoTherm GP xx R tsc", is also presented in Table 7.3.

If emergency situation occurs the failure code, indicated on the control module's display panel, has to be checked and the relevant corrective measures should be performed. After that the burner has to be restarted through switching OFF and then back ON its power supply.

If the consuming appliance, to which the burner is mounted, has been overheated (emergency situation) its emergency thermostat activates. This thermostat is a **MANDATORY** equipment and is not included in the burner's standard delivery kit. The reason for the emergency situation has to be determined and the relevant corrective measures have to be performed. The emergency thermostat has to be switched back manually, in order to supply the burner with power again.

	In case the burner's pellet feeding inlet pipe has been overheated (also treated as an emergency situation) the sensor, which monitors the temperature in this zone and protects the transport auger from the so called back fire", activates. After cooling of the burner's main module the cause for the emergency has to be determined and the relevant corrective actions have to be performed. After removing the reason for emergency, in this case overheating of the burner's fuel inlet pipe, the security sensor in that zone might be damaged, as it may requires replacement.

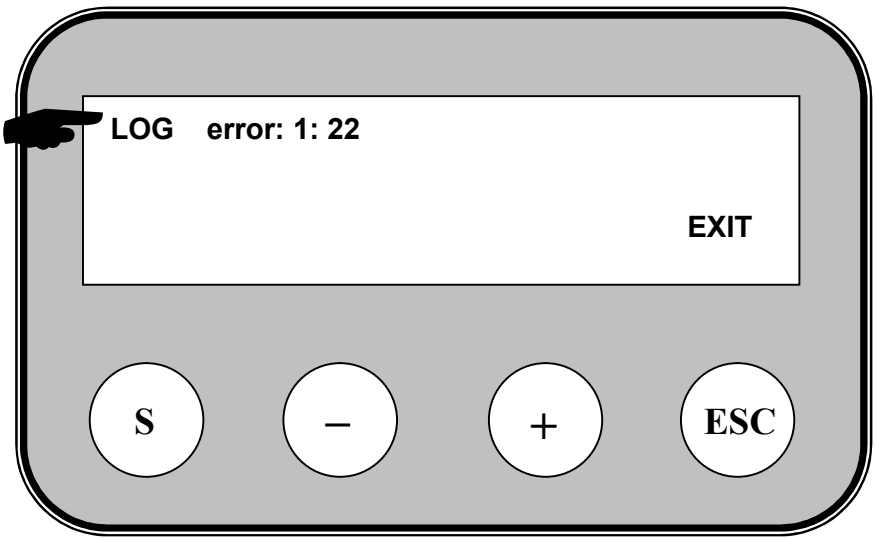
	The control module has built-in protection against overruns the temperature of the circulating water in the boiler body over limited value of 95°C. Upon reaching this temperature was suspended feeding of pellets in the burner and enters the accident – appears message overheating. The emergency thermostat set at 95°C is an additional protection.

6.6. MENU DISPLAYING A LIST WITH THE LAST FAILURES, OCCURRED DURING OPERATION OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

To check the last failures that have occurred during operation of the burner it is necessary to enter the menu **"LOG"**.

	The menu **LOG** shows a list only with the last 10 failures, which have occurred during operation of the burner. In case a new failure occurs it replaces the oldest one in the list.

Figure 6.14. The controller's display panel shows the chosen menu **"LOG"** together with the failure sequence number and code.



To exit this menu presses the button "**ESC**".

Table 7.2 provides information about the failure code and its explanation.

6.7. RESTART OF THE TUBE PELLET BURNER OPERATION.

The burner restarting is necessary in situations when there is assignment for operation, but the control module has switched to secured mode and the burner is not operating. The display panel shows a message with the failure code. The reason for the failure has to be determined and the relevant corrective measures performed. After that the burner has to be restarted – it can be performed by switching OFF and then back ON the electrical supply of the main module (for example through the main switch of the control board to which the burner is connected).

6.8. ACTIVATION OF OPTION "OPERATION WITH HEAT ACCUMULATOR (BUFFER)".

6.8.1. CONDITIONS FOR OPERATION WITH HEAT ACCUMULATOR (BUFFER).

a. It is necessary to be mounted additional sensors for measurements of the temperature in heat accumulator (buffer) – TB and TC.

TB - sensor **up** in heat accumulator/buffer (connector EXT15 on the PCB terminal).
TC - sensor **down** in heat accumulator/buffer (connector EXT12 on the PCB terminal).
TA – hot water temperature sensor in a boiler, it is mounted in a factory in a boiler (connector EXT13 on the PCB terminal).

Note: All temperature sensors in a boiler are NTC type.

b. Correct settings on operation mode.

- Selected mode **DUAL NTC POP =1** in **Superuser menu** (it is assumed that is made from factory);
- Selected mode **Temp BC + Room** in menu **THERMOSTAT**;
- Correctly selected temperatures on the system.

Example:

TA – water temperature in a boiler 80 °C.
TB - temperature up in heat accumulator/buffer 60 °C.
TC - temperature down in heat accumulator/buffer 75 °C.

In order to properly carry out the algorithm is necessary the set temperatures values to be **TC>TB** (**TC** – the temperature down in accumulator/buffer to be larger than **TB** – the temperature up in accumulator/ buffer).

6.8.2. OPERATING ALGORITHM.

Example:

Boiler starts operation with above mentioned settings. If the temperature **TB** (up in the heat accumulator/buffer) is lower than **60 degree** the pellet burner is switched on. When the temperature **TC** (down in the heat accumulator/buffer) is **75 degree** the pellet burner is switched off.

After some time and after consumption of heat energy from the heat accumulator/buffer when the temperature **TB** (up in the heat accumulator/buffer) becomes lower than **60 degrees**, again start the pellet burner of the boiler

It is classic algorithm of heat accumulator/buffer operation: sensor **TB** switched on pellet burner, and sensor **TC** switched off it.

The detailed technical information about this option is given in the wiring diagrams of the rotary tube pellet burner in section 8 of this operational manual.

6.9. ACTIVATION OF OPTION "OPERATION WITH DHW (RESERVOIR FOR DOMESTIC HOT WATER)".

6.9.1. CONDITIONS FOR OPERATION WITH DHW RESERVOIR.

a. It is necessary to be mounted:

- Additional sensor for measurement of the temperature in the DHW reservoir; **TD** – sensor in DHW reservoir (connector EXT11 on the PCB terminal);
- Additional PCB EK071;
- Additional pump for DHW, connected to the additional PCB EK071.

b. Correct settings on operation mode.

- Selected mode **CHARGING PRIO** (in **ADVANCE MENU**):

NONE - without priority.
Prio A+BC - the priority is heat accumulator/buffer.
Prio A+D – the priority is the DHW reservoir.

- Selected mode **PUMP 2** (pump for DHW):

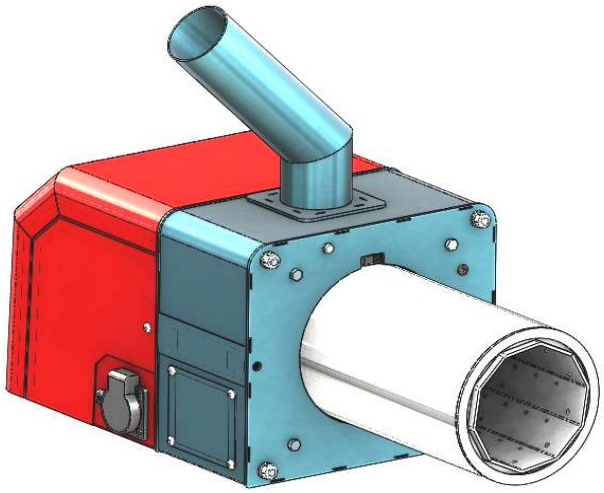
A+D sens. – selects parameters **D Max**, **D Hysteresis**, **A-D Min Diff** (minimal difference between the water boiler temperature and the temperature in a DHW reservoir), **A Min**.
Follow burner – the pump following pellet burner operation.
Always – the pump is always switched on.
Inactive – the pump is deactivated.

6.10. CLEANING SYSTEM OF A BURNER „GREENECOTHERM GP XX R TSC".

The system for cleaning of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" consists of:

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

Figure 6.15. Self-cleaning mechanism of a tube pellet burner „GreenEcoTherm GP xx R tsc”.

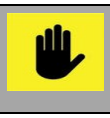


The cleaning of the rotary tube pellet burner is carried out in a certain algorithm, in the combustion process.

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

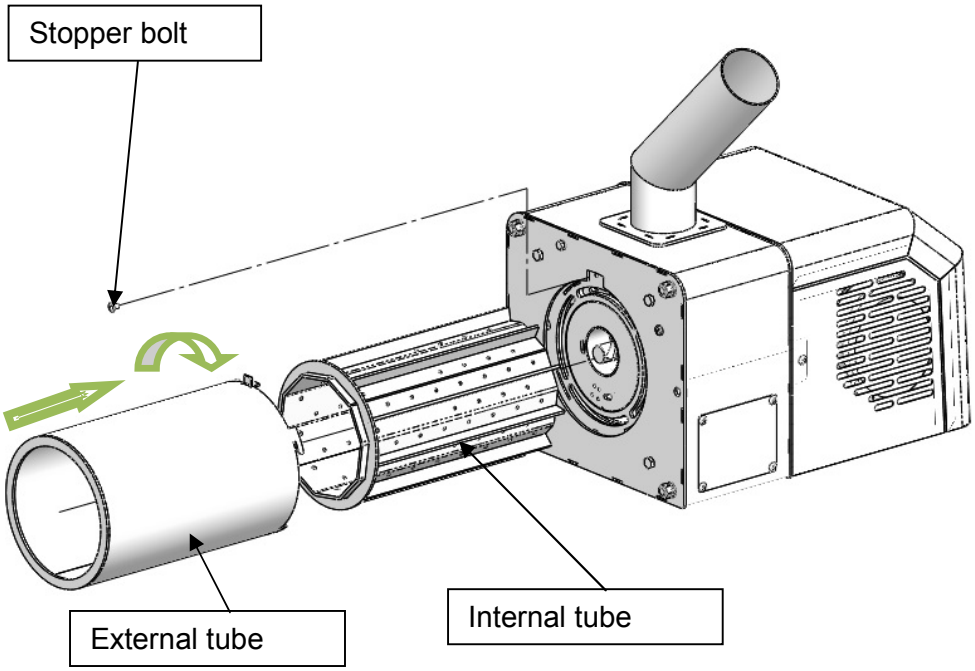
6.11. DISMANTLING AND MOUNTING OF A PELLET BURNER ROTATION TUBE.

The time for cleaning (rotating tube) of the combustion chamber of pellet burner "GreenEcoTherm 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 "GreenEcoTherm GP xx R tsc" need to be removed combustion head of the burner, as shown in the diagram in the following figure.

Figure 6.16. Diagram of the burner main module with dismantling tube.

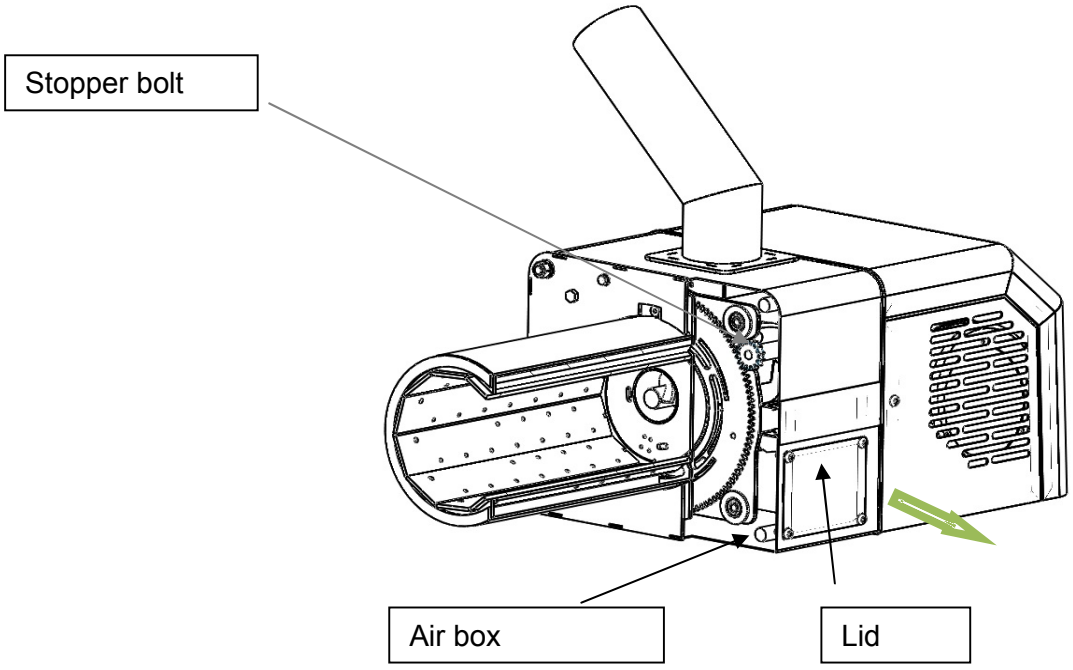


The tube of pellet burner is removed after cooling of the base module so that be safety in tube handling in its cleaning. During the cleaning should pay particular attention to overall cleaning of the holes through which air supply and that provides efficient combustion process and optimum cooling.

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 6.17. 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 6.17. 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.

6.12. USER INTRODUCTION WITH THE MAINTENANCE AND ADJUSTMENTS PROCEDURES OF A BURNER „GREENECOTHERM GP XX R TSC".

The users must read in details the presented manual book for operation of the burner, as well as how it operates the methods for adjustment of its heating output level and with the methodic for maintenance.

Regular cleaning of the burner's modules and components ensures it's reliable and economic operation for long time.

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

It is necessary to clean the flexible connection tube from the dust separated by the fuel, because when the auger transports fuel the dust from it gathers in the flexible pipe. As a result the fuel feeding could be troubled and also the dust might fire in case of emergency situation, in which the hot flue gasses are passing through the flexible tube.

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

6.13. SAFETY AND UNPREDICTED RISKS.

6.13.1. RISKS RELATED WITH THE USAGE OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

The rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc" is designed and manufactured in compliance with the main safety requirements of the acting European standards and provisions. Dangerous conditions might occur in the following situations:

- The tube pellet burner with self-cleaning has been used incorrectly;
- The pellet burner has been installed by unqualified staff;
- The burner is not installed on appropriate boiler in accordance with the recommendations in this instruction;
- The guides for safe usage, presented in this manual book, have not been observed.

6.13.2. UNPREDICTED RISKS.

The tube pellet burner from series „GreenEcoTherm GP xx R tsc" is designed and manufactured in compliance with the acting safety standards. Although all possible risky situations are preliminary considered, resulting from incorrect operation, the following risks might occur:

- Risk from burning, caused by high temperatures from the burning process in the combustion chamber;
- Risk from electrical shock by indirect contact. The pellet burner is connected to the power supply network and the controlling modules are positioned in specially designed section, all equipped with the necessary components for overload and short circuit protection. The ground connection of the burner is mandatory and must be performed by an authorized technician. Opening of the protection cover panel of the burner by unauthorized staff is forbidden;
- Risk from fingers injuries during maintenance and cleaning. It is recommended to use proper individual protection equipment;
- Risk from strangulation in case of insufficient chimney draught to the consuming appliance, to which the burner from series „GreenEcoTherm GP xx R tsc" is mounted or bad sealing of the flue extraction tract.

6.14. COMPLETION OF THE BURNER'S WARRANTY CARD.

The attached WARRANTY CARD must be completed by filling the required information in its fields, as the signature and stamp fields must be completed too, in order to ensure the WARRANTY CARD VALIDITY of the pellet burner from series „GreenEcoTherm GP xx R tsc".

6.15. ACTIONS AFTER EXPIRY OF THE LIFE CYCLE OF A PELLET BURNER „GREENECOTHERM GP XX R TSC".

After expiry of the product's life cycle, its termination must be environmentally friendly and protective. For that purpose the burner has to be disassembled and its modules and components have to be delivered to waste disposal offices, by observing the principles for separate collection of wastes.

7. FAILURES AND TROUBLESHOOTING.

Table 7.1. Description of the failures in the operation of a tube pellet burner „GreenEcoTherm GP xx R tsc" and methods for troubleshooting.

No.	Failure	Cause	Troubleshooting
1.	In case the burner is mounted to a hot water boiler and the temperature in the heated premises is too low	Insufficient heating output	It is necessary to adjust the burner's heating output level.
		The assigned temperature is low	It is necessary to check the circulations water temperature assignment in the burner's control module.
		Low temperature assignment by the room thermostat (if connected)	It is necessary to increase the room thermostat temperature assignment.
2.	In case the burner is mounted to a hot water boiler and the temperature in the heated premises is too high	Heating output, exceeding the consumption	It is necessary to increase the burner's heating output level.
		The assigned temperature is high	It is necessary to decrease the assigned temperature
		High temperature assignment by the room thermostat (if connected)	It is necessary to decrease the room thermostat temperature assignment
3.	The burner is switched ON but there is no burning process	No assignment for operation	Check the assignment for operation by the burner's control module.
4.	Difficult pellets ignition	The pellets are with low quality	It is required to change the fuel, as its water content is probably higher by the values needed for normal operation of the appliance.
5.	The fuel ignition is accompanied by abnormal noise	Insufficient chimney draught	It is necessary to check the condition of the chimney and of the appliance, to which the burner is mounted and to clean the ash deposits. After cleaning it might be necessary to adjust the operational parameters of the system – ask for servicing assistance.
6.	Overheating of the appliance, to which the burner is mounted	No heating load or incorrectly adjusted heating output level of the burner, or of the heat energy consuming appliance	Check the heating system - burner - appliance for correct operation and eventually adjust the operation parameters – to be performed by servicing specialist. After the consuming appliance cools down and the failure has been removed deactivate the emergency thermostat (unscrew the protection cover cap, press the button and screw the cap back), after that restart the burner.
7.	No fuel ignition	No pellets in the fuel hopper	The hopper from which the burner's transport auger intakes fuel must be refueled.
		No pellets in the burner's combustion chamber	The process of primary fuel ignition can be restored by restarting the pellet burner.
		Presence of non-ignited or burned pellets over the burner's fire-grate, but there is no burning process	Clean the gathered fuel from the burner's fire-grate. If the ignition heating element is damaged or inactive it must be replaced.
		Incorrect operation of	The photosensor for monitoring of the burning

		the burner's photosensor, which monitors the burning process	process has to be re-adjusted or replaced – to be performed by a servicing specialist.
8.	The burner does not start or stops during operation	No power supply	Check the operation of the burner's display panel and its indications. Check the working order of the power supply of the appliance, to which the burner is mounted and which provides voltage with parameters 230VAC, 50Hz – to be performed by servicing technician. Check the burner's electrical connections, according to the attached wiring diagram. Check for loose electrical connections – to be performed by servicing technician.
		No starting signal submitted to the burner	Check if the burner receives starting signal and the working orders of the electrical connections of the burner's module, which submits signal for operation – to be performed by servicing technician; Check for loose electrical connections. Check the working order of the burner's control module, which provides voltage with parameters 230VAC, 50Hz – to be performed by servicing technician.
		The burner does not operate, although there is starting signa	Check for activated alarm – check the list with alarm codes in the controller and their indications, as presented in the next table.
		Blown fuses	**To be performed by servicing technician:** check the fuses condition and if necessary replace them with new fuses, but only from the same type.
9.	The flame from the burning process is dim and the chimney smokes too much.	Pellets with low quality	Change the pellets as their water content is probably higher than the required for normal operation.
		Improper adjustment of the pellet burner's operational parameters	Re-adjust the burner's operational parameters – to be performed by a servicing specialist.
10.	The burner starts, but can't transit to stable operation mode	Improperly oriented photosensor	Change the photosensor's position for monitoring of the burning process by turning it around its longitudinal axis.
		The photosensor's surface is dirty	Clean the contaminations (dirt) from the photic sensor carefully.
		The photosensor has defected – its surface seems to be burned	Replace the photosensor with new one – ask for servicing assistance.
11.	The burner operates unstable	Malfunction of the photosensor	Check the photosensor's working order
		The control module's operational parameters have been changed	Check the burner's heating output level adjustment.
			Check the controller's adjustments – to be performed by servicing technician.
12.	Heating of the pellet burner's fuel feeding inlet pipe	Insufficient chimney draught or not cleaned burner	Clean the appliance and eventually the chimney. Possible solution is to install additional flue gas extraction fan and/or to change the chimney*.
13.	Heating of the pellet burner's fuel feeding inlet pipe and	Low chimney draught or dirty appliance from the ash	Clean the appliance and eventually the chimney. It is necessary to restart the burner. Possible solution is to install additional flue gas extraction

	activation of its emergency thermostat		fan and/or to change the chimney**.
14.	High temperature indicated by the reversible temperature sticker	Increased resistance in the flue extraction tract or insufficient chimney draught	It is necessary to clean the appliance and/or the chimney from the ash residues. In case the chimney draught is insufficient it is necessary to install additional flue gas extraction fan and/or to change the chimney - to be performed by specialist.
15.	Activation of the irreversible temperature sticker, positioned on the pellets inlet pipe of the burner	Increase of the operational temperature in this pipe, which in most cases is caused by hot gasses passing through it	It is necessary to clean the appliance from the ash residues, to check and clean the chimney tract and to check the pellet burner condition - to be performed by specialist.
16.	Dirty and/or melted photosensor	Improper stopping of the burner's operation	It is necessary to clean the photosensor's surface or to replace it with new one. The burner's stopping procedure, as presented in this manual book, must be observed.
17.	Presence of unburned fuel in the ash tray	Inefficient fuel combustion	It is necessary to adjust the appliance's operational parameters – ask authorized servicing technicians for consultation and/or to perform adjustments.
18.	Too many slag deposits in the burner's combustion chamber (melted mineral mass)	The used fuel is with high ash content and does not comply with the requirements of the appliance	Change the fuel with type which complies with the requirements for reliable operation of the burner.
		The burner operates in a mode with heating output higher than its nominal output	Decrease the heating output of the burner by changing its output level.
19.	A failure code, indicated on the controller's display panel	Trouble in the operation of the burner	Check the meaning of the indicated failure code in the next table. If necessary look for consultation/intervention by servicing technician.
20.	The burner has stopped, but after a new start it operates again	The photosensor submits faulty information to the controller	Check the fuel quantity over the tube. Look for assistance or consultation by servicing technician.
21.	High temperature of the flue gas (if a thermometer is installed)	Dirty heat exchanging surfaces, depending on the consuming appliance type and the operation modes	It is necessary to clean the appliance's heat exchanging surfaces.
22.	Smoke in the boiler room after a certain period of operation	Dirty or clogged from dust flue extraction tract of the heat energy consuming appliance	Clean the heat energy consuming appliance from the ash deposits.
23.	Another, not described failures		Ask for assistance by servicing specialist or company.

* The heating of the pellets inlet pipe in most cases is caused by contamination of the heat exchanging surfaces of the appliance, to which the pellet burner is mounted.

** In case of insufficient chimney draught it is recommended to look for servicing assistance in order to solve the problem – cleaning or change of the chimney might be required, as well as installation of additional flue extraction fan or another solution.

Table 7.2. Description of the failures, saved in the “LOG” menu of the tube pellet burner’s „GreenEcoTherm GP xx R tsc” controller.

Error code	Inscription displayed on the display	Error description	Remedy
10	[ERROR: IGNITION] [FAILED]	Ignition failed	Clean the burner grate. Check the availability of fuel. Seek advice from a service technician.
11	N/A	Loss of flame during burner operation	Seek service assistance.
12	[ERROR: PHOTOSENS]	Error during photosensor operation	Seek service assistance.
13	N/A	Not used	
14	[ERROR: SENSOR A] [LOW TEMP]	The temperature sensor A has measured value below 5°C	The circulation water is with dangerously low temperature and its freezing is possible. Seek for service help to check the heating installation.
15	[ERROR: SENSOR A] [OVERHEAT]	The temperature sensor A has measured value over 95°C	Circulating water is with dangerously high temperatures and is possible overheating of the heating system and equipment. Seek service help to check the heating installation.
16	[ERROR: OPTO-] [COUPLER]	Board error	Seek service assistance.
17	[ERROR: OVER-] [PRESSURESENS]	Not used	
18	[ERROR: FAN 1] [ALWAYS ON]	Combustion air fan can not be stopped, possible damage at the exit of the controller	Seek service assistance.
19	[ERROR: FAN 1] [STOPP]	The fan for combustion air does not rotate	Seek service assistance.
20	[ERROR: FAN 1 RPM] []	The fan for combustion air does not rotate at the desired speed	Seek service assistance.
21	N/A	Not used	
22	[ERROR: STOKER] [FAULT]	Screw error	Seek service assistance.
23	[ERROR: FINAL] [COMBUST FAILED]	Photosensor does not shade during the final burn out phase	Seek service assistance.

Error code	Inscription displayed on the display	Error description	Remedy
24	[ERROR: LOST FIRE] [IN COMBUSTION]	Loss of lightness of photosensor during work and unsuccessful new ignition	Seek service assistance.
25	[ERROR: SCRAPER] [OPERATION]	The board of the self-cleaning mechanism is not working or motor mechanism	Seek service assistance.
26	[ERR: SCRAP.STUCK] [TURN OFF 5 MIN]	Self-cleansing mechanism is blocked in an unknown situation	Seek service assistance.
27	[ERR: SCRAP.STUCK] [OUTWARDS]	Self-cleansing mechanism is blocked in forward motion	Seek service assistance.
28	[ERR: SCRAP.STUCK] [INWARDS]	Self-cleansing mechanism is blocked in backward motion	Seek service assistance.
29	[ERROR: SENSOR B] [LOW TEMP]	The temperature sensor B has measured value under 5°C	The circulation water is with dangerously low temperature and is possible its freezing point. Seek service assistance to check the heating installation.
30	[ERROR: SENSOR B] [OVERHEAT]	The temperature sensor B measured value over 95°C	Circulating water is with dangerously high temperature and possible overheating of the heating system and equipment. Seek service assistance to check the heating installation.
31	[ERROR: SENSOR C] [LOW TEMP]	The temperature sensor C has measured value below 5°C	The circulation water is with dangerously low temperature and is possible its freezing point. Seek service assistance to check the heating installation.
32	[ERROR: SENSOR C] [OVERHEAT]	The temperature sensor C has measured value over 95°C	Circulating water is with dangerously high temperature and is possible overheating of the heating system and equipment. Seek service assistance to check the heating installation.
33	[ERROR: FAN 2] [ALWAYS ON]	Flue gases fan can not be stopped, possible damage at the controller exit	Seek service assistance.
34	[ERROR: FAN 2] [STOPP]	Flue gases fan does not rotate	Seek service assistance.
35	[ERROR: FAN 2 RPM] []	Flue gases fan does not rotate with the desired speed	Seek service assistance.

Table 7.3. Description of the failures indicated on the display panel of the tube pellet burner „GreenEcoTherm GP xx R tsc".

No.	Message indicated on the display panel	Meaning	Troubleshooting
1.	IGNITION FAILED	Ignition failure	Check for presence of fuel and also the auger's operation. If there is fuel - look for servicing assistance.
2.	LOST FIRE IN COMBUSTION	Loses flame during burning	Check the auger's connection, restart the burner.
3.	STOKER FAULT	The auger connection is interrupted	Check the auger's power supply. Power supply cut off might occur if the pellets inlet pipe has been overheated – check the temperature stickers.
4.	TEMP- SENSOR LOW	The temperature sensor is switched OFF	Check connection of NTC sensor.
5.	PHOTOSENS	Photosensor failure	Check the photosensor condition, replace it if necessary – to be performed by a servicing technician.
6.	TEMP SENSOR OVERHEAT	High temperature indicated by the temperature sensor	Check the hot water boiler's condition, cool the appliance down.

8. WIRING DIAGRAM OF A ROTARY TUBE PELLET BURNER „GREENECOTHERM GP XX R TSC”.

Figure 8.1 presents the wiring diagram of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc”.

Figure 8.2 presents the wiring diagram of the terminals with connectors for connecting the rotary tube pellet burner with self-cleaning from series "GreenEcoTherm GP xx R tsc".

Figure 8.1. Wiring diagram of a tube pellet burner „GreenEcoTherm GP xx R tsc”.

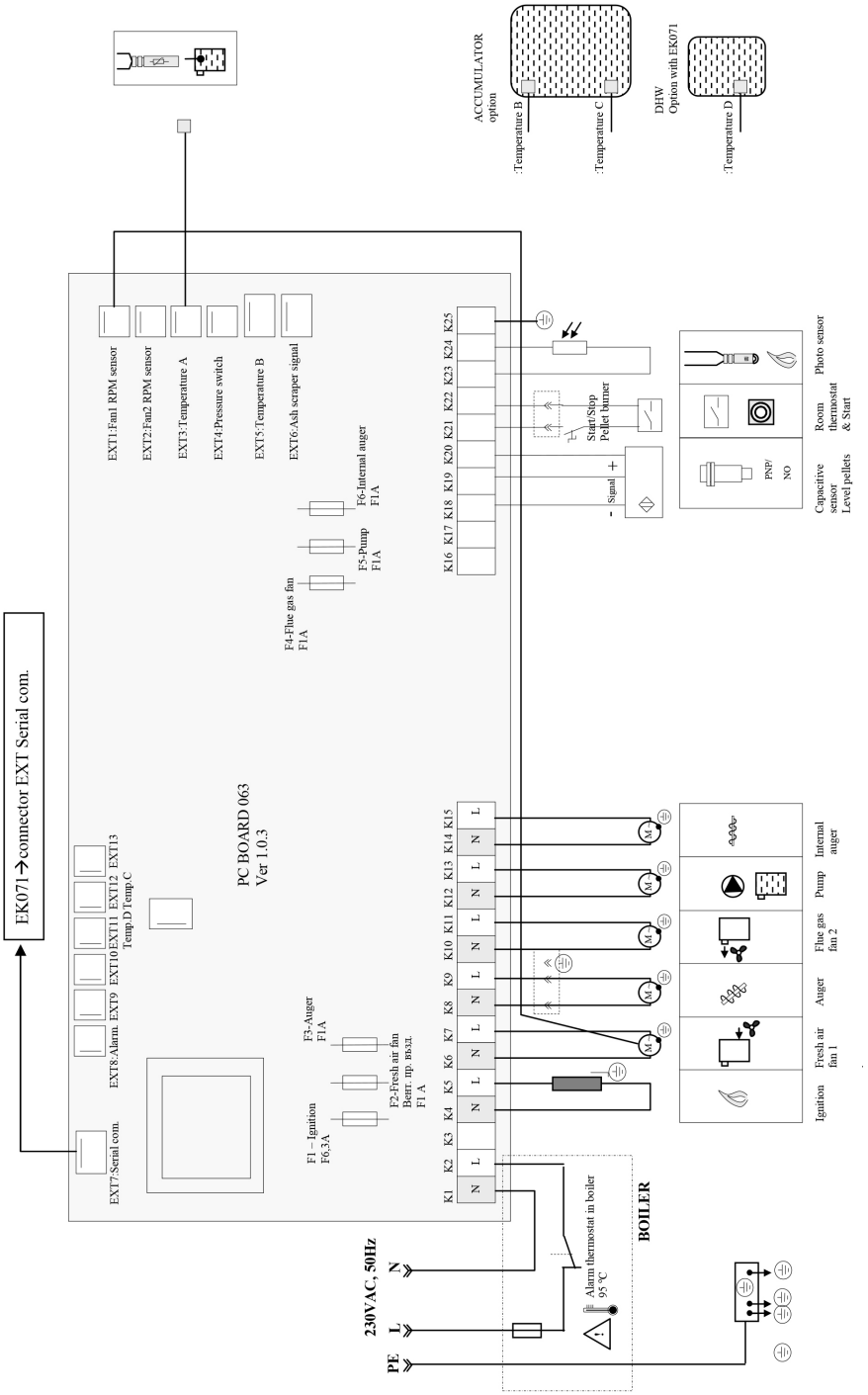
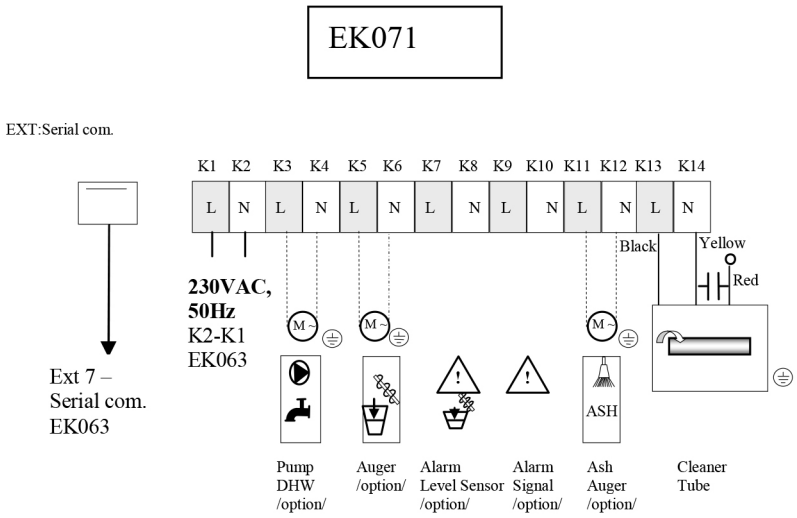


Figure 8.2. Wiring diagram of the terminals with connectors for connecting the pellet burner "GreenEcoTherm GP xx R tsc".



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WARRANTY CONDITIONS

The manufacture company guarantees correct and failsafe operation of a rotary tube pellet burner from series „GreenEcoTherm GP xx R tsc", only when the requirements for installation and operation are observed during initialization to operation and maintenance.

The warranty start date of the tube pellet burner from series „GreenEcoTherm GP xx R tsc" is considered from the date of completion and stamping of its warranty card.

The pellet burner's warranty start date is considered from the date of its initiation to operation, but no later than 6 months from the date of purchase.

The warranty period validity of the pellet burner is 24 (twenty four) months.

The warranty is valid only if an invoice and original warranty card have been presented.

THE WARRANTY OF THE PRODUCT IS INVALID in the following cases:

- Damages of the pellet burner caused by improper storage, transport and/or unloading, not performed by the manufacturing company;
- Emergencies caused by natural disasters (earthquakes, fire, floods and etc.);
- The requirements for installation, operation and periodical maintenance, presented in the present manual book, are not observed;
- Attempts to recover defects, performed by the buyer or by other unauthorized persons;
- Changes in the pellet burner's modules construction;
- Incorrect technical project for installation and operation of the burner;
- Damages or failures caused by reasons for which the manufacture company is not responsible or can't perform control;
- Interferences and failures not caused by the tube pellet burner from series „GreenEcoTherm GP xx R tsc", but have led to failures/damages in its construction;
- If the irreversible temperature sticker has been colored (activated) or in case it has been removed, torn, detached or destroyed.

Every warranty repair must be registered in the product's warranty card.

The warranty period is stopped for a term considered from the date of a registered warranty claim until the date of removing the failure.