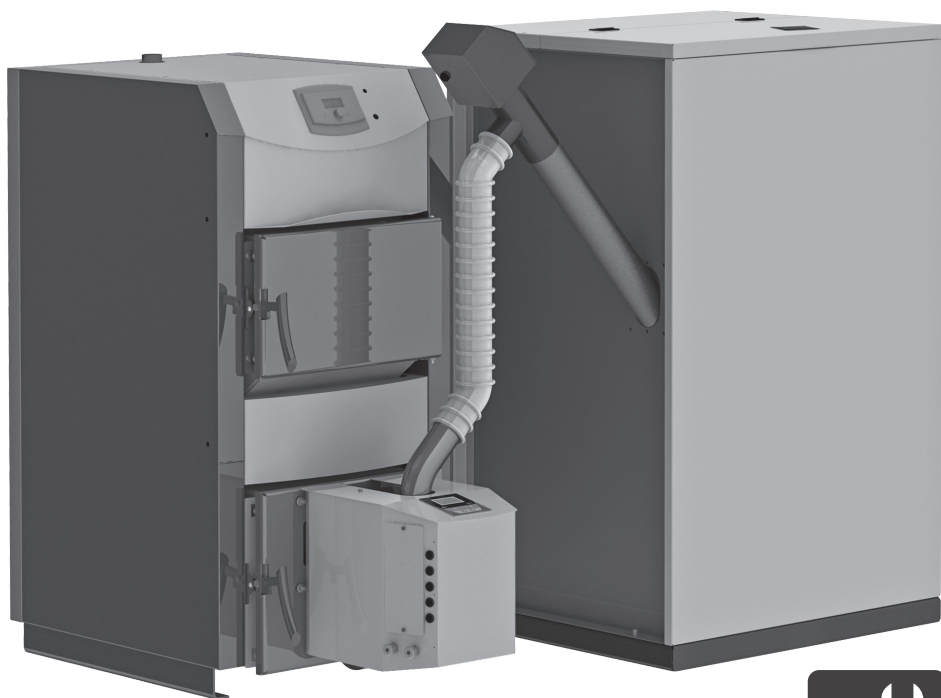


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**BURNiT**  
by **SUNSYSTEM®**

**Set pellet boiler with pellet burner  
WBS Active - Pell**

**TECHNICAL PASSPORT  
INSTALLATION and OPERATION MANUAL  
FOR AUTHORIZED INSTALLER / SERVICE SHOP**



**Version i0.2.8**



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## 1. EXPLANATION OF SYMBOLS AND SAFETY INSTRUCTIONS

### 1.1. Explanation of symbols



**CAUTION!** – Important recommendation or warning concerning safety conditions during installation and operation of the heating

boiler.



**DANGER!** – fault or improper use may cause injury or be hazardous to life of humans or animals.



**FIRE HAZARD!** – fault or improper installation and operation may cause fire.



**INFORMATION** – Important information on the proper operation of the product.

### 1.2. Requirements to boiler installation room

This manual contains important information for the safe and correct installation, start-up and trouble-free operation and maintenance of the heating boiler.

The heating boiler can be used for heating rooms only in the manner described in this manual.

Note of the boiler type data on the factory rating label and the technical data provided in chapter 13 in order to ensure proper operation of the product.

#### 1.2.1. Instructions to boiler installer

During installation and operation, the country-specific requirements and regulations must be observed:

- local construction regulations on the installation, air supply and exhaust gas extraction as well as chimney connection.
- regulations and norms concerning the fitting of the heating installation with safety devices.



**Use only original BURNiT parts**



**DANGER of intoxication, suffocation.**  
*Inadequate inflow of fresh air to the boiler room may result in dangerous leak of exhaust gases during boiler operation.*

- Make sure the air inlets and exhaust gas outlets are not clogged or closed.
- If faults are not remedied immediately, the boiler must not be operated, and the user must be provided with written instructions on the fault and the hazard it entails.

	<p><b>DANGER of fire when burning flammable materials or liquids.</b></p> <ul style="list-style-type: none"> <li>- Flammable materials/liquids must not be left in close proximity of the heating boiler.</li> <li>- Instruct system user of the allowed minimum clearances from surrounding objects.</li> </ul>
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	<p><b>It is mandatory to assure a backup power generator of corresponding rated power! (see 13.2)</b></p>
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### 1.2.2. Instructions to installation user

	<p><b>DANGER of intoxication or explosion</b> <i>Toxic gases may be discharged when burning waste, plastics, liquids.</i></p> <ul style="list-style-type: none"> <li>- Use only the fuels indicated in this manual.</li> <li>- In case of danger of explosion, ignition or discharge of exhaust gases in the room, stop the heating boiler from operation.</li> </ul>
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	<p><b>CAUTION! Danger of injury / damage of system due to incompetent operation.</b></p> <ul style="list-style-type: none"> <li>- The heating boiler must be serviced only by persons familiar with the operation manual.</li> <li>- As a user, you are only allowed to start the boiler up, adjust the temperature of the boiler, shut the boiler down and clean it.</li> <li>- Unattended children must not be allowed access to premises with running pellet burner inside.</li> </ul>
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	<p><b>It is mandatory to assure a backup power generator of corresponding rated power! (see 13.2)</b></p>
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#### Safety rules for user operation:

- Operate the heating boiler at a maximum temperature of **80°C**, and to that end you must regularly inspect the boiler room.
- Do not use flammable liquids for ignition or increase of burner output.
- Collect ash in lid-covered fireproof containers.
- Clean the heating boiler surface using non-flammable agents only.
- Do not place flammable objects onto the heating boiler or in its proximity. (see diagram 1 for the minimum clearances)
- Do not store flammable materials in the boiler room.

### 1.2.3. Minimum clearances for installation and combustibility of construction materials

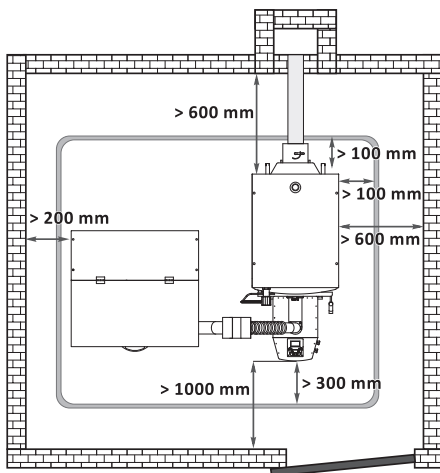
The applicable minimum clearances in your country may differ from the ones specified below. Please,

consult your installer.

The minimum distance from the heating boiler or exhaust gas pipe to objects or walls must be at least 200 mm.

For general safety considerations, we recommend that the boiler be placed on a foundation with height of 100 mm made of class A material, see table 1.

**Diagram 1**  
**Recommended clearances between the boiler and walls.**



**Table 1. Combustibility of construction materials**

<b>Class A - non-combustible</b>	Stone, bricks, ceramic tiles, baked clay, solutions, plaster free of organic additives.
<b>Class B - hard combustible</b>	Gypsum board panels, basalt fiber needled felt, fiberglass board, AKUMIN, Izomin, Rajolit, Lignos, Velox, Heraklit.
<b>Class C1/C2- Medium combustible</b>	Wood beech, oak, Wood softwood, layered wood
<b>Class C3 - easy combustible</b>	Asphalt, cardboard, cellulose, tar, fiberboard, cork, polyurethane, polyethylene.

## 2. PRODUCT DESCRIPTION

**Set BURNiT WBS Active - Pell:** tested according to European standards

**EN 303-5, class 5.**

### 2.1. Description of WBS Active

- **Design.** Boiler body is made of high-quality boiler steel sheets with thickness of 5 mm for the combustion chamber and 3 mm for the water mantle.
- **Efficient.** The flue gas makes a three-pass movement around three water-filled barriers in the combustion chamber on its way to the chimney. This way the gas is cool when it leaves the boiler and its energy has been transferred to the water in the mantle. The water mantle embraces the combustion chamber in full to utilize the emitted heat most efficiently. To keep from losing heat into the ambience, the boiler is insulated on the outside by 50 mm high-temperature wool.
- **Reliable and safe.** The heat exchanging tubular grill is protected by a replaceable metal grate. A complex of safety devices provide for the safety of the appliance.
- **Cleaning door (combustion chamber)**
- **Draft regulating flap, mounted on flue end**
- **Safety heat exchanger**

### 2.2. Description of pellet burner

The BURNiT Pell pellet burner for hot water boilers is designed to burn only and exclusively wood pellets and it is intended to heat up heating boilers. The built-in control unit, automatic cleaning system and internal pellet auger ensure the automated operation of the burner and optimal burning of the fuel.

#### Design.

The burner is made of high-quality stainless steel able to withstand temperatures of up to 1150°C. The burner must be installed on a heating boiler. The burner consists of two parts: combustion chamber tube and external tube with sheet metal mantle. Longitudinally, under the housing, there are blow chamber, fuel ignition heater, fan and power supply. On the upper part of the burner there is a feeder chute to which the pellet auger is attached. The housing of the burner has been designed to meet all regulatory safety requirements (no sharp or protruding elements) with operating temperature not exceeding 50°C.

The combustion chamber consists of two tubes:

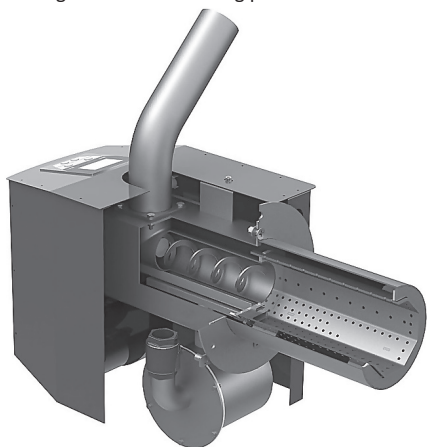
Ember resistant steel tube inside the burner with holes for air intake along its entire length, opening for the hot air from the fuel ignition heater, opening for photosensor.

Outer stainless steel tube. Between the two tubes there is a gap which provides for free circulation of the air necessary both for cooling and oxygen supply into the combustion chamber.

The feeder chute allows 360° rotation for its best convenient positioning when connecting the pellet auger to the hopper.

• **Built-in controller.**

The main control unit, located in the burner, manages the entire heating process.



*Diagram 2. Pellet burner Pell design*

**Controller functions:**

- 1) fully automated ignition and pellet feed;
- 2) self-cleaning function (adjustable 1-12 times over 24 hours at equal intervals), programmable start time;
- 3) controls the operation of the circulation pump of the central heating;
- 4) option for control by room thermostat;
- 5) timer;
- 6) controls the operation of the pump of the domestic hot water;

- **Photo-sensor** - monitors the power of the burner flame
- **Internal auger**
- **Dry contactless resistance heater** assuring ignition

of fuel

- **Innovative cleaning system** of the combustion chamber
- **Air feed fan**, step-regulated (0% to 100 %).

**2.3. Burner safety devices**

- **Elbow-shape feeder chute.** The geometrical shape of burner feeder chute prevents backfire entry from burner into pellet hopper.
- **Thermostatic protection (80°C).** The thermostatic protection is fitted on the feeder chute. When the surface of the feeder chute reaches 80°C, the control stops the feeding of pellets into the burner and signals for fault.
- **Fuse.** In case of electrical fault in the system of the burner (short circuit, high current, etc.), the overload is borne by the electrical fuse fitted on the main control panel of the burner (10 A).
- **Power interruption.** In case of power interruption, all parameter settings are stored in the memory of the controller. Upon the subsequent restart of the burner, the controller resumes the execution of the program from the point when the power interruption occurred.

**3. FUEL**

	<p>When purchasing pellets, ask for conformity declaration and certificate issued by an accredited laboratory and make sure the fuel meets the requirements indicated in the manual. If you purchase large amount of pellets (bulk supply for the entire heating season for example), ask your supplier to provide accurate and true information about the storage conditions.</p>
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We recommend to use pellet with size of 6 - 8mm. Density 600 - 750kg/m<sup>3</sup> heating value 4.7 - 5.5 kWh/kg. Ash content – less than 1% and moisture content up to 8%, EN ISO 17225-2:2014.

The optimal density of the pellets which guarantees their quality is 605-700 kg per cubic meter.

Pellet moisture content must not exceed 10%. Make sure you store your fuel in a dry and well-ventilated place.

The optimal pellet ash content is ≤ 1%. This also provides for less frequent cleaning intervals for the burner.

The table below contains the parameters which we recommend that you take into consideration when choosing fuel for your „Pell” burner.

### 4. TRANSPORTATION OF THE BOILER AND BURNER

#### 4.1. Transportation of the boiler

We recommend to transport the heating boiler to the installation site in its packaging placed on the pallet. During transport and installation, depending on the weight, suitable safety devices should be used in accordance with Directive 2006/42/EC.

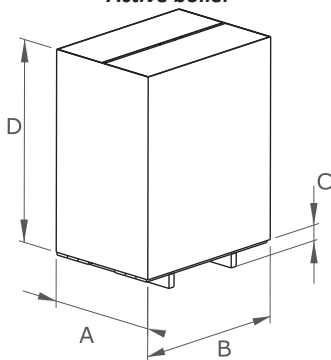
When transporting items weighing more than 30 kg, the use of pallet jack, fork truck or other hoisting devices is a must.

The boiler is securely fastened with fasteners to a wooden pallet.



**Important:** When installing the boiler, the wooden pallet onto which the boiler is placed must be removed by unscrewing the bolted connections using flat ring wrench S13.

**Table 3. Overall dimensions of model WBS Active boiler**



Model	A, mm	B, mm	C, mm	D, mm	Weight, kg
WBS-A 20	650	1050	125	1475	255
WBS-A 30	650	1050	125	1475	300
WBS-A 40	750	1100	125	1475	362
WBS-A 50	750	1100	125	1475	392
WBS-A 70	810	1300	125	1620	466
WBS-A 90	810	1300	125	1620	508

#### 4.2. Transportation of the pellet and auger.

It is mandatory for transportation to place and secure the burner and auger on a pallet.

- Dimensions of the packaging of the burner: 450x350x750 mm;

- Dimensions of the packaging of the auger: 260x120x1700 mm;

### 5. DELIVERY OF THE BOILER AND BURNER

- Inspect the integrity of the packaging upon delivery.
- Check whether all components have been delivered to you.

#### 1. Boiler scope of delivery includes:

- 1) Boiler body with boiler doors
- 2) Control unit
- 3) Safety valve 3 bar
- 4) Fire irons
- 5) Cleaning brush for flue pipes
- 6) Technical passport. Installation and operation manual
- 7) Service booklet and Warranty card If any of the above items are missing, contact your supplier.

#### 2. Burner consignment package includes:

- 1) Pellet Burner Pell with built-up Control unit
- 2) Feeding chute
- 3) Fire irons
- 4) Auger
- 5) Technical passport. Installation and operation manual
- 6) Service booklet and Warranty card

#### 3. Fuel Hopper.

#### 4. Mounting kit for particular model burner.

If you find a missing component, contact your provider.

### 6. INSTALLATION OF THE HEATING BOILER



**The assembly, installation and set-up of the boiler must be performed by a technician authorized for such operations. Installer must indicate to the user of the installation the minimum clearances from flammable materials and liquids.**

#### 6.1. Requirements:

- Boiler room must be frost-proof;
- Boiler room must allow for continuous access of air necessary to maintain combustion;
- Boilers must not be placed in inhabitable rooms;
- All boiler rooms must have correctly calculated vent depending on the boiler output. The vent

must be protected by means of a net or grate.

The size of the vent is calculated according to the formula:

$A = 6,02 \cdot Q$  - where:

$A$  – area of the vent in  $\text{cm}^2$ ,

$Q$  – boiler output in kW

- Remove the packaging without polluting the environment
- Observe building supervision instructions, in particular the existing Ordinance on combustion devices and storage of combustion materials, on building requirements applicable to installation sites and on ventilation;
- The boiler must be placed on a foundation whose surface area is larger than the base of the heating boiler according to diagram 1;
- The boiler must be placed in a position which allows for the easiest possible cleaning and servicing;
- Installation must be carried out according to installation diagram 1 which shows the boiler housing;
- No objects made of flammable materials or liquids may be placed on/near the boiler;

## 6.2. Check door tightness

Open boiler doors.

Place paper strips on the four sides of the doors and close leaving part of the strips protruding outside.

Pull the paper strips. If the strips tear upon pulling, doors seal tightly.



**Caution! Inadequate adjustment of the hinges may result in air being sucked in through the doors and the boiler burning uncontrollably.**

## 7. SETUP OF THE HEATING BOILER AND BURNER

### 7.1. Connecting the boiler to a chimney

Boiler-to-chimney connection must always comply with the existing standards and rules. The chimney must provide sufficient draught for evacuation of the smoke under any conditions.

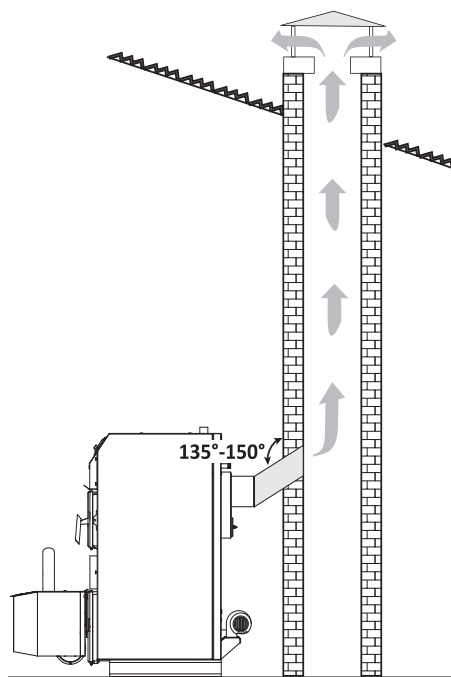
The proper functioning of the chimney requires adequate sizing of the chimney itself since the draught it produces affects combustion, boiler's output and life span.

The draught created by the chimney is in functional relation to its cross-section, height and the roughness of its interior walls. No other appliance

may be connected to the chimney serving the boiler. Chimney diameter must not be smaller than the flue outlet of the boiler. Flue outlet must be connected to the chimney opening. In terms of mechanical properties, the flue outlet must be sturdy and properly sealed (to avoid gas leak) and allow for easy access for cleaning on the inside. The inner section of the flue outlet must not be greater than the effective section of the chimney and must not narrow. Avoid using elbow joints.

The chimney cleaning opening has to be in its lowest part. The chimney's wall has to be threeplied where the medium layer is from mineral wool. The thickness of the insulation is not less than 30 mm when the chimney is setting up inside the house and the thickness is 50 mm, when the setting up is outside.

The inner diameter of the chimney depends on its real height and the power capacity of the boiler (see diagram 4). Please entrust choosing a chimney and its installation by a qualified professional. The required distance between the boiler and the chimney is 300-600 mm.



**Diagram 4. Interdependence between boiler rated power and flue dimensions**

**Table Required chimney height, depending on boiler capacity and chimney diameter**

Boiler output	Diameter of boiler chimney	Chimney clear opening	Chimney minimum height
20 kW	Ø 150 mm	160 mm	≥ 5,5 m
30 kW	Ø 150 mm	160 mm	≥ 6 m
40 kW	Ø 180 mm	180 mm / 200 mm	≥ 11,5 m / ≥ 8 m
50 kW	Ø 180 mm	180 mm / 200 mm	≥ 12 m / ≥ 10 m
70 kW	Ø 200 mm	220 mm	≥ 10 m
90 kW	Ø 200 mm	220 mm	≥ 12 m



Data in the tables are for indicative purposes.

Draught depends on the diameter, height, uneven sections along the chimney surface and differences in temperature of combustion products and outside air. We recommend that you use chimney fitted with flue terminal. Heating specialist must calculate the precise sizing of the chimney.

### 7.2 Connecting the safety heat exchanger



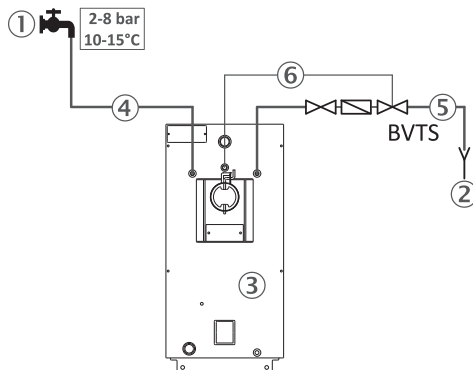
Such connection must be performed by a technician / service shop authorized for such operations.

The heating boiler is equipped with safety heat exchanger (cooling circuit). It connects to the water system through a thermostatic valve. In case of overheating, the thermostatic valve feeds in cold water from the water mains which passes through the heat exchanger and absorbs the heat in the boiler. The water is then discharged into the sewage system. This arrangement ensures safe evacuation of the excess heat without the need for additional energy. This guarantees that the water in the boiler will not exceed the maximum safe level of **95°C**.

The minimum operating pressure of the cooling water in the safety heat exchanger must be within the range **2 ÷ 10 bar**.

A flow rate of at least 12 l/min is required. Connect the safety heat exchanger according to the hydraulic diagram using thermostatic valve. Install a filter on the inlet before the thermostatic valve.

**Diagram 5. Connecting the safety heat exchanger**



1. Water supply network (pressure 6-10 bar)
2. Drainage (sewerage)
3. Boiler WBS Active
4. Safety heat exchanger inlet
5. BVTS valve sensor
6. Safety heat exchanger outlet

### 7.3. Connecting the boiler to the heating installation.



Such connection must be performed by a technician / service shop authorized for such operations.

When the boiler is connected to a heating system, it is mandatory to install a 3 bar relief valve and expansion vessel. No shut-off fittings may be installed between the relief valve, expansion vessel and boiler.



It is mandatory to install a three-way valve (Laddomat or similar) or a four-way mixing valve which to ensure that the temperature of the heating medium fed into the boiler from the heating installation is at least **65°C**.

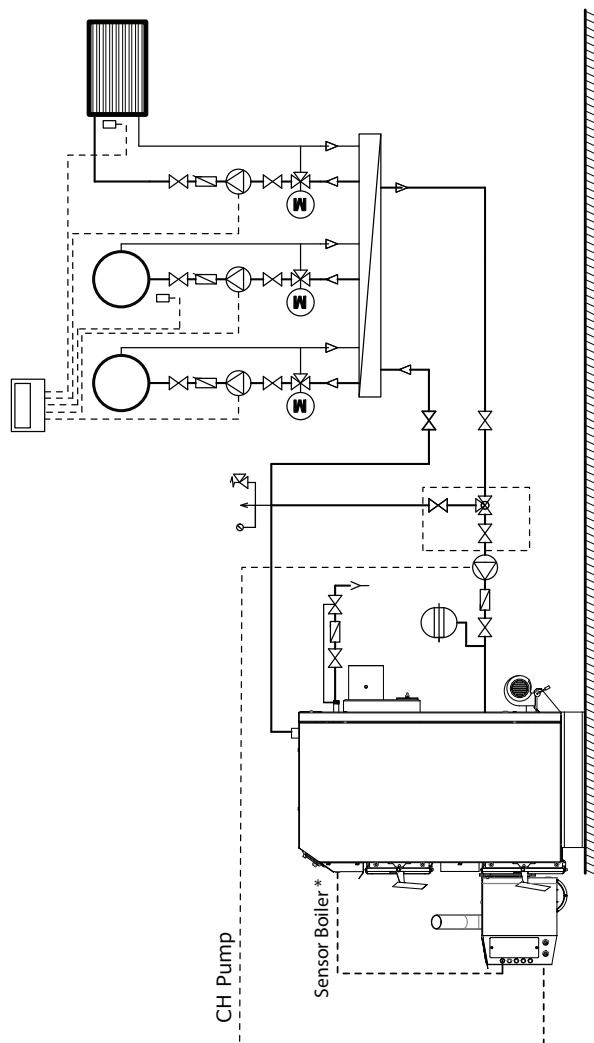
**Table 4. TROUBLE-SHOOTING TABLE**

<i>Fault</i>	<i>Cause</i>	<i>Solution</i>
1. Low temperature in the boiler on which the burner is installed. Unable to reach normal temperature mode of 65° - 85° C	1.1. Inadequate sizing and/or combination of heating appliances	1.1. Immediately consult your installer about the problem. Mount the supplied filling and drainage cock on the drainage outlet Y.
2. Ejection of unburned pellets into the combustion chamber of the boiler	2.1. Poor adjustment of the fuel-to-air ratio from the burner controller	2.1. Contact your installer. It is necessary to set the burner properly using gas analyzer
	2.2. Utilization of low-quality pellets (shorter than the specified length)	2.2. Use only fuel which meets the requirements specified in the manual.
3. Formation of clinkers and noncombustible inclusions inside burner body.	3.1. Utilization of low-quality pellets (with higher ash content)	3.1. Use only fuel which meets the requirements specified in the manual.
	3.2. Low performance of the automatic cleaning system	3.2. Increase turn-on frequency of the automatic cleaning system.
	3.3. Improper setting of fuel-air mixture	3.3. Adjust using gas analyzer
4. Smoke in the pellet hopper	4.1. Poor chimney draught or high internal resistance of the boiler combustion chamber	4.1. Immediately consult your installer about the problem.
	4.2. Blockage of burner combustion chamber due to build-up of noncombustible materials	4.2. It is necessary to clean the burner combustion chamber using brush
	4.3. Improper setting of fuel-air mixture	4.3. Adjust using gas analyzer
5. Unstable flame (photosensor detects > 180 units at maximum output)	5.1. Blockage of burner combustion chamber due to build-up of noncombustible materials	5.1. It is necessary to clean the burner combustion chamber using brush
	5.2. Dust on the photosensor	5.2. It is necessary to clean the photosensor. Refer to the manual for the cleaning procedure.
	5.3. Improper setting of fuel-air mixture	5.3. Adjust using gas analyzer
6. Boiler temperature too high. Controller failure	6.1. Grid power fluctuations	It is mandatory to assure a backup power generator of corresponding rated power! (see 13.2)
	6.2. Power failure	

#### 7.4. Connection diagrams

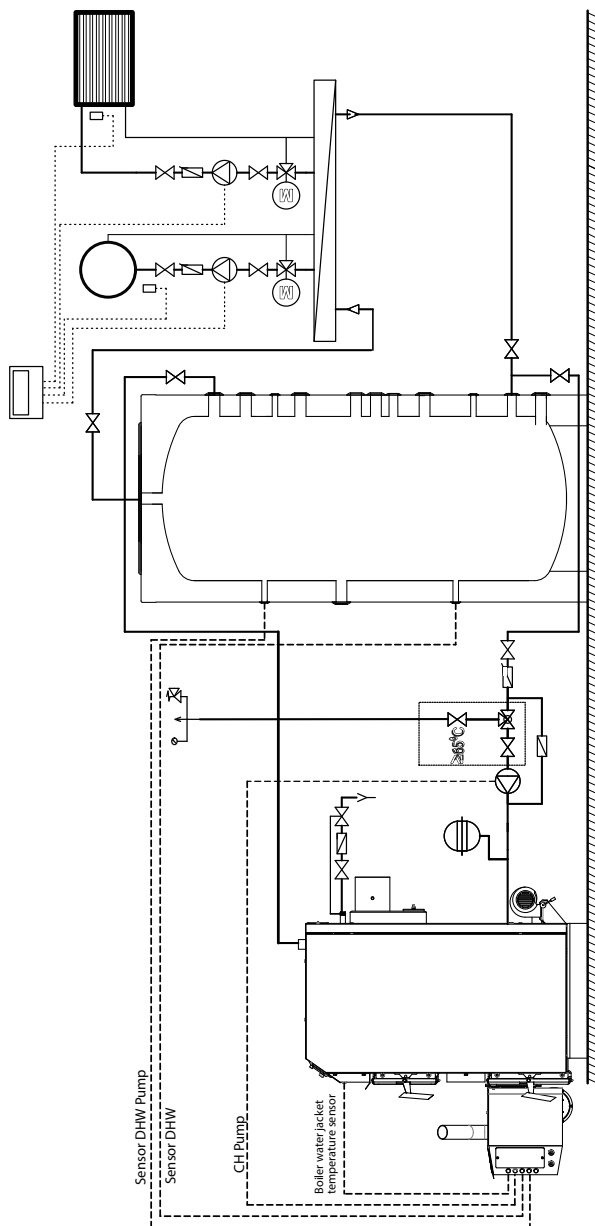


Such connections must be performed by a technician / service shop authorized for such operations.



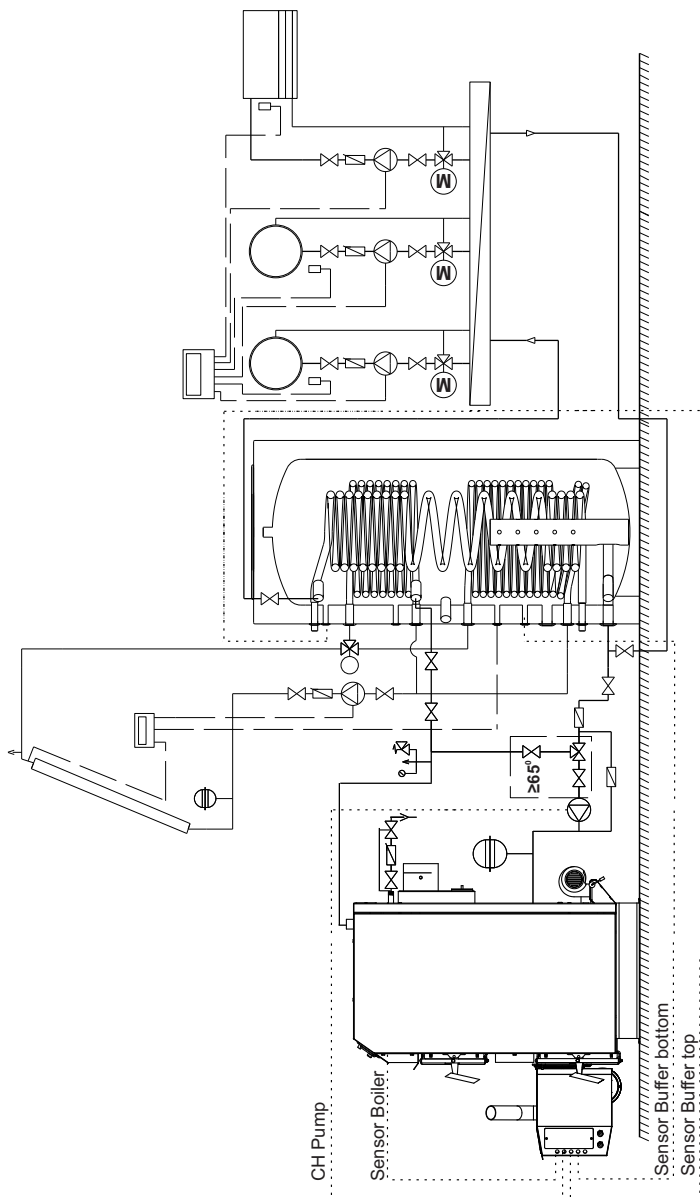
**Diagram 6. Connection of WBS Active-Pell boiler to three-way valve**

**\* Sensor Boiler - water jacket temperature sensor**



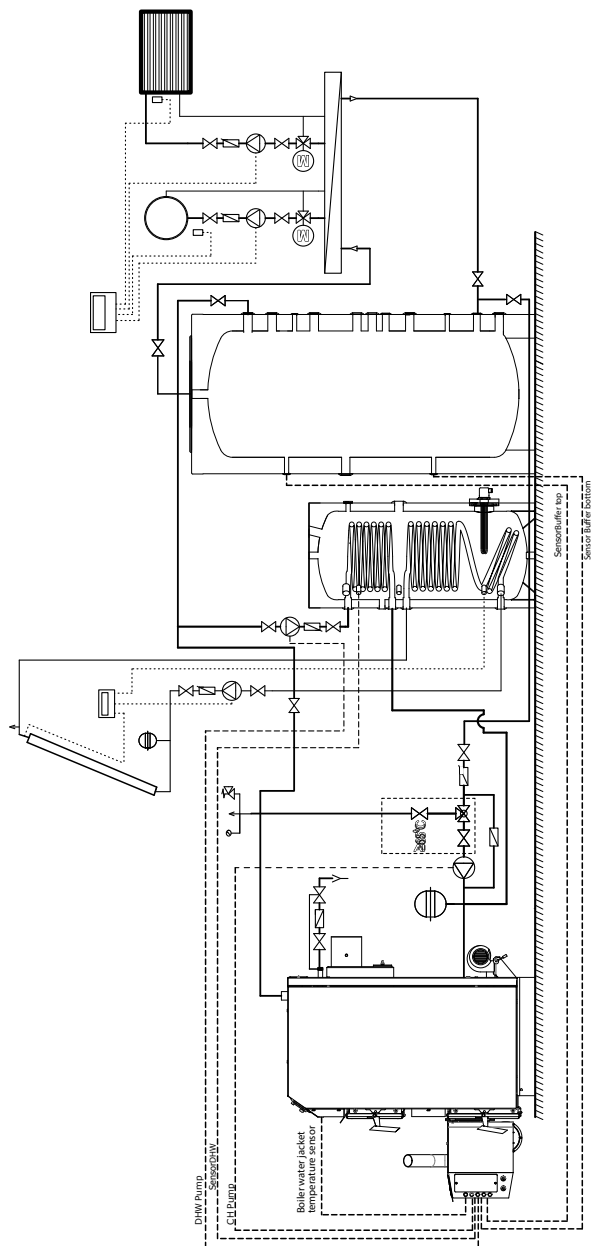
**Diagram 7. Connection of WBS Active-Pell boiler to P type buffer tank and three-way valve**

**\* Sensor Boiler - water jacket temperature sensor**



**Diagram 8. Connection of WBS Active-Pell boiler to combi tank HYG BR2, flat plate solar collector PK and three-way valve**

**\* Sensor Boiler - water jacket temperature sensor**

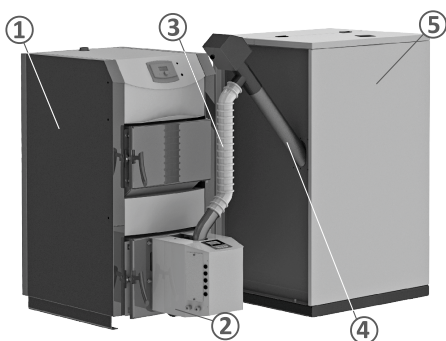


**Diagram 9. Connection of WBS Active-Pell boiler to solar tank SON, buffer tank P, flat plate solar collector PK and three-way valve**  
\* Sensor Boiler - water jacket temperature sensor

### 7.5. Pellet burner connection to the fuel hopper and pellet auger

Take the feeder chute flexible hose (from the auger set). Using a bracket, clamp one end of the hose onto the motor-end outlet of the pellet auger.

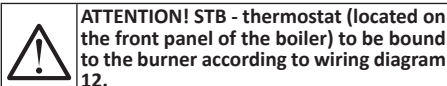
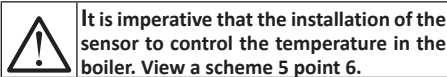
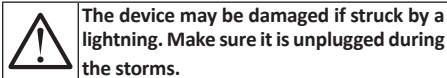
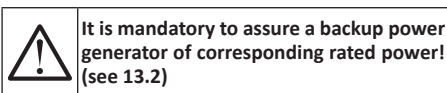
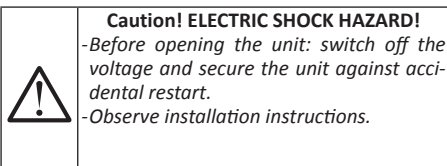
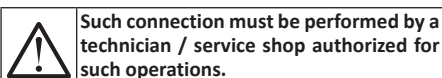
- Remember – pellet auger must be installed at 45° angle to the ground horizontal surface.
- Fill the hopper with fuel (see table 2 for parameters of the fuel types used)
- Plug the power cord of the pellet auger into the indicated Schuko-type burner socket on the left side of the burner housing.



**Diagram 10. Mounting the pellet burner Pell to WBS Active boiler**

1. WBS Active boiler;
2. Pellet burner Pell;
3. Auger flexible pipe;
4. Auger;
5. Fuel hopper.

### 7.6. Connecting the pellet burner to the mains power supply



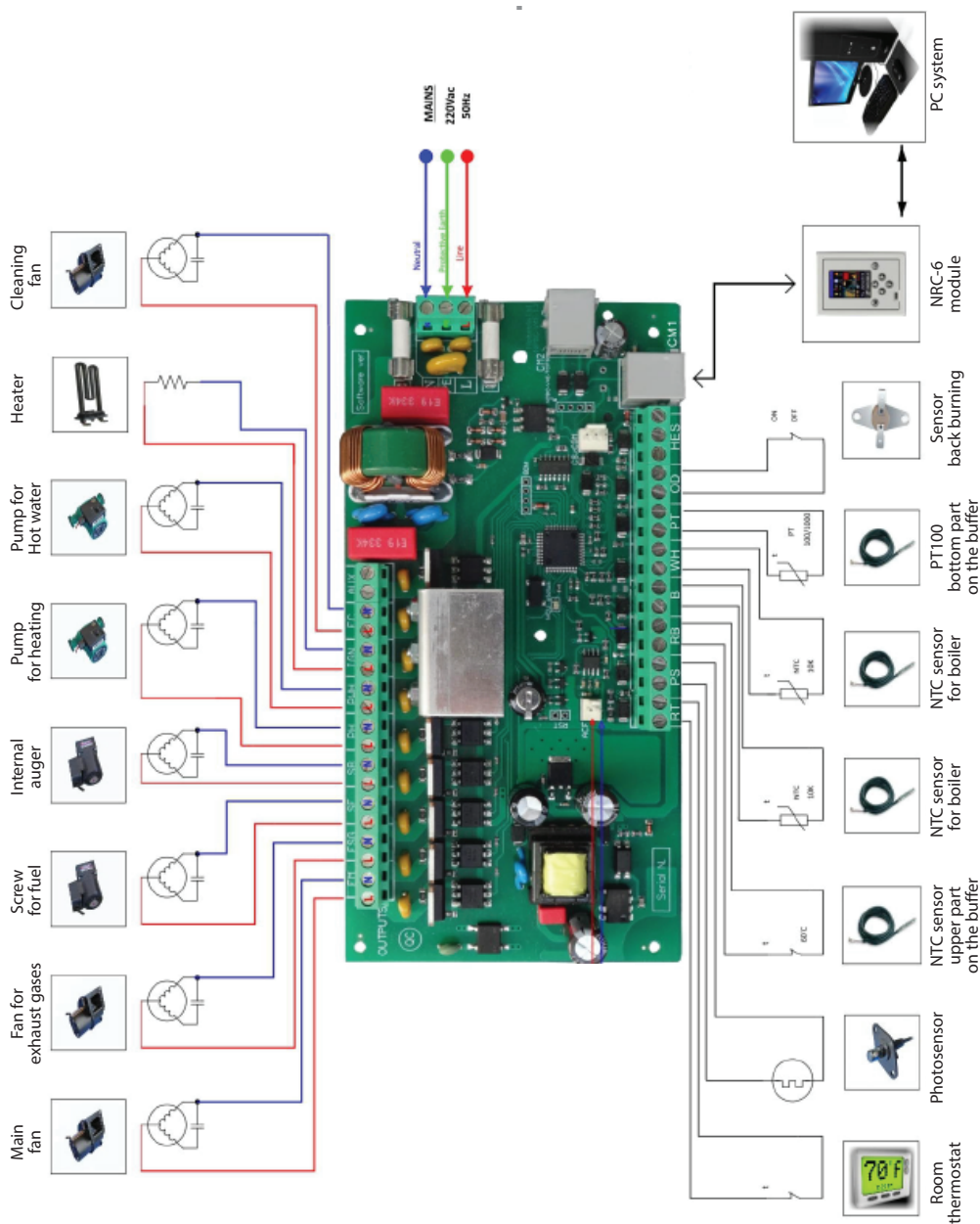
The boiler must be connected to a 220V/50Hz mains using power plug (3 meters long, bound to the burner).

Create tight connection with the electrical mains which complies with the local regulations.

**Table 3. OUPUTS of NPBC-V3C-1/NPBC-V4C-1/NPBC-V4E-1**

OUTPUTS		INPUTS	
<b>FM</b>	Air fan	<b>RT</b>	Room thermostat. A normally open or normally closed contact can be connected to this input without additional voltage!
<b>FSG</b>	Flue gas fan The pin is not output for binding!	<b>PS</b>	Photosensor
<b>SF</b>	Fuel auger	<b>RB</b>	Temperature sensor at the top of the buffer
<b>SB</b>	Internal auger	<b>B</b>	Thermosensor for boiler
<b>PH</b>	Heating circulation pump	<b>WH</b>	Thermosensor in DHW boiler
<b>PWH</b>	DHW circulation pump	<b>PT</b>	Temperature sensor at the bottom of the buffer
<b>IGN</b>	Ignition heater	<b>OD</b>	Reverse combustion sensor
<b>FC</b>	Cleaning fan	---	

Diagram 6. Electrical diagram of connecting the internal devices / sensors to the controller



## 8. BURNER OPERATING

### 8.1. Ignition

After the start up of the burner from the control panel, the main pellet auger conveys certain amount of fuel from the pellet hopper to the burner. This specific amount of pellets is set by the installer and depends on the fuel characteristics. The fed-in quantity of pellets is conveyed from the auger conveyor built in the burner to the combustion chamber where it is being ignited using hot air.

### 8.2. Burning

The burning process takes place in the combustion chamber and, after it has been fed into the combustion chamber, the fuel is then transported from the internal auger conveyor to the combustion chamber in portions. This allows for constant and optimal burning rate of the fuel. Flame intensity is monitored by a photosensor which monitors the burning and feeds data into the control unit which enables the starting or stopping of the combustion process, if necessary. The output of the burner is determined by the intervals preset on the control panel taking into account the heating value, size and density of the pellets.

### 8.3. Automatic cleaning system

The "Pel" pellet burner is equipped with innovative automatic cleaning system for the combustion chamber. Thanks to a powerful cleaning motor built in the burner body, air is being blown in at high speed and rate thus removing all residues – ash, noncombustible inclusions, etc. built up into the combustion chamber of the boiler. These automatic cleaning cycles last several seconds and can be additionally adjusted as well as their repeat rate depending on the load of the burner.

### 8.4. Installer prescriptions regarding burner servicing and maintenance

Before the heating season it is mandatory to check up and clean the burner and its components.

It is mandatory to clean up the combustion chamber of burner using the scraper brush from the maintenance kit. In case of combustion chamber orifices clogged by non-combustive material, those should be released using a bodkin. Clean thoroughly the inner combustion chamber using the scraper brush to remove all deposits on the metal surface. Use a vacuum cleaner to remove all sand and ashes from inside the combustion chamber. Check integrity of gasket between outer combustion chamber and closing hatch, replace if compromised.

**It is mandatory to clean dust off main fan and controller board**

### 8.5. Important recommendations for long-lasting and correct operation of the burner

- For assembly and installation of the burner follow the requirements in this manual.
- Use only recommended in this manual fuel.
- Disassemble the burner from the boiler body before clean it. Depending on fuel and burner settings, clean the pellet burner once a month.
- User's training for operation and maintenance of burner is performed by an authorized installer or service shop.



**Failure to observe the installation and operating requirements described in the manual and the service booklet voids the warranty.**

Type of maintenance	Procedure	Duty of:
<b>Weekly</b>	Cleaning of combustion chamber by poker and scraper brush.	<b>User</b>
<b>Monthly</b>	Dismantling of combustion chamber housing (A). Cleaning of combustion chamber by scraper brush and vacuum cleaner. Replacement of gasket if faulty (see Diagram 13)	<b>User / Installer</b>
<b>Yearly</b>	Full dismantling and cleaning of burner. Replacement of all gaskets (see Diagram 13.3)	<b>Installer</b>

### 9. MAINTENANCE AND CLEANING OF THE BOILER

#### 9.1. Cleaning of the boiler



##### Caution! Hot surfaces.

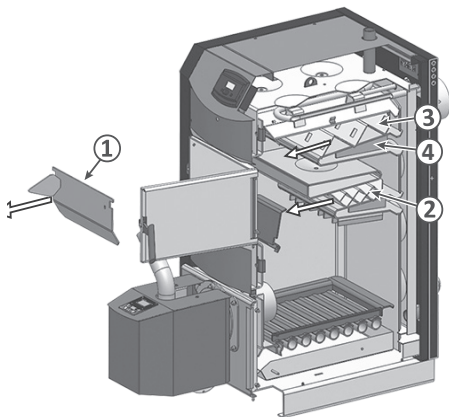
*Before cleaning the boiler, make sure the fire in it has died out and the boiler has cooled down.*

Boiler cleaning must be carried out periodically and adequately every 3 to 5 days. Ash accumulated in the combustion chamber, condensed moisture and tar deposits significantly reduce the life span and performance of the boiler and result in deterioration of the properties of the heat exchange surface. In case of larger ash accumulation there is not enough space for fuel combustion which may result in damage of the boiler as a whole. Regular cleaning is important to ensure the optimal performance and long operational life of the boiler.

It is recommended that the ash-and soot-container be emptied and cleaned every 3 to 5 days depending on fuel used. Scrape the inside of flue pipes if necessary. Use the scraper tool.

##### Disassembling of barrier ribs:

1. Open upper boiler door. Just behind the boiler door are fitted upper and lower protective doors. Disassemble upper protective door (1) in this order:
  - lift the door gently up and forward
  - detach the door from retaining hinges
  - remove gently upper protective door.



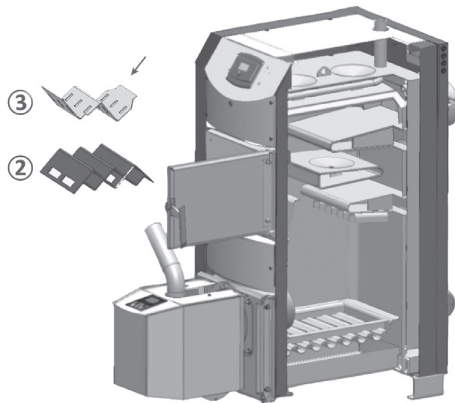
2. Gently pull out lower barrier rib (2) which is on top of middle water rib.
3. Gently pull out upper barrier rib (3) which is on

top of upper water rib (4)

4. For assembling the barrier ribs back into boiler follow the steps in reverse order.



**Caution! When mounting the upper resistance rib (3) bend pointing upwards!**



Scrape the inside of flue pipes if necessary. Use the scraper tool.

It is mandatory to clean once a week additional barrier ribs into combustion chamber.

Disassemble the barrier ribs.

Follow described above instructions for assembly and disassembly.

Clean barrier ribs.

Clean the accumulated ash from heat exchanging ribs.



**Caution! Ashes may contain smoldering charcoal. Dispose of ashes only in specially designated facilities. Disposing of ashes into public garbage containers may cause fire.**

#### 9.1.1. Preparing for the new heating season. Recommended boiler maintenance procedures:

1. Remove internal safety gates inside the boiler firebox (combustion chamber). Scrape thoroughly the firebox using the scraper brush from the boiler cleaning kit. Remove tar and soot deposits as they obstruct normal heat radiation.
2. Clean thoroughly water jacket ribs. Remove cinder and soot deposits using the scraper tool and brush from cleaning kit.
3. Remove inspection opening lid below the boiler flue opening and remove ash deposits in there.



**Caution! Replace inspection opening lid gasket with a new item if its integrity is broken.**

4. Clean well metal grill in the bottom part of the boiler. Check whether gaps between flue pipes are well cleaned. Tar deposits or residues of non-combustive materials inside the boiler firebox deteriorate normal combustion process.

5. Check for good sealing of doors:

- Open the doors of the boiler.
- Place four strips of paper sides of the doors and close so that some of the tapes to be submitted outside.
- Pull the paper strip. If to break during pull, the doors are sealed.



**If necessary, adjustment of of boiler doors or replacing insulation rope, please contact in your installer.**

## 9.2. Important recommendations for long-lasting and correct operation of the boiler.

- Carry out periodic maintenance of boiler following the prescriptions in Section 9.1.
- Gas emission in the combustion chamber may result in the formation of tar and condensate (acids). Therefore, a mixing valve must be installed and it must be adjusted so that the minimum temperature of the water returning in the boiler is **65°C**. This extends the life span of the boiler and its warranty. The operating temperature of the water in the boiler must be within the **65°C ÷ 80°C** range.
- It is not recommended to operate the boiler for a long period of time at an output lower than **50%**.
- When using circulation pump, boiler operation must be controlled via a separate thermostat in order to ensure the prescribed rated temperature of the return water.
- The eco-friendly operation of the boiler is realized at rated output.
- It is recommended to install a storage/buffer tank and pump type group with thermostatic mixing valve to the boiler. The capacity of the storage tank is 55 L of water per 1 kW installed boiler power.
- Maintenance and operation training for the boiler is conducted by an authorized installer




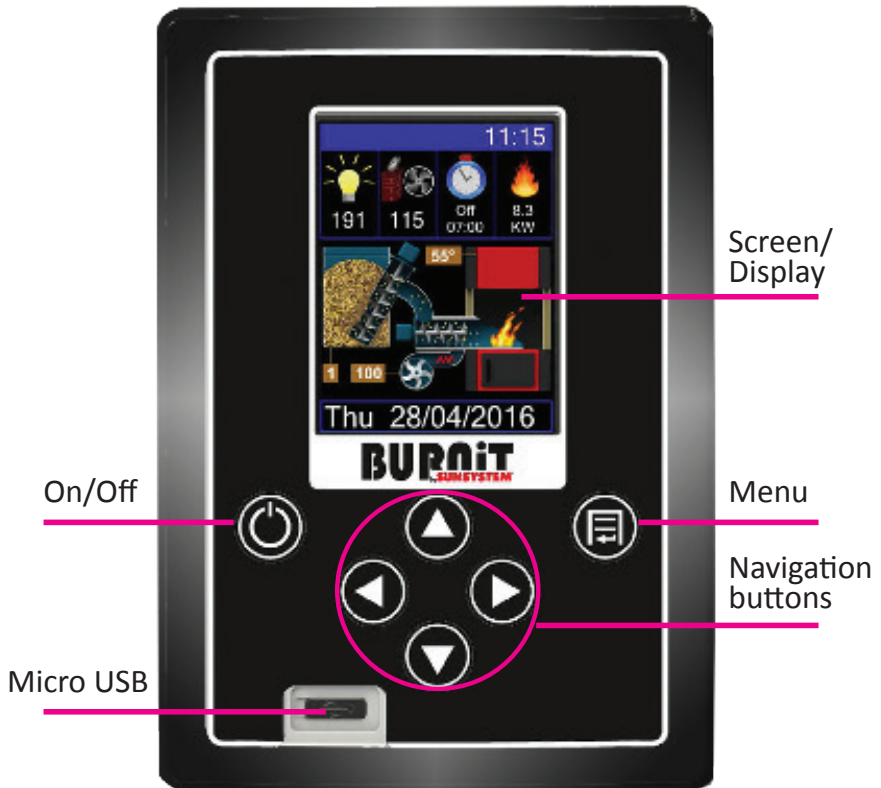
**Failure to observe the installation and operating requirements described in the manual and the service booklet voids the warranty.**

### 10. MICROPROCESSOR CONTROL

#### 10.1. View of the controller. Explanation of the buttons and indicators

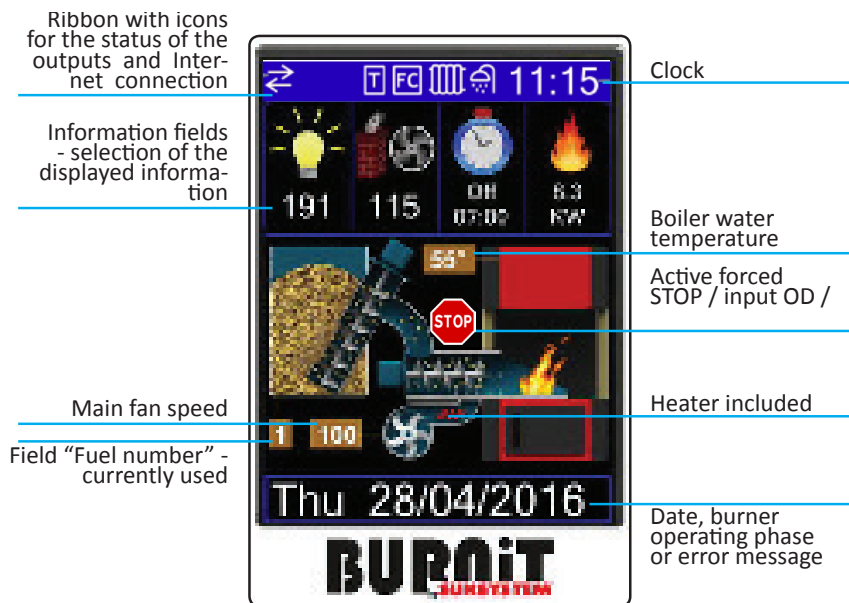
The NPBC-V4C-1 controller is controlled via its "Control Module" using 6 buttons. The functions of each button are shown below:

 The NPBC-V4 controller must be powered for at least 3 minutes for the clock maintenance and fuel monitoring system to work properly when the power is off!



## 10.2. LCD Screen. Explanation of the display indication:


After turning on the power, the controller displays its main screen, which has the following view:








During the operation of the burner, the operation of both augers and the fan is depicted with animated pictures of their respective place. When a fire is lit, a flame will appear in the boiler. If there is a need to display several messages on the bottom line, they alternate every 4 seconds.

The date is displayed in white, the operating phase in green and the registered errors in red. If the watch has not been adjusted, its reading will be --. You will need to adjust the clock for the burner to work properly.

In most cases, when there are error messages displayed in red on the bottom line, a warning three-tone beep will sound

Some of the error messages are cleared automatically after the reason that led to their registration disappears. There are other messages such as "back-burning", "frozen boiler", etc., which can be cleared only by pressing and holding the button  for more than 2 seconds.

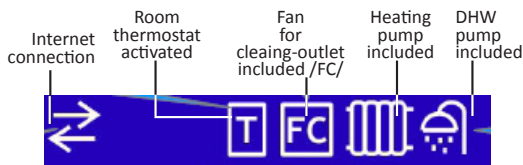
### Explanation of the display indication:

-  Illuminance level measured by the photosensor.
-  Chimney fan speed.
-  Displays information about the next action of the timers. If the timers are not activated or the burner is on, there will be no information under the icon. If at least one timer is active and the burner is on, below the icon will be the next timer action and the time or day of the week when it will occur.
-  Temperature measured by the DHW thermosensor.
-  Calculated burner power at the moment. In order for this power to be reliable, you must enter a calibration constant for the

auger from "Service Settings" -> "Basic Settings" -> "Auger Fuel Capacity".



Temperature measured by the flue gas thermosensor.



### 10.3. Controller operation:

The burner operated by NPBC-V4C-1 can operate in both continuous mode and timer mode. When in timer mode, the burner operates only at user-specified intervals of the day and days of the week. During operation, it goes through several phases: **cleaning, ignition, fire stabilization, combustion with modulation of power** depending on the current and set temperature of the boiler, intermediate cleaning performed in the combustion process, extinguishing and cleaning after combustion. In what phase is the process of operation of the burner at the moment, is displayed with text in green on the bottom row of the main screen.

Each burner ignition starts with a **cleaning cycle**. The purpose is to remove all remnants of previous combustion. First for a specific time set in the "Service settings" menu -> "Service settings" **combustion** -> "Fuel X" -> "Cleaning" column "Vent" row "Start", only the main fan works, then the additional fan for cleaning is turned on, if any and is not turned off from the time settings set in the "FC" column. The burner then goes into the **ignition phase**.

The burner **ignition** procedure begins with loading the first dose of pellets into the combustion chamber. The ignition is done with the help of an electric heater and forced air from the burner fans.

The **ignition procedure** performed after loading the first dose with pellets consists of three stages. During the first stage, only the electric heater without the fan works in order to reach the required ignition temperature faster. During the next two stages, air is supplied to the combustion chamber simultaneously with the operation of the heater, thanks to which the heat of the heater is transferred to the pellets and the necessary oxygen

is delivered to ignite the fuel. Usually during Stage 2 the fan is set with more low speed so as not to cool the flame, and after a more stable ignition of the fire, the amount of air can increase, which can happen during Stage 3.

From the "Service settings" menu -> "Service settings" **combustion** -> "Fuel X" -> "Ignition" sets the maximum duration of each stage of ignition, as well as the speed of the main and chimney fan. When the photo sensor measuring the illuminance of the fire detects that the pellets are ignited, the heater is stopped and a combustion procedure is started, which aims to stabilize the fire while the combustion chamber is not yet hot enough.

If the pellets do not ignite within the set time, the burner is loaded with a new portion of pellets and a new attempt is made to ignite. In order not to clog the burner with unburned pellets, the amount of new pellets fed is halved with each subsequent ignition attempt.

In addition, new pellets are only supplied for the first 3 ignition attempts in terms of 100%, 50% and 25% of the set amount. When the set maximum number of ignition attempts is exhausted, the burner stops by displaying an ignition failure message.

The parameters required to control the loading with the first dose of pellets and their ignition are in the menu: "Service settings" -> "Settings combustion" -> "Fuel X" -> "Ignition".

The parameters for detecting a lit or extinguished fire are in the menu "Service settings" -> "Fire detection".

The next phase of operation of the burner are the **procedures for calmly lighting the fire**.

If pellets and air supply for maximum power start with an unstable flame and a cold combustion chamber, the flame can be suffocated or blown out. To prevent this, first wait for the burning of the first dose of pellets and then begin a gradual increase in power from the lowest power P1 to the greatest required power, depending on the difference in temperature (set temperature and water temperature in the boiler).

The setting of the combustion process is done in the menu "Service settings" -> "Combustion setting" -> "Fuel X" -> "Combustion".

The next step is combustion control. The controller supports settings for 4 different powers. Three of these capacities are used during normal operation of the burner to heat the boiler. The fourth power is

to maintain the fire when it is not necessary to heat the water in the boiler and thus avoids the need to extinguish the burner, then clean and re-ignite. Of course, if there is no need for new energy in the heating system for a long time, the burner will go out. The dose of pellets that will be fed into the combustion chamber and which determines the current power is a function of: the productivity of the fuel auger, the time of operation of the auger and the cycle between two inclusions of the auger. The parameters required for setting each power are: the operating time of the fuel auger, the cycle between two consecutive auger connections and the speeds of the main and chimney fan. They are set in the menu **"Service settings" -> "Settings combustion"->"Fuel X"->"Power P1" / "Power P2"/"Power P3"/ "Maintenance"**. The burner automatically selects how much power to operate depending on the temperature difference between the set temperature and the current temperature in the boiler.

The choice is made at the beginning of each fueling cycle. All this is set from **"Service settings" -> "Power modulation"**. The last menu also sets the maximum time during which the burner will have the power to maintain the fire. If this time has elapsed, the burner will go out. If during the "Maintenance" operating phase the temperature difference reaches that required for some of the operating capacities and if there is still embers in the burner, it will ignite again using the embers in it and not the heater.

The burner is cleaned by increasing to 100% the speed of the main fan and if an additional powerful fan or other mechanical cleaning system is installed to the FC outlet and with them. The cleaning settings are different, depending on whether it is before starting, after switching off or if a problem is registered. The procedure is as follows:

1. Extinguish the burner and wait for the flame to disappear.
2. The main fan is switched on and operates at maximum power for a time set from the menu **"Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning" column "Fan" row "Start", "Stop" or "Alarm"**.
3. After the time from the above step has elapsed, an additional more powerful fan or mechanical cleaning system can be switched on, which works together with the main fan for a time set from the menu **"Service settings" -> "Combustion settings"->"Fuel X"->"Cleaning" column"FC" row "Start", "Stop" or "Alarm"**. If time 0 is entered, output FC

will not work and this step is skipped!

In addition to starting, extinguishing or registering an alarm, the controller allows the setting of additional automatic cleaning cycles. The activation of automatic cleaning and the burner operating time during which this cleaning is switched on are set in the menu **"Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning"**.

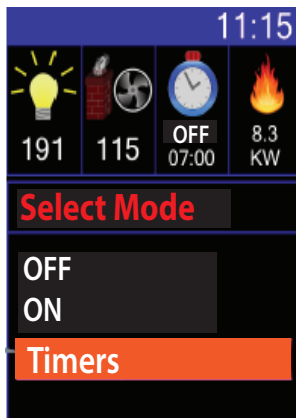
During automatic cleaning, the burner is first extinguished, cleaned and then re-ignited automatically.

The controller uses another method of intermediate cleaning, in which the fire is not extinguished, but only increases the power of the fan or triggers the FC output for some mechanical cleaning mechanism.

The required settings of this cleaning method are made from the menu **"Service settings" -> "Combustion settings" -> "Fuel X" -> "Intermediate cleaning"**. The parameters to be set are: the time during which the intermediate cleaning procedure is repeated, the fan speed to be maintained during cleaning, how long to clean and whether to use the FC output. The pellet supply is not interrupted during this cleaning method.


#### 10.4. Burner operation:

##### 10.4.1. Switching the burner on / off.



With the **On / Off button** goes to the mode selection menu.

Use the **▲** or **▼** buttons to highlight higher

or lower row. There is a choice between three operating modes: Off, On and Timers. The next time you press the On / Off button, switches to the highlighted mode. If no button is pressed for more than 5 seconds or  is pressed, it will exit without changing mode or condition. To make sure that the burner is switched off after selecting the Off mode, you must make sure that the bottom line does not appear in green, with some of the operating phases of the burner given in the following table.

Working phase			
1	Cleaning	6	Power P1
2	Charging	7	Power P2
3	ignition	8	Power P3
4	Heating	9	Intermediate cleaning
5	Maintenance	10	Extinguishing

When the burner is in "Off" mode, it will not work. If the burner was lit during the switch to this mode, a fire extinguishing procedure will be performed.

Complete fire extinguishing and cleaning require some time. It is normal for the burner and boiler units to continue to operate even after switching to "Off" mode.

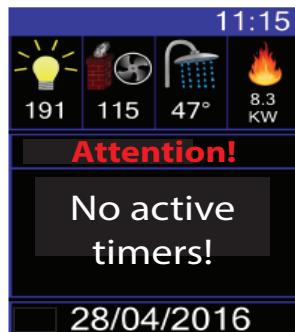
Circulation pumps can continue to operate despite the burner being switched off as long as the conditions for their operation are met. In this way the remaining heat energy of the water in the boiler will be used.

When the burner is switched on, the "**Fuel number**" field will appear first. If all conditions for ignition of the burner are met, such as not reached boiler temperature, not activated room thermostat, inactive OD input for forced stop, lack of registered serious problems and permission, if one of the timers is on, the burner will automatically switch to ignition.



Then all will be executed automatically procedures for ignition, fire stabilization, maintenance, power modulation, intermediate cleaning, extinguishing and complete cleaning set for this fuel.

When timer mode is selected, the burner will run at intervals when it is allowed to operate. These intervals are set from the "**Timers**" menu in the user settings. If there are no preset intervals, an error message will be displayed and the burner will remain off.


The controller will remember the selected mode and as soon as intervals are set for operation from the corresponding menu in the user settings, the burner will switch to operation in Timer mode without having to select it again:





#### 10.4.2. Change the set temperature for heating the water in the boiler.

By pressing the buttons  , when the controller is in the "Main screen", you switch to the screen for correction of the set temperature. The temperature will start to change when the button is released and then pressed again. If any of the buttons are held down, the temperature will start to rise automatically at a rate of up to 5 degrees per second. To exit and save the temperature, press the "**Menu**" button. If you do not press a button for 5 seconds, it will appear in the main screen, and the change will not be remembered.

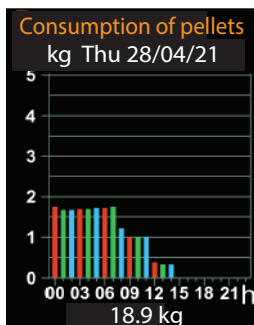
#### 10.4.3. Output of additional information about the operation of the burner

By pressing a button , when the controller is in the "**Main screen**", you go to the additional information screens.


#### 10.4.4. Statistics of pellet consumption by hours.

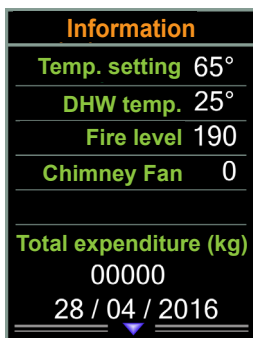
The first information is the screen "**Pellet consumption**" which contains graphs with the consumption of pellets for the last 4 days. First, information about the current day is displayed, and with the buttons  , the remaining up to 4 days are traversed. The display is done with a histogram on the entire display

The coordinate system has a horizontal axis with the hours of the day and a vertical axis with the consumed pellets in kilograms for the respective hour. At the top is the date to which the information relates, and at the bottom is the summary information about the consumption of pellets during the day.



#### 10.4.5. Information about the status of some current parameters.


By pressing the button , when the controller is in the "Pellet consumption" screen, you go to the "Information" screen. This screen displays the set temperature, the domestic hot water (DHW) temperature, the light level of the photo sensor, the exhaust gas temperature, the current speed of the smoke fan, and the consumption of pellets since its last reset.



By pressing and holding the **Menu** button for more than 2 seconds, the readings for the total consumption of pellets are reset. In addition, remember the date and time of this reset, thanks to which you will have information for what period the next "Total cost" of pellets has been accumulated.




Keep in mind that the consumption of pellets for the current day is not reset, because it starts to be reported from 00:00 on the day whose date is displayed on the screen!

If you press  from the "Information" screen, you go to the front screen - "Pellet consumption".

In addition to these measured parameters, there is other information important for the operation of the burner, which can be displayed for constant monitoring in the Information fields on the main screen.

#### 10.4.6. Information about the operation of the WiFi modem and the Internet connection.

To get to the screen with information "WiFi connections" you need to press a button .

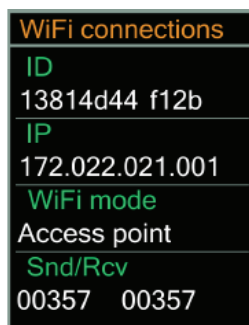
The fields are as follows:

- **ID** - Unique identifier of each modem
- **IP** - IP address of the modem


**WiFi mode** - Modem status which can be:

- **Idle** - The modem has not yet connected to a WiFi router with Internet
- **Access point** - The modem is in Access point mode and provides the ability to accept the SSID and password of the local WiFi network to connect to it
- **AP Associated** - The modem has connected to the router
- **Internet Access** - Has an Internet connection
- **Connected** - The modem has connected to the information system server
- **Snd / Rcv** - Data packets sent / received over the Internet


If no WiFi modem is connected to the controller, the message "No WiFi modem" will be displayed.



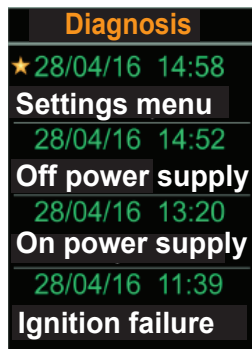
#### 10.4.7. Information about the operation of the WiFi modem and the Internet connection.

To get to the version screen, you need to press the button  on the "WiFi connections" screen.






#### 10.4.8. Diagnosis

By pressing the button , when the controller is in the "Information" screen, you go to the "Diagnostics" screen, which is a list of information about each registered problem and the exact time and date of its occurrence. If there are more than 4, with buttons, the next or previous page is displayed respectively. By holding down the "Menu" button for more than 2 seconds, the accumulated diagnostic information is cleared. The star symbol marks the latest and most recent registered information

The messages you can see on this screen are given in **Table 5**. Messages 1 to 13 are also displayed as messages for registered faults on the bottom row of the main screen.




**Table 5.**

	Message	Clear	Description
1	Reverse combustion	button 	A reverse combustion thermostat has tripped
2	Interrupted TS boiler	automatically	Interrupted boiler thermal sensor
3	Short in TS boiler	automatically	Short in the boiler thermal sensor
4	Frozen boiler	button 	Time and date of registration of the damage
5	Ignition failure	button 	
6	Interrupted TC RB	automatically	Interrupted thermal combustion sensor
7	Short in TS RB	automatically	Short in the thermal combustion sensor
8	Interrupted TS boiler	automatically	Interrupted thermal sensor of the DHW boiler
9	Short in TC бойлер	automatically	Short in the DHW boiler thermal sensor
10	Interrupted TC Pt100	automatically	Interrupted flue gas thermosensor-Pt100
11	Short in TC Pt100	automatically	Short in flue gas thermosensor-Pt100
12	High temp., Smoke	button 	Temperature of flue gas is very high
13	Dangerous temp., Smoke	button 	Temperature of exhaust gases is unacceptably high
14	Settings menu	---	It is entered in the system settings menus
15	No executable module	---	No connection to "Executive module"
16	On power supply	---	Time and date of power on
17	Off power supply	---	Time and date of power failure
18	Beginning	---	Record restart of the controller



*When error messages are displayed in red in the bottom field of the main screen, they can be cleared in the following ways:*





- *automatically after the cause has disappeared, leading to their appearance for all messages with automatic clearing enabled.*





- *by pressing and holding a button  for more than 2 seconds while the display is in the main screen and when the cause that led to their appearance disappears*

## 11. ADJUSTMENTS OF OPERATING PARAMETERS

### 11.1. Ways to change the operating parameters

When the parameters required for the operation of the controller are set, the display has a similar appearance to any of the following:

- Select from list - The red line indicates the highlighted line. Use the buttons   to move the red line. By pressing a button , the option of the highlighted line is selected by entering the respective setting screen. If there are more rows below the visible part of the screen, there will be an arrow pointing down. If there are more rows above the visible part of the screen, there will be an up arrow. If there is an arrow to the right of the row, then you will not enter the setup screen, but an additional one under the selection menu. If it is currently viewed further under the selection menu, by pressing the button , you go to the previous selection menu.




- Setup screen - After entering such a screen, a pink check box appears on the first parameter, indicating that this parameter can be edited. Using the   buttons, the marking frame can be positioned on the parameter you want to edit by moving left / right or up / down, respectively. With buttons   the selected parameter can be changed as its value is increased or decreased or selected or released. The parameter fields are some of the following types: numeric parameters, selection fields with possible values activated / not activated (selected / unselected) or a list of text values. Parameter fields are some of the following types: numeric parameters, selection fields with possible values activated / not activated (selected / unselected) or a list of text values. The numerical parameters are checked for permissible limit values and, if they are reached, the corresponding parameter stops changing despite the short beep when the change button is pressed.

After completing the necessary adjustments to remember the changed parameters and exit to the previous screen, you must exit with the button **(Menu)**. There is a maximum waiting time without pressing a button, after which you go to the previous screen, without remembering the changes made so far.



When you hold down any of the arrow buttons, in most cases there is an automatic repetition of the function of the corresponding button. This repetition is at a rate of 5 times per second, which will increase or decrease the value of the selected parameter or move the marking frame between the individual parameters!

### 11.2. Custom menu. Settings.

By briefly pressing the Menu button on the main screen, you enter the user settings menu. Use the buttons   to move the red line. Pressing the button  selects the highlighted submenu.

**Time and date** - Adjust the controller clock. In this submenu the time, date, minutes and day of the week are adjusted. There is also an option for automatic verification of the above parameters.

**Language** - Change the language.

**Timers** - Setting and activating time intervals in which the operation of the burner is allowed. If at least one of the three timers is active, the burner will only run at the intervals indicated by the active timers! Outside the intervals, the burner will be extinguished.



To see more clearly whether the timers are activated and will control the burner and what their next on / off operation will be and at what time, you can display the information from them in the information fields at the top of the screen.

If there are active timers and the burner is switched on, by pressing and holding the "On / Off" button for more than 2 seconds, the timers will switch off.

**Fuel selection** - This menu selects the preset fuel profile currently in use.

**Info Fields** — Sets the information to be displayed in the four information fields at the top of the screen.

The possible labels and information displayed in each field are the following:

- **Fire level** - level of illumination measured by the photosensor
- **Chimney fan** - chimney fan speed
- **Timers** - next action controlled by timers
- **Power** - calculated instantaneous power obtained by burning pellets
- **DHW temp** - temperature of the hot water boiler
- **Smoke rate** - exhaust gas temperature.

**Pump control** - sets the operating mode of the pumps of the external heating systems, as well as their on and off temperatures. The pumps are as follows: a pump for the heating system connected to the PH outlet and a domestic hot water boiler pump connected to the PWH outlet.

**Manual refueling** - Manual switching on of the fuel auger or circulation pumps. This menu is useful for: filling the auger when it is empty, switching on the auger to measure the amount of pellets fed per unit time in order to calibrate it, switching on the circulation pumps for testing or filling the installation with liquid.

**New WiFi network** - If the NRC-6 has a WiFi module for Internet connection and if it is installed for the first time or the WiFi network to which it is connected needs to be changed, you must go through this menu.

### 11.3. Installer (service) menu. Service parameter settings.

These parameters are directly related to the control of ignition, combustion and safety when using the burner. Access to them can be restricted with a code that is set from the menu "Service settings" -> "Change code". To enter the service settings, you must press and hold the "Menu" button for more than 2 seconds. If an access code is activated, a screen for entering it will be displayed first.

After entering the access code correctly, a screen for selecting the service settings menus will appear. Note that the NPBC-V4C controller supports up to 4 different profiles for different fuels.

Some of the settings do not depend on the fuel used and are common to all fuels. However, there are many parameters that depend on the fuel for which they are intended, and therefore you must first go through the choice of one of the fuels.



The fuels are named: **Fuel1**, **Fuel2**, **Fuel3** and **Fuel4**. When there is a right arrow after the selection line, you will move to a new selection submenu:

#### 11.3.1. Fuel-independent service settings.

**Equipment** - from this menu the presence or absence of the optional burner elements is set, as well as the polarity of the action of the contacts of the room thermostat or the forced stop circuit connected to the OD input.

**Basic settings** - here you set the control mode of the internal auger (burner auger), the maximum allowable heating temperature of the boiler, the capacity of the fuel auger and whether the cleaning fan outlet (FC outlet) has an additional wait if used to control a linear drive mechanism that has time to return to its original state after moving forward.

**Fire detection** - Adjusts the brightness of the photo sensor to detect a lit or extinguished fire and how long such light should be measured to ensure recognition.

Fire recognition		
Fire	Flame level	Duration seconds
	> 100	20
	< 40	60

*The fire will be considered lit if the photosensor measures a level above 100 for more than 20 seconds.*

*The fire will be considered extinguished if the photosensor measures a level below 40 for more than 60 seconds.*

**Power modulation** - The temperature differences between the set and measured temperature of the boiler are set, upon reaching which the power is switched from one to another.

The operating conditions in power for "Maintenance" of the fire, waiting time and maximum overheating of the temperature are also set.

**Thermostat control** - here the way of reducing the power of the burner is set, when the room thermostat is activated and the pumps are controlled in "Heating priority" mode. In this mode, once the room thermostat has been activated, if the burner has been operating at power P3, for example, the time set below will be maintained at this power and then switched to power P2, P1 and "Maintenance". The "Maintenance" power will last as long as it is set in the "Service settings" menu -> "Power modulation" line "Time".


These settings are responsible for the smooth

reduction of the power supplied to the heating system when the expected room temperature is reached.

**Output test** - all outputs of the controller can be controlled directly through this menu. In order for this control to be possible, the burner must be switched off. There is a maximum activity time for this menu without pressing buttons for 5 minutes. Then the outputs are turned off and go to the front screen.

### 11.3.2. Fuel-dependent service settings.

To enter these settings, you need to enter the main screen for service settings on the line **"Settings. Combustion"**, press button, then select fuel and

press button again 

**Cleaning** - From this menu the duration of the cleaning cycles is set, with the operating time of the main and additional cleaning fan. Here it is set whether to have cycles for automatic cleaning and during what period to be. The automatic cleaning cycles are in the following sequence: extinguishing, cleaning after extinguishing and re-ignition. The cleaning procedures are performed before ignition (Start row), after extinguishing or during automatic cleaning (Stop row) and with a registered **"Reverse combustion"** alarm (Alarm row).

**Ignition** - this menu sets the number of ignition attempts (ignition tests), fuel auger operation time for refueling the first pellet dose (Refueling), chimney fan speed during the entire ignition period (chimney vent) and maximum duration at each of the three stages of ignition, as well as the speed of the main fan during each stage.



**If the photosensor detects an ignited fire, the ignition procedure is stopped immediately and switched to ignition!**

**Ignition** - adjusts the process of smooth ignition to stabilize the fire after ignition. The upper field adjusts the fan speed, main and chimney, as well as the duration (Duration [sec]) of the burning period of the first dose. No new pellets are fed during the first dose incineration. In the lower field, the retention time of each power is set in the process of gradual increase of the power from the smallest P1 to reaching the nominal one, according to the temperature of the water in the boiler.

Field **Continued. (sec)** - waiting time to burn the first dose and fan speed

Field **Smooth-burning** - After burning the first dose, 60 seconds will work with power P1 and another 60 with power P2.

D1>Kinding	
Burning first dose	
Duration (sec)	0
Fan	20
Chimney fan	20
Smoothly kindling	
P1 (sec)	60
P2 (sec)	60

**Power P1, Power P2, Power P3, Maintenance** - the same type of menus for setting the operating parameters for each power from the smallest P1 to that for maintaining the fire. In order to accurately dispense the amount of pellets, the Portion line, which is the operating time of the fuel auger, and the Cycle line, which is the time between two fuel supply periods, are set. In order for the fire to burn properly, an appropriate amount of air must be supplied. Therefore, the speeds of the main fan (row **Fan**) and the chimney (row **Chimney vent**) must also be set.

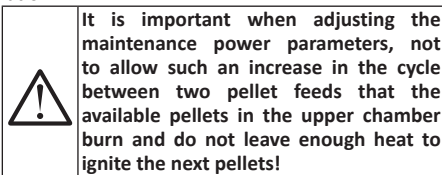
D1>Power P1	
Fuel supply	
Portion (sec)	3.0
Cycle (sec)	30
Fan	25
Chimney fan	25
Power	8.3kW

**Power field** - Calculated power based on calorific value 5kWh / kg.

**This parameter is not corrected!**

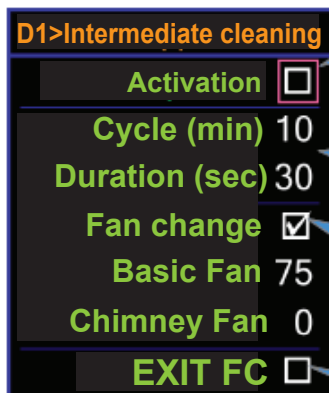
We recommend that you set the P3 power to the maximum power you will want to receive from the burner. Power P2 should be 50% of P3 and P1 should be 20% of P3. With such a setting, the controller will be able to smoothly modulate the burner power in the range of 20 to 100%, changing

ing the power if necessary for each new cycle. For example, if you need 75% power, the controller will switch from power P3 to P2 and then back to P3 at regular intervals. Thus, the average power can be reduced to the following  $(100 + 50) / 2 = 75$ . The switching time will depend on the inertia of the whole system and the set temperature differences in the menu **"Service settings"** -> **"Power modulation"**. The smallest interval for switching between two powers can be one cycle, which is about 20-30 seconds. For such a short switching period, the temperature of the heating system will not change significantly to feel the pulsation of power. By adding **"Maintenance"** power, which will be less than P1, the burner gets an even wider range of modulation.



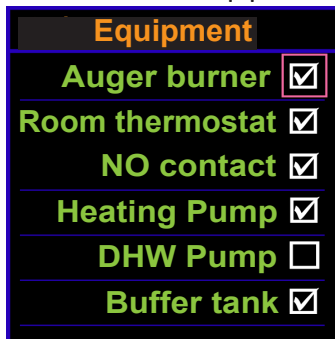
**Intermediate Cleaning** - This menu sets an additional feature that the NPBC-V3C controller allows, called "Intermediate Cleaning". The idea is that while the burner is operating normally, only increase the speed of the fans, which will temporarily raise the temperature of the fire and this will lead to a more complete combustion of slag and ash. A mechanical cleaning mechanism connected to the FC outlet can also be used, which can be activated periodically while the fire is burning to scrape off the stuck slag or ash.

To do this, you need to check the **"Exit FC"** line and perhaps remove the **"Change vent"** line.

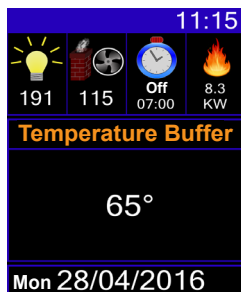


### 11.4. Activation of buffer vessel management.

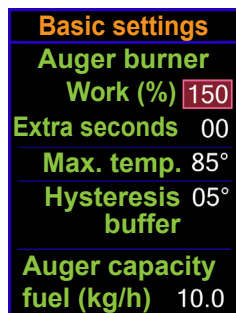
The operation of the pellet burner can be controlled depending on the temperature in the buffer vessel, for which purpose the sensors provided for the buffer vessel in the complete set of the burner must be installed in the buffer. Activation of the mode is done from the service menu **"Equipment"**.



When adjusting the maximum burner temperature, information is displayed to adjust the buffer temperature.



In the service menu, in the **"Basic settings"** sub-menu you can adjust the hysteresis of the buffer tank.



Range of adjustable parameters						Default					
Menu	Parameters		Unit	Min	Max	Pell 25	Pell 30	Pell 40	Pell 70	Pell 90	Pell 150
Display	Brightness		level	2	10	7	7	7	7	7	7
Pump control	Heating Pump	On	°C	10	80	50	50	50	50	50	50
		Hysteresis	°C	1	20	5	5	5	5	5	5
	DHW pump	DHW temp.	°C	10	70	45	45	45	45	45	45
		Hysteresis	°C	1	20	5	5	5	5	5	5
Basic settings	Auger burner	Work	%	100	500	300	300	300	300	300	300
		Additionally	sec	00	30	00	00	00	00	00	00
	Maximum temperature		°C	35	90	85	85	85	85	85	85
	Auger fuel capacity		kg/h	0.5	2000	24	24	24	24	24	24
Fire recognition	Ignition		level	0	150	100	100	100	100	100	100
			sec	10	240	20	20	20	20	20	20
	Extinguishing		level	0	150	40	40	40	40	40	40
			sec	10	500	60	60	60	60	60	60
Modulation power	P3Δ		°C	2	30	8	8	8	8	8	8
	P2Δ		°C	1	29	4	4	4	4	4	4
	P1Δ		°C	0	28	0	0	0	0	0	0
	Time		minutes	0	120	30	30	30	30	30	30
	Overheating		°C	00	20	5	5	5	5	5	5
Cleaning	Start	Fan	sec	0	600	180	180	180	180	180	180
		FC	sec	0	250	0	0	0	0	0	0
	Stop	Fan	sec	0	600	180	180	180	180	180	180
		FC	sec	0	250	20	20	20	20	20	20
	Alarm	Fan	sec	0	600	180	180	180	180	180	180
		FC	sec	0	250	20	20	20	20	20	20
	Automatic cleaning cycle		minutes	10	990	180	180	180	180	180	180
Ignition	Burning experience		number	0	5	1	1	1	1	1	1
	Charging		sec	1	240	30	30	35	35	35	40
	Chimney Fan		sec	0	100	0	0	0	0	0	0
	Stage 1		sec	0	600	120	120	120	120	120	120
		speed	--	--	--	--	--	--	--	--	--
	Stage 2		sec	10	540	120	120	120	120	120	120
		speed	0	100	15	15	15	15	15	15	15
	Stage 3		sec	10	540	60	60	60	60	60	60
		speed	0	100	20	20	20	20	20	20	20

Range of adjustable parameters					Default					
Menu	Parameters	Unit	Min	Max	Pell 25	Pell 30	Pell 40	Pell 70	Pell 90	Pell 150
Kindling	Duration	sec	0	300	0	0	0	0	0	0
	Fan	speed	0	100	20	20	20	20	20	20
	Chimney Fan	speed	0	100	20	20	20	20	20	20
	P1	sec	10	600	60	60	60	60	60	60
	P2	sec	10	600	60	60	60	60	60	60
Power P1	Portion	sec	0.1	25.0	1.8	1.8	3.0	3.0	1.8	3.0
	Cycle	sec	4	120	20	20	20	20	20	20
	Fan	speed	0	100	18	18	18	17	15	17
	Chimney Fan	speed	0	100	25	25	25	25	25	25
Power P2	Portion	sec	0.1	25.0	3.0	3.0	5.0	5.0	3.1	5.1
	Cycle	sec	4	120	20	20	20	20	20	20
	Fan	speed	0	100	20	20	20	20	22	32
	Chimney Fan	speed	0	100	50	50	50	50	50	50
Power P3	Portion	sec	0.1	25.0	6.0	6.5	10.0	10.0	6.2	10.2
	Cycle	sec	4	120	20	20	20	20	20	20
	Fan	speed	0	100	32	32	29	26	35	50
	Chimney Fan	speed	0	100	100	100	100	100	100	100
Maintenance	Portion	sec	0.1	25.0	2.0	2.0	2.0	2.0	2.0	2.0
	Cycle	sec	4	120	120	120	120	120	120	120
	Fan	speed	0	100	8	8	8	8	8	8
	Chimney Fan	speed	0	100	5	5	5	5	5	5
Intermediate cleaning	Cycle	minutes	1	15	30	30	30	30	30	30
	Duration	sec	4	120	10	10	10	10	10	10
	Basic Fan	speed	0	100	50	50	50	50	50	80
	Chimney Fan	speed	0	100	0	0	0	0	0	0
Manag. from thermostat	P3	sec	10	240	60	60	60	60	60	60
	P2	sec	10	240	60	60	60	60	60	60
	P1	sec	10	240	60	60	60	60	60	60
Safety	Warning>	°C	150	300	200	200	200	200	200	200
	Extinguishing>	°C	151	350	220	220	220	220	220	220

## 12. WARRANTY TERMS

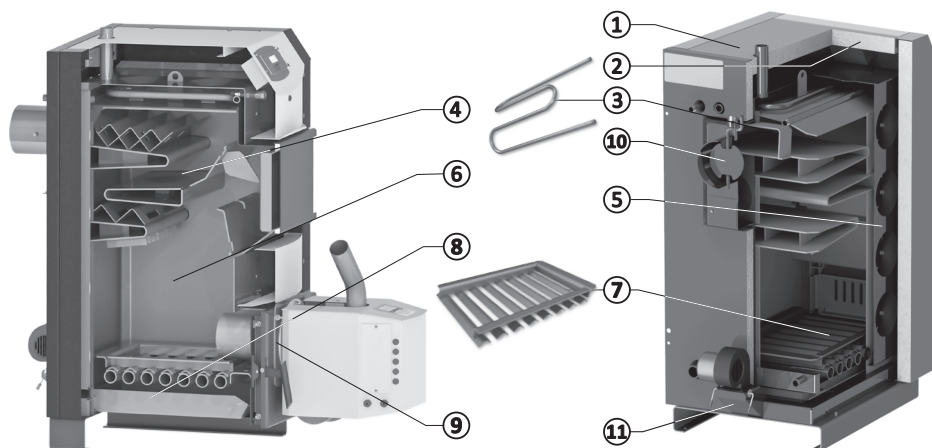
The warranty terms are described in the Service booklet included in the supply.

## 13. TECHNICAL PARAMETERS OF WBS ACTIVE - PELL

### 13.1. General features

- Electronic control unit controls the combustion by modulating the fan speed. Optional control of circulation pumps for central heating and domestic hot water (DHW).
- Combustion chamber with large heat exchanging surface and low chamber resistance.
- Ribbed chamber surface and three-pass flue gas flow for improved heat exchange.

- Exchangeable metallic ash grate protects the pipe grid from the flame.
- Burner flange on lower door for fitting pellet burners.
- Safety devices:
  - 1) Elbow-shape feeder chute prevents backfire entry from burner into pellet hopper;
  - 2) Thermostatic protection (80°C).
  - 3) Fuse 10 A;
  - 4) In case of power interruption, all parameter settings are stored in the memory of the controller.
  - 5) Safety heat evacuator;
  - 6) Pressure relief valve 3 bar.



*Diagram 14. Elements of WBS Active - Pellet*

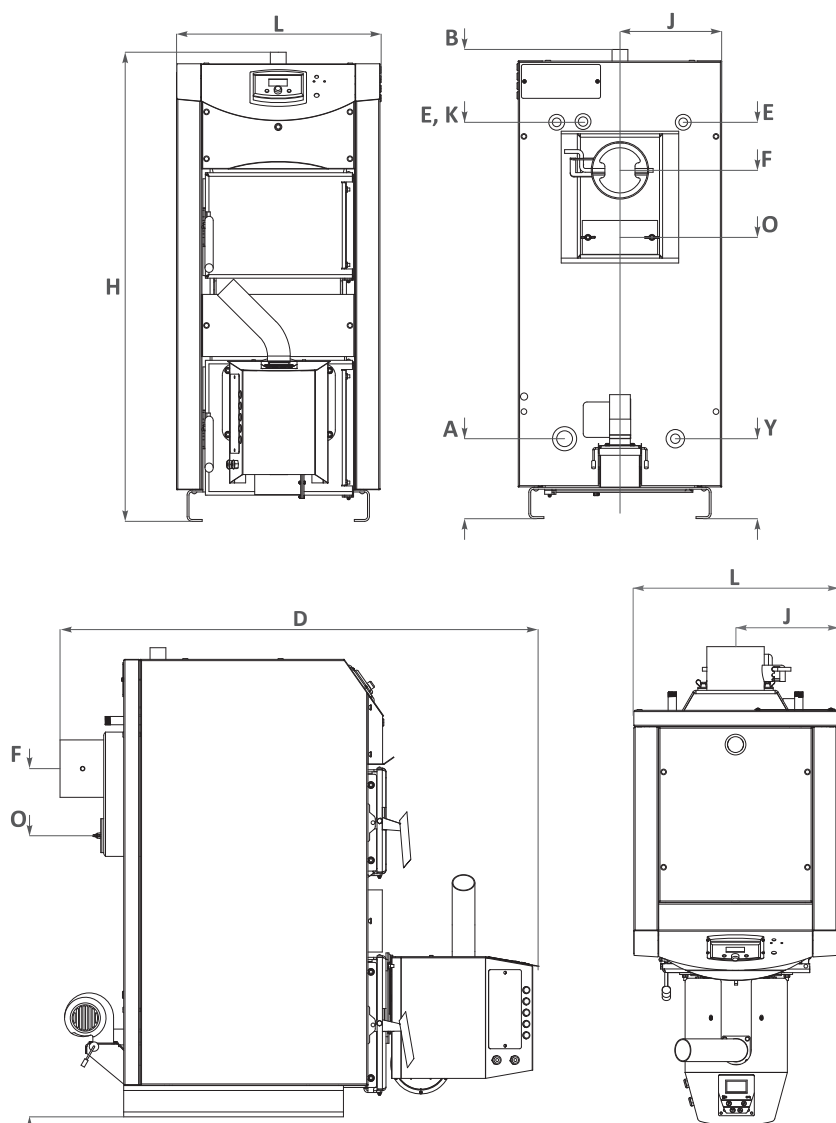
- |                                       |                      |
|---------------------------------------|----------------------|
| 1. Housing                            | 7. Metal ash grate   |
| 2. High efficiency thermal insulation | 8. Ash-and-soot tray |
| 3. Safety heat evacuator (exchanger)  | 9. Burner flange     |
| 4. Three-pass flue gas flow           | 10. Flue             |
| 5. Water mantle                       | 11. Air intake flap  |
| 6. Combustion chamber                 |                      |

### 13.2. Technical parameters of WBS Active - Pell

				WBS - A 20 - Pell 25	WBS - A 30 - Pell 30
Nominal heat output			kW	17	22
Minimum ÷ maximum heat output			kW	5÷20	6÷25
Mass flow of exhaust gases, min.÷ max. heat ouput			kg/s	0,004÷0,012	0,005÷0,013
Dimensions of boiler WBS Active + burner Pell		Height H	mm	1235	1235
		Width L	mm	540	540
		Depth D	mm	1250	1315
Water mantle volume			l	60	75
Combustion chamber volume			l	58	62
Mantle resistance, Δt=20, K			Pa/mbar	8/0,08	9/0,09
Required chimney draught			Pa/mbar	10/0,10	10/0,10
Insulation			Boiler Doors	high-efficiency thermal wool high-efficiency thermal wool	
Average power consumption		Boler WBS Active	W	60	60
		Firing-Up mode	W	~ 400	~ 400
		Operate mode	W	~ 60÷70	~ 60÷70
		Self-cleaning mode	W	~ 1300	~ 1300
Electric power supply			V/Hz	230/50	230/50
Recommended fuel			Pellets, class ENplus-A1; ENplus-A2; EN-B		
Operating temperature range			°C	65 - 80	65 - 80
Operating pressure			bar	3	3
Weight: boiler, burner / fuel hopper			kg	264/71	309/71
Cold water inlet			A, mm	R1¼"/232	R1¼"/232
Hot water outlet			B, mm	R1¼"/1265	R1¼"/1265
Safety line sleeve (sensor or safety valve sleeve)			K, mm	Rp½"/1075	Rp½"/1075
Safety heat evacuator inlet / outlet			E, mm	R½"/1072	R½"/1072
Flue			F    ø	150	150
			mm	945	945
			J, mm	270	270
Flue chimney opening			O, mm	150/70	150/70
Drain			Y, mm	Rp½"/232	Rp½"/232
Ash-and-soot tray			X	✓	✓

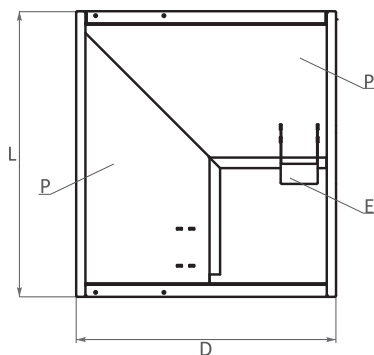
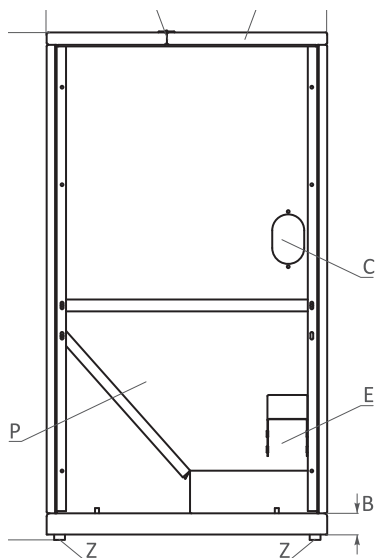
WBS - A 40 - Pell 30	WBS - A 50 - Pell 40	WBS - A 70 - Pell 70	WBS - A 90 - Pell 70
30	35	52	60
9÷32	10÷40	15÷65	18÷65
0,011÷0,025	0,007÷0,021	0,012÷0,032	0,010÷0,031
1235	1235	1385	1385
700	700	700	760
1315	1375	1495	1495
96	106	134	145
84	97	120	133
12/0,12	14/0,14	26/0,26	20/0,20
12/0,12	14/0,14	26/0,26	30/0,30
high-efficiency thermal wool high-efficiency thermal wool			
60	60	110	110
~ 400	~ 400	~ 400	~ 400
~ 60÷70	~ 60÷70	~ 70÷110	~ 70÷110
~ 1300	~ 1300	~ 1300	~ 1300
230/50	230/50	230/50	230/50
Pellets, class ENplus-A1; ENplus-A2; EN-B			
65 - 80	65 - 80	65-80	65 - 80
3	3	3	3
384/71	414/71	496/71	538/71
R1¼"/232	R1¼"/232	R1½"/232	R1½"/232
R1¼"/1265	R1¼"/1265	R1½"/1420	R1½"/1420
Rp½"/1075	Rp½"/1075	Rp½"/1225	Rp½"/1225
R½"/1072	R½"/1072	R½"/1222	R½"/1222
180	180	200	200
930	930	1065	1065
350	350	350	380
150/70	150/70	150/70	150/70
Rp½"/232	Rp½"/ 232	Rp1"/ 232	Rp1"/ 232
✓	✓	✓	✓

*Diagram 15. Dimensions of WBS Active - Pell*



### 13.3. Technical parameters of fuel hopper FH 500-V2

		<b>FH 500-V2</b>
Capacity	l	500
Max /Min wood pellets load, $\varnothing 6 \div 8$ mm	kg	280÷300 / 15
Height H	mm	1260
Width L / Depth D	mm	772 / 730
Foundation	B, mm	53
Auger mounting opening	C, $\varnothing$ mm	76
Auger holder	E	✓
Pellet-load hatch	F, mm	400 / 772
Hinges	G	✓
Inclination of guide plates	P	45°
Leveling feet	Z	✓
Weight	kg	71



## 14. RECYCLING AND WASTE DISPOSAL

Submit all packaging material for recycling according to the local regulations and requirements. At the end of life cycle of each product its components are due to be disposed of in conformity with regulatory prescriptions.

According to Directive 2002/96/EC regarding electrical and electronic equipment waste, disposal thereof is required separately from the normal flow of solid household waste. Obsolete equipment shall be collected separately from other recyclable waste containing materials with adverse effect on health and environment. Expired appliances must be collected separately from other recyclable waste

containing substances hazardous to health and environment. Both metal and non-metal parts are sold out to licensed organizations for recyclable metal or non-metal waste collection. In any case they should not be treated as household waste.









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