tPell GFX

Pellet stove controller

Version 45 *Main screen*

Content

Working with the device

User interface

The tPell GFX control module has a color capacitive touch screen, easy to operate with and perceive of the displayed information.

The display is controlled by touching virtual buttons, using sliders, sliding screens and texts. The main parameters of settings can be selected directly from main screens. Detailed information and settings are available via the main menu.

User interface components:

-  **button –** the button is activated by pressing
-  /  **switch** – by pressing it switches the options ON (switched on) / OFF (switched off)
-  **slider** – touch the button and slide it to the desired value
- scroll the content on the screen – drag on the area containing the items to move content

Main screen

This screen This screen shows the general condition of the device and allows the management of the most important parameters of the work (Fig. 1).

Operating mode:

-  ON (switched on, manual mode)
-  AUTO (switched on, automatic mode)

■ 

OFF (switched off)

Current temperature: measured temperature of the heated object
Set temperature: desired temperature of the heated object or an external thermostat if used (**ON/OFF**)
Weekly programmer: active weekly program and time of next task
Main menu button to access the **Main menu**
Errors: icon for an error, by pressing it opens a detail window
Screen Lock: the screen is locked
Wi-Fi: established connection to the server
Hopper: amount of pellets in the hopper
Power: current combustion power in kW and relative units
Clock: current time
Current condition:

	Ignition
	Heating
	Combustion
	Purge
	Extinguishing
	Cleaning
	Stand by
Empty	Rest

Switching on the device

Press the operating button to switch on / off the device.

Fig. 2 Switching on

In the window that appears, press and hold the button on the selected mode for 3 seconds to confirm your selection.

The switching between the commands ON and OFF is signaled by an audible signal.

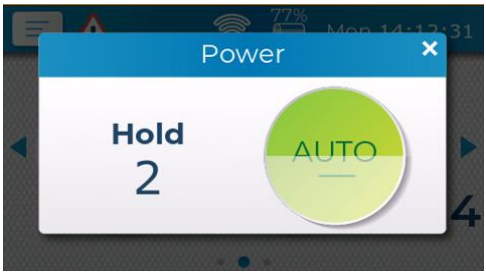

Fig. 3 Holding on

If the device is turned off **(OFF** mode) and the user has not touched the screen for 1 minute (adjustable), the clock and the current temperature are displayed. Tap the display anywhere to go to the **Home screen**.

Fig. 4 Switched off

If the screen lock is activated and the lock time has elapsed, by touching the screen a window **Enter Code** opens.

Swipe through the dots to enter the set code.

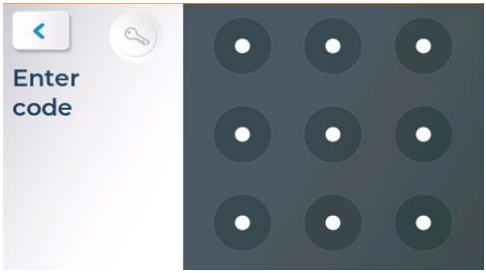

Fig. 5 Enter code

Set temperature

Press the temperature button on the main screen to set the desired temperature.

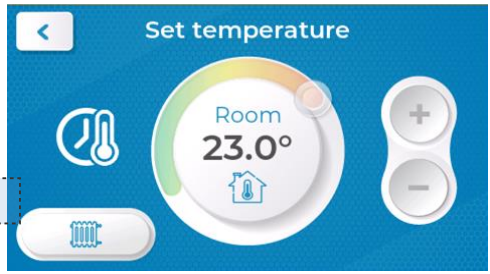

Fig. 6 Set temperature

Touch the button and slide it to the desired value. Use and for fine tuning, hold for faster change.

Depending on the setting of the device, you can change the setting temperature by pressing the icon of the heated object.

Press the **Heating Mode** button to select the heating priority (enabled only if the device is set to support DHW).

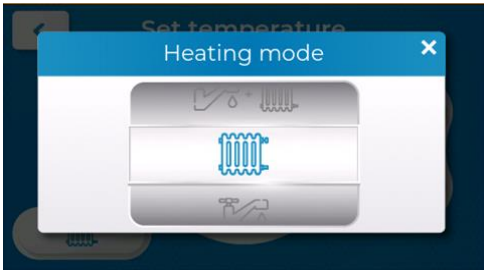

Fig. 7 Heating Mode

The active element is depicted in the middle of the wheel, swipe up / down to change the selected mode.

- **Heating** – heating circuit only
- **Domestic Hot Water (DHW)**
- **Heating + DHW** – both circuits are with equal priority
- **DHW + Heating** – DHW circuit with priority

Additional screens

Swipe anywhere on the main screen to the right or tap to go to the **Quick settings** screen (Fig. 8). Swipe left or press to go to the **Detailed information** screen (Fig. 9).

Depending on the status and settings of the device, some icons may be missing or have another form.

Quick settings

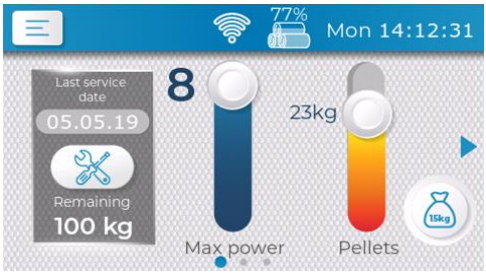

Fig 8 Quick settings

- **Maximum power**

The device modulates the power to achieve the set temperature. Maximum power can be limited (8 - maximum, 1 - minimum) by using the slider.

- **Pellets**

The fuel level in the bunker automatically decreases according to the operation of the device. Use the slider to adjust the amount of pellets or press , to increase the pellet level with 15 kg (1 bag).

- **Service**

Indicator of the remaining amount of pellets until the next service of the appliance, as well as the last date of service. In case of service, press to reset the counter and the date.

Detailed Information

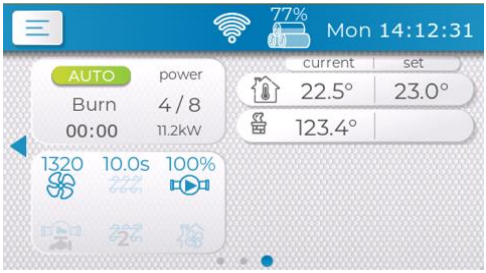

Fig. 9 Detailed information

This screen gives information about the operation of all modules of the device, as well as for the indications of all sensors.

The shown inputs and outputs depend on the configuration of the device.

Errors

If an error occurs while using the device, a window with description of the event is displayed, a repetitive beep signal sounds and the device switches to OFF mode. Closing the window stops the signal, but does not eliminate the error. Active errors are removed after switching on the device again. If the cause of the error is still present, then at the reboot error is registered again.

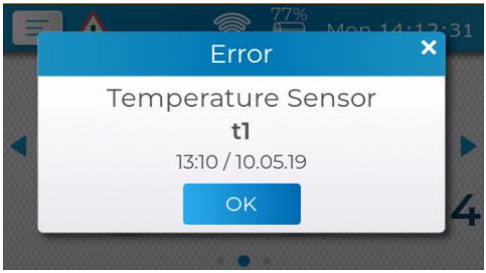

Fig 10 Error

Main Menu

Fig. 11 Main menu

The menu items are displayed as windows with an icon and description. Press the desired window to enter the screen.

Swipe over that area left / right to move visible items and reach the desired item.

The button takes one level back, and if you are in the main menu on the main screen.

General settings

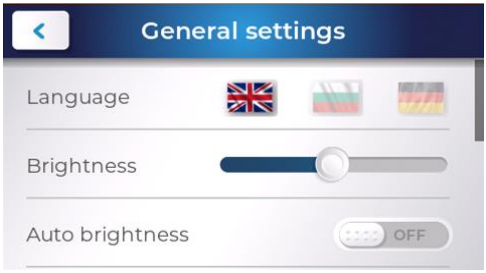

Fig. 12 General settings

- **Language** – the language of the user interface

- **Brightness** – brightness of the screen when it`s in active mode.
- **Auto brightness** – Brightness of the screen depending on the ambient light sensor. Use the **Brightness** slider to adjust the calculated illuminance.
- **Screen lock**

Set the time to display the **Device Off** screen (Fig. 4). If you allow locking, you will need to enter an unlock code.

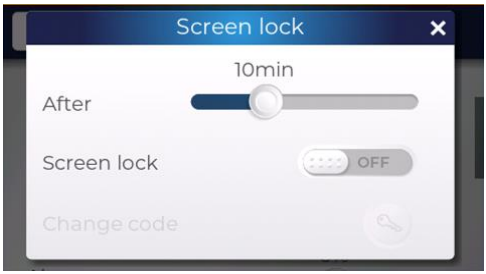

Fig. 13 Screen lock

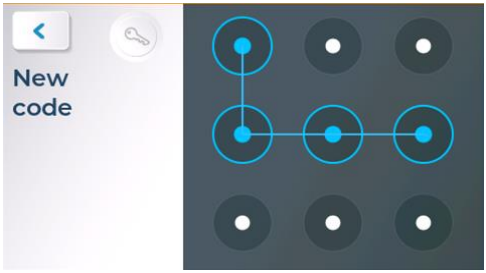

Fig. 14 New code example

The Interface is like the **Enter Code** screen (Figure 5). Enter the desired lock code and confirm it. Minimum number of points 4, maximum 9 (diagonal lines are not recommended).

- **Air** – change the fan power according to the service settings.
- **Pellets** – compensation for the pellet loading depending on their quality. Increasing or decreasing the dose in %.
- **Date and Time**

Set the date and time used by the weekly timer. The controller clock has a battery that supports it in case of power failure.

If you select the option **Automatic** and the device is connected to the internet, the clock will syncs automatically but the manual adjustment is disabled.

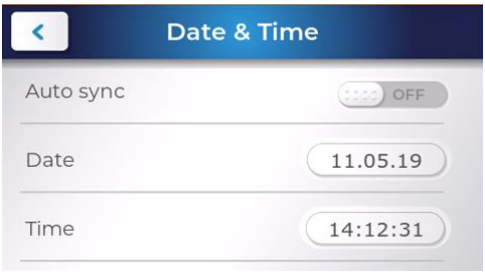

Fig. 15 Date and time

Fig. 16 Time

- **Sound signal** – adjust the volume of the sound signal, it can be turned off.

Weekly timer

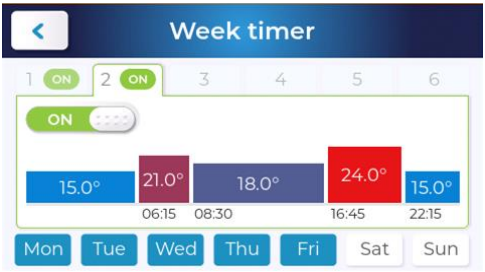

Fig. 17 Weekly timer

The weekly timer allows you to set the temperature for a certain interval of the day and a day of the week. There are 6 programs available, as each has 4 timers, which sets an hour of the day and temperature. The hour of the each timer must be greater than the previous one. The hour of the each timer must be greater than the previous one. For example, the configuration shown in **Figure 17** sets the following temperatures and periods:

- 05:00 – 08:30 22.5°C
- 08:30 – 22:30 20.0°C
- 22:30 – 05:00 OFF
- Each program can be active as well as applied to selected days of the week. In case that more than 1 program is active on a certain day of the week, the program with a larger number is with priority.

If the timers are less than 4 you can add new. Press + to open the screen **New timer**.

To edit this measure, click the colored rectangle with the temperature, a window **Edit** will open.

The **Remove** button will delete this timer.

The **OK** button saves the edited time and temperature.

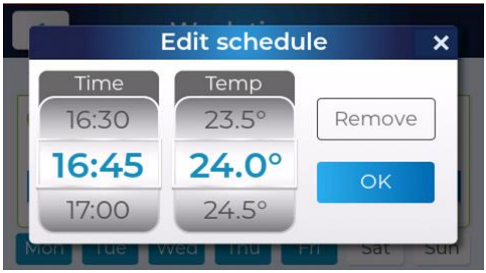

Fig. 18 Edit

Information

Fig. 19 Information

Appears information about the operation of the device:

- **`Pellets`** – counter for burned pellets from the last reset. It can be reset by pressing the text **Reset**, and after confirmation, the counter has a value of 0 and the reset date becomes the current one.
- **`Version`** – device version - control module (display)
- **`Starts`** – the number of starts
- **`Auger`** – general operation of the auger (HH:MM)
- **`Ignitor`** – general operation of the ignitor (HH:MM)
- **`General operation`** – operation of the device (DDdHH:MM)
- **`First Start`** – date of the first start

Manual feed

Fig. 20 Manual feed

An output **Auger** can be switched on manually from this screen. This is only possible if the device is in mode **OFF**.

This function is convenient when starting the device for the first time or in cases when the pellets have run out during normal operation.

If the auger is empty, press the **START** button until the pellets start to come out in the working part. If the auger is not full of fuel, the pellets will not be dosed during the ignition process, which will cause a misfire.

Events

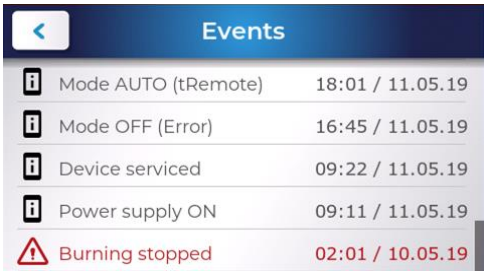

Fig. 21 Events

A list of recorded errors is displayed / actions that occurred during the operation of the devices. A maximum of 80 entries are recorded, in case of full memory the new enter is overwritten on the oldest one.

- **Errors –** The list of errors helps in diagnose a problem with the device working. The user can seek help remotely, reporting the error to the technical person, which eliminates the need of visiting.
- **Actions –** Records actions taken by the user during normal operation of the device, such as changing the operating mode, switching the device on / off and others.

Graphs

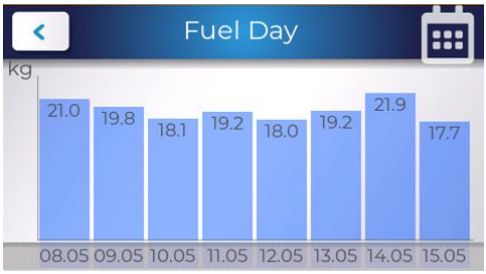

Fig. 22 Graphs

Press , to change the statistic type - for a day or a month. The kilograms of pellets consumed per day / month are shown graphically. Drag on the area containing the items to move the contents. For details view, click on the disered vertical blue element.

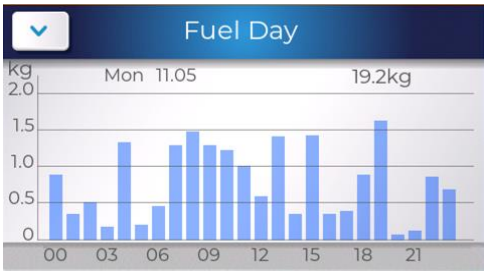

Fig. 23 Detailed view

In daily mode it shows the consumption for every hour, and in monthly mode - for every day.

At the top of the screen are displayed the date, the month and the total amount of fuel consumed for the selected period. Press to go back to the previous view.

tRemote WiFi

If you have a WiFi module installed, on this screen you can see the device's connection to the remote control system and monitoring **tRemote**.

If you are configuring your device for the first time, you need to find **WiFi Configure** mode (*see the instructions for the initial connection and work with tRemote)*.

When connected to the server, the device is in **tRemote online** mode. The attributes of the connected WiFi network are displayed, and the **tPell ID field** is the device indicator in the tRemote system. The **QR code** can be used for easy entry of the identifier in case of registration.

Fig. 24 tRemote online

The **New WiFi** button is used to set up a new WiFi network, after confirmation, the current settings are reset and the device switches to **WiFi Configuration** mode.

Service menu

Attention! Use only from a specialist! Improper parameter changes in this menu can stop the normal operation of the device and cause dangerous situations!

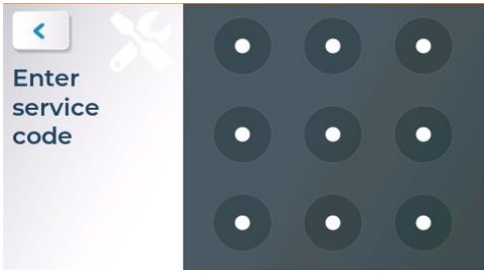

Fig. 25 Service code

This menu is password protected.

Entering a password is like on the **Enter Code** screen, see Figure 5.

Working principle

Operating mode

According to the mode, the device goes through certain states so that it reaches the final status of the mode. When changing the mode, depending on the current state, it switches through a sequence of actions ensuring proper ignition or extinguishing.

The boiler pump runs whenever the conditions for its inclusion are met, without importance of the mode of operation. The only exception is the case when the DHW pump is activated and the temperature of the heated object is reached, as then the boiler pump switches off.

ON / AUTO– Switched On

Final state: *Burning*

Upon reaching the Burning state, the process is managed so as to provide the necessary heat energy.

The difference between automatic AUTO and manual ON mode is in the way the set temperature is determined. In automatic mode, the weekly timer or the external thermostat are used, while in manual mode the user sets the desired temperature.

OFF – Switched Off

Final state: *Rest*

If there has been combustion, the device goes through the steps on extinguishing, so that the cessation of combustion is safe.

Conditions

The process of the device operation consists of the following sequence of states:

1 Cleaning
2 Ignition
3 Heating
4 Combustion
    4.1 Purge
5 Extinguishing
6 Cleaning
7 Standby

In all conditions, the occurrence of errors is monitored (by sensors) and when an error is detected, the combustion process stops, turning off the device in the specified order.

Cleaning

When cleaning, the cleaning mechanism is activated for a fixed set time. Cleaning up is performed when the device starts and stops.

Ignition

Fills a certain amount of fuel and activates the ignitor. You need to wait for the refueled fuel to get ignited by monitoring the temperature of flue gas or flame strength (depending on settings). If the device is successfully ignited it passes to the next state. If the time for ignition overdue, the ignition process is restarted by refueling 50% less. A set number of ignition attempts are made then the device switches to extinguishing and saves error.

Heating

The combustion is expected to stabilize. The flue gas temperature must exceed a set threshold or the flame power must be stable for a certain time above the limit value. In the meantime, more fuel is being supplied. If no stable ignition is observed for the permitted ignition time, the device proceeds to the next ignition attempt.

Combustion

Once stable combustion is detected, it switches to combustion mode. The power (combination of supply air and fuel) is determined by the control algorithm according to the set temperature (s) and / or external thermostat. Changing the power also changes the generated heat energy to meet the current needs of the heating system.

The burning process can be interrupted in the following cases:

- By user: from the main screen.
- Cleaning timeout: if periodic cleaning is set, the device switches to stop, then restarts.
- No need to be heated: after the combustion has been at minimum power for a certain period of time or the regulated temperature has been exceeded, the device switches off and goes into Standby mode.
- Loss of flame: it depends of flue gas temperature or if the flame light is below the set thresholds. The device records an error.

Purge

Periodically, during burning, a purge is triggered, lasting a fixed time. The fuel suppling stops and the amount of air changes, thus the device cleans the combustion chamber. After the time expires, it returns back to Burning.

Extinguishing

The fuel supplying stops. The fan supplies air according to the extinguishing setting. Wait for the remaining fuel to burn, making sure that the flame detector passes below the extinguishing threshold (flue gas temperature or flame force). After extinguishing, switch to the Cleaning state.

Standby

The appliance is waiting for the need to heat the heated object (s). In case all of the set temperatures are higher than the current ones (active external thermostat), you need to wait for the configured time to expire, after which the burning starts in the established order.

Service parameters

Structure

- Basic
- Boiler / Room fan
- DHW
- Hardware
- Temperature Control
- Protection
- Fuel
- Cleaning
- Ignition
- Heating
- Combustion
- Extinguishing
- Purge
- Light Calibration
- Change Password
- Stop Work
- Output Test
- Reset

Menus with parameters

The table describes the parameters in the service menu. They are divided into sub-menus described in the **Menu** column in the table.

The power of the combustion fan is set as a percentage of maximum rotation speed, as 100% = **Fan Max**, and 0% = 0 rpm.

The fuel supply time is set directly in seconds with an accuracy of 0.1 sec, and the pause time is determined by the total period, as the sum of work + pause is equal to the **Auger Period**.

Menu	Parameter	Description
Basic		
	Auger Period	Total time (work + pause). **Auger** = work.
	Auger Power	Auger output power.
	Auger brake	Number of AC periods for brake application. Minimum value of the parameter OFF.
	Fan Max	Maximum rotation speed of the combustion fan.
	Fan poles	Number of pulses of the fan encoder at 1 rotation. Minimum value OFF – the rotation speed monitoring is off.
	Burning presence	Method of recording combustion: ■ Light: Opto-sensor for monitoring the intensity of the flame light ■ Gas: Flue gas temperature
	Heating type	■ Water: appliance with back boiler, all inputs and outputs allowed ■ Air: appliance with room fan ▹ forbidden outputs: **Auger2, DHW** и **Cleaning** ▹ forbidden inputs: **H20**, **DHW**, **Light**

Menu	Parameter	Description
Boiler / Room fan According to the parameter **Heating type** the menu refers to: • **Boiler**: water pump, contrelled by **H2O** temperature • **Room fan**: room fan, controlled by flue gas temperature		
	Min temperature	Minimum threshold temperature for switching on the pump.
	Hysteresis	Hysteresis for switching on and off the pump. Switch-on temperature = **min temperature** + **Hysteresis**. Switch-off temperature = **min temperature** - **Hysteresis**.
	Modulation	Enable heat exchanger pump modulation.
	Modulation range	Operating temperature range in which the pump power is modulated proportionally according to **min power** *И* **max power**.
	Min power	Minimum modulation power of the pump, at the heat exchanger temperature <= **min temperature**.
	Max power	Maximum power of modulation of the pump, at temperature of the heat exchanger >= **min temperature** + **modulation range**.
DHW		
	Min temperature	The minimum threshold temperature for switching on the DHW pump.
	Delta temperature	The boiler temperature must be higher than the DHW temperature with the set degrees in order to activate the DHW pump.
	Hysteresis	Hysteresis for switching on and off the DHW pump. Switch-on temperature = **Min temperature** + **Hysteresis**. Switch-off temperature = **Min temperature** - **Hysteresis**.
	Waiting for DHW ON	Temperature difference below the set temperature to exit **Standby.**

Menu	Parameter	Description
	Waiting for DHW OFF	Temperature difference above set temperature to enter **Standby.**
	Low priority	In heating mode **Heating+DHW** the DHW pump is not activated until the main heating circuit reaches the set temperature.
Hardware		
	DHW	Complete resolution of DHW functionality.
	Auger 2 Output	Function of the output **Auger 2**: ■ OFF: It is not used. ■ Alarm: Triggered in the event of an error. ■ Feed: Refueling outlet. ■ Auger2: Second auger.
	Output cleaning	Function of the output **Cleaning**: ■ Cleaning: Cleaning mechanism that is activated during the Cleaning state. ■ Chimney: Chimney fan, which is activated whenever the main fuel fan is active.
	Chimney fan	Power as a percentage of the Clean output when configured as a chimney fan.
	Level input	Function of the input Level: ■ OFF: It is not used. ■ Pellets: Pellet level in the hopper. ■ Cleaning: Position of cleaning mechanism. ■ Pressure: Chimney pressure switch error, input **E2** (see manu **Protection**).
	Refueling	Operating time at the refueling outlet when the pellet level in the hopper is low.

Menu	Parameter	Description
Temperature control		
	Thermostat	Control the thermostat according to: ■ Room: Room temperature. ■ Boiler: Back boiler temperature. ■ External NO: External Normally Open Thermostat. ■ External NC: External Normally Closed Thermostat.
	Waiting time ON	Time, required for switching from **Standby** to **Combustion** state. If the device is in **Standby** mode and needs to be heated for a longer time than the set one, the ignition procedure is activated.
	Waiting time OFF	Time, required for switching from **Combustion** to **Standby** state. If the appliance is in the **Combustion** state and operates at minimum power for a longer time than the set one, the extinguishing procedure is activated.
	Waiting temperature ON	Difference between the current and set temperature, below which the device immediately switches from **Standby** to **Combustion** state.
	Waiting temperature OFF	Difference between the current and set temperature, above which the device immediately switches from **Combustion** to **Standby** state.
	Boiler waiting	Exceeding the set boiler temperature by the set degrees triggers a switch to **Standby**.
	Power levels	Number of power levels. The maximum power change step is 2. Increasing this parameter makes power modulation smoother and decreasing it - sharper.

Menu	Parameter	Description
	Fuzzy period	Calculation period for power change. The more inert the regulated object, the longer the period should be and vice versa. If the operating power fluctuates between extreme positions when the set temperature is reached, increase the period. If the set temperature is greatly exceeded, reduce the period.
	Flue gas temperature	The power is modulated according to the set temperature so that the flue gas temperature does not exceed the parameter.
Protection		
	Gas Max	Maximum flue gas temperature above which an error *Overheating Gases* is registered (if flue gas monitoring is used).
	Boiler max overheating	Maximum boiler temperature above which an error *Overheating Water* is registered.
	E1 switching to Cleaning	Direct switching to state **Cleaning** in case of error at input **E1**.
	E2 Time	Time for active level at error input **E2** for registering an error.
	E2 inverted	Inverting the active state at the error input **E2** (normally closed sensor).
	Recovery	If the power supply is interrupted for less time than the set one, then when the power is restored, the controller returns to the state **Combustion**. Otherwise, it switches to the **Extinguishing** state, and Power supply error is registered according to the parameter Power Error.

Menu	Parameter	Description
	Power Error	Whether to register an error under the conditions described for the **Recovery** parameter. Error registration changes the mode to OFF.
Fuel		
	Auger flow	Fuel feeder capacity - the amount of pellets fed per minute.
	Hopper volume	Volume of the hopper for calculating the fuel level.
	Service	Quantity of burned pellets, after which the device must be serviced.
	Heating value	Fuel energy in **kWh/kg**
	Show KW	Allow the user to display the current power in absolute (kW) units.
Cleaning		
	Period	Burning time, after which the device is switched off, cleaned and re-ignited. *Minimum value of the parameter OFF.*
	Fan	Fan power in Cleaning state.
	Time ON	Duration of the Cleaning status when the device is switched on.
	Time OFF	Duration of the Cleaning status when the device is switched off.
	Exit	Operating time of the cleaning mechanism. *Minimum value of the parameter OFF.*
Ignition		
	Time	Ignition Attempt Time includes the total time for the states Ignition and Heating. After the time expiration, it proceeds to the next ignition attempt.
	Attempts	Number of attempts, then an error *Ignition* is registered.
	Fan	Fan power in state *Ignition*.
	Refueling	Auger operation time when loading pellets.
	Gas delta	Flue gas temperature relative to the start of ignition above which ignition is considered.
	Auger 2:1	Work in percentages of Auger 2 according to the main auger. At 200% Auger 2 will work 2 times more than the main auger.

Menu	Parameter	Description
Heating		
	Fan	Fan power during state Heating.
	Auger	Auger operation during state Heating.
	Gas Combustion	The temperature of the flue gases, for switching to state Combustion.
	Light Level	Light sensor level above which ignition is considered.
	Light Time	Time during which the level of the light sensor is constantly above Light time, then the Ignition state ends.
	Ignitor	Time during which the lighter remains switched on in state Heating. Minimum value of the parameter OFF.
Combustion		
	Min Fan	Fan rotation speed at minimum power operation.
	Min Auger	Auger operation at minimum power operation.
	Max Fan	Fan rotation speed at maximum power operation.
	Max Auger	Auger operation at maximum power operation.
	Auger 2:1	Operation in percentages of the Auger 2 according to the main auger. At 200% Auger 2 will work 2 times more than the main auger.
Extinguishing		
	Fan	Fan power in Extinguishing state.
	Light Level	Light sensor level below which starts counting the time Light time.
	Light Time	Time during which the level of the light sensor is constantly below Light Level, then the Extinguishing state ends.
Purge		
	Period	Operating time in state Combustion, then it proceeds to state Purge. Minimum value of the parameter OFF.

Menu	Parameter	Description
	Time	Duration of state Purge/Blowing.
	Fan	Fan power in state Purge/Blowing.
	Clean period	Time for periodic activation of output Cleaning.
	Clean time	Duration of activation of output Cleaning.

Additional menus

Light Calibration

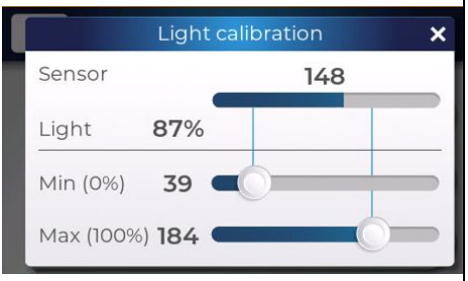

Fig. 26 Light Calibration

From here you can set the minimum and maximum value of the light sensor in absolute units (from 0 to 255), corresponding to the input voltage of the light sensor (I1), against which the relative illuminance is calculated as a percentage (0% = **Min**, 100% = **Max**).

The screen consists of the following:

- **Sensor**: indication of the input of the light sensor at the moment (absolute value)
- **Light**: calculated value in percent (relative value)
- **Min**: slider to adjust the value for minimum illumination (0%)
- **Max**: slider to adjust the value for maximum illumination (100%)

Password change

The password for accessing the service menu can be changed from here. A current password is required. The new password must be entered in the same way two times in a row in order to be accepted and saved.

The interface is the same as in the password entry menu to access the service menu.

Stop Work

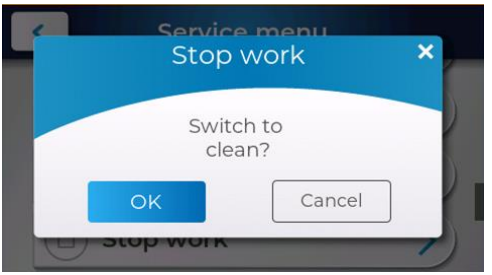

Fig. 27 Stop Work

The operation of the device can be stopped directly, without the need to wait for the conditions to turn off and go to rest. If the device is running, it first goes into the Cleaning state, and if the operation is repeated, the device goes into state **OFF**.

Output test

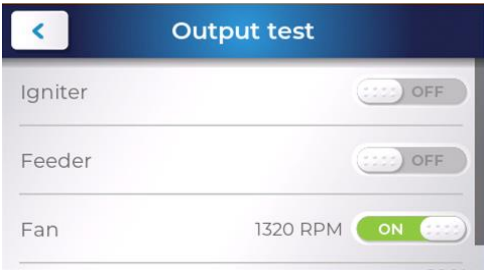

Fig. 28 Output test

Attention! Improper use of the controller outputs can cause a dangerous situation!

Each of the controller outputs can be operated manually. The menu is only available if the controller is state OFF and does not perform any operation.

- **Fan**: Rotation speed per minute measured by the speed sensor (I2). Testing the sensor and determine the maximum fan speed.
- **Pump** and **Cleaning**:

Use the slider to modulate the output power.

Reset

Ability to reset system counters, event list and restore factory settings. Press the appropriate button and confirm to perform the action.

Errors

In case of an error, the device switches off if it is in the Combustion state.

The exception is the **Overheating Hopper** error. When it occurs, it goes directly to the Cleaning state, even if the device is in OFF mode.

Possible errors:

- **Temperature sensor**: Temperature sensor (t1 to t4) interrupted or broken (according to the error description).
- **Ignition**: Ignition failure.
- **No pellets**: The pellet level sensor has detected the depletion of fuel and the refueling time has expired.
- **Cleaning**: The cleaning mechanism is not in the correct position.
- **Stop combustion**: In the Combustion state, flame loss is reported according to flue gas temperature or light level.
- **Power Supply**: Power is interrupted for a longer time than the set recovery one.
- **Fan**: Fan rotation speed reading problem - check the fan or living room rotation speed sensor.
- **Locked auger**: The current amperage, consumed by the auger has exceeded the set limit.
- **Overheating**: Overheating of one of the following modules was reported (according to the error description):
  - **Water**: heat exchanger temperature above the maximum.
  - **Gas**: flue gas temperature above the maximum.
  - **Hopper**: error input signal **E1**.
- **Flue gas pressure**: An error input signal is reported **E2**.
- **Clock**: Error in the timer module. Does not cause the device to switch off.

Actions

Possible actions:

- **Power supply ON**: Turn on the power.
- **Power supply OFF:** Turn off the power.
- **Mode ON:** Switching the device to mode ON.
- **Mode AUTO:** Switching the device to mode AUTO.
- **Mode OFF:** Switching the device to mode OFF.
- **Service Menu:** Access to the service menu.
- **Service:** Performed service.

Temperature Control – Fuzzy Logic Algorithm

The aim of the algorithm is to reach the set temperature as quickly as possible and, after reaching it, the stable maintenance.

Temperature control is applied at discrete periods, and the reaction rate changes depending on the frequency. Correction of the current power is periodically calculated, as the time is set by the parameter **Temperature control / Fuzzy period**. Too frequent adjustments lead to work in extreme positions, so it is important that the reaction rate is consistent with the inertia of the heated object. In the opposite case, the set temperature is usually exceeded.

Power modulation is performed with a resolution of 0.1 units, and the number of power units is set by the parameter **Temperature control / Power levels**. The maximum power change that is applied is limited to 2.0 units, so the greater number of modulation steps corresponds to a smoother change of power over the entire range - from minimum to maximum.

For each monitored temperature (room, water, DHW and flue gases, each having a corresponding set temperature) a power correction is calculated. Of all corrections the one with the minimum value is used, thus no

exceeding of the set temperatures is allowed.

Connection scheme

The connection of an external main circuit breaker and controller power fuses for L (phase) and N (zero) is mandatory and must be in accordance with the total consumption of all modules!

The body of the appliance, as well as all aggregates must be earthed. (PE)!

Inputs		
Pt1000	**t1 / tFumes**	Temperature sensor flue gas
NTC 10K	**t2 / tH2O**	Temperature sensor heat exchanger
NTC 10K On – Off	**t3 / tRoom**	Temperature sensor room temperature Room thermostat
NTC 10K	**t4 / tDHW**	Temperature sensor DHW
Photo element	**i1 / Opto**	Light sensor for flame intensity
Active level **GND**	**i2 / RPM**	Sensor for reading the rotation speed of the combustion fan
	i3 / Level	Pressure switch **e2** Pellet level sensor / position of the cleaning mechanism
Opto-isolated input for 230V AC	**e1 / Error**	Reverse combustion error (hopper overheating)
230V 50Hz	**N~L**	Power supply, internal fuse 6.3A
	PE	Earthing terminal
Outputs		
Relay	**LIGHTER**	Ignitor
Triac	**FEEDER**	Main auger (fuel feeder)
	FEEDER 2	Internal auger
	FAN	Combustion fan
	PUMP	Heat exchanger pump (water pump / fan)
	DHW	DHW pump
	CLEANER	Cleaning / Chimney fan
Display		
Connect the display cable to the RJ connector socket.		

Fig 29 Connection scheme

Installation

The control module can be mounted by using the plastic dowels provided in the set.

Fig 30 Control module

The display is mounted on a panel with a rectangular hole, with dimensions 121 x 79 mm (Fig. 31) and thickness of 1 to 3 mm. Fixing is done by pressing until the periphery leans on the surface, with the side teeth locking the box.

Fig 31 Display module

Technical data

Power supply voltage	230 V, 50 Hz
Consumption of the controller	4.5 VA
Total output amperage	6.3 A
Operation temperature	0 ... 40 °C
Protection rate	IP 20
	Control 112 x 97 x 28 mm
Dimensions	Display 126 x 84 x 18 mm
Display	TFT IPS 4.3” 480x272 px
Thermo probe Pt1000	-40 ... 250 °C
Thermo probe NTC	-40 ... 125 °C

Warranty

The duration of the warranty is 24 months from the date of sale. The guarantee is considered invalid under the following conditions:

- Improper connection
- Attempts to repair and / or modify by the customer
- Visible damage to the body and / or interior of the product
- Damage caused by thunderstorms and / or electric shocks
- Use in unacceptable conditions / temperature and humidity /

The elimination of factory defects during the warranty period does not lead to its extension.

In case of failure, the product should be sent to the service of Balkan Energy.