

tPelL GFX

Pellet Stove Controller



technogamma

Contents

Using the device	3
User interface.....	3
Main screen.....	3
Turning on the device.....	4
<i>Set temperature</i>	4
Additional screens.....	5
<i>Quick settings</i>	5
<i>Detailed information</i>	5
<i>Errors</i>	5
Main menu.....	5
<i>General settings</i>	6
<i>Week timer</i>	7
<i>Information</i>	7
<i>Manual feed</i>	7
<i>Events</i>	8
<i>Chart</i>	8
<i>tRemote WiFi</i>	8
<i>Service Menu</i>	8
Principle of operation	9
Work mode.....	9
<i>ON / AUTO</i>	9
<i>OFF</i>	9
States.....	9
<i>Clean</i>	10
<i>Ignition</i>	10
<i>Kindle</i>	10
<i>Burn</i>	10
<i>Purge</i>	10
<i>Shutdown</i>	10
<i>Wait</i>	10
Service parameters	11
Structure.....	11
Parameter menus.....	11
Additional menus.....	16
<i>Light calibration</i>	16
<i>Change code</i>	16
<i>Stop work</i>	16
<i>Output test</i>	16
<i>Reset</i>	16
Errors.....	16
Actions.....	17
Temperature Control – Fuzzy Logic algorithm.....	17
Connection diagram	18
Assembly	20
Technical data	21
Limited Warranty	21


Using the device


User interface

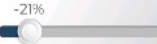
tPell GFX is intuitive and easy to operate, thanks to its color capacitive touch screen.

Interaction with the display is achieved by touching virtual buttons, dragging sliders, screens and texts. Basic settings parameters can be selected directly from the main screens. Detailed information and settings are available through the main menu.

User interface components:

-  **button** – touching the button activates its function

-  **switch** –touching it toggles the state between ON (active) / OFF (inactive)



-  **slider** – touch the knob and by sliding it, set the desired value

- scrolling screen content – touch and slide over the components area in order to move the content

Main screen

This screen shows the general status of the device and gives access to the most important device controls (Fig 1).

Mode:

-  ON (manual mode)
-  AUTO (automatic mode)

-  OFF

Current temperature: the measured temperature of the heated object

Temperature set point: desired temperature of the heated object (room or water) or an icon for the state of external thermostat (**ON** or **OFF**)

Week timer: current week program and time for the next temperature set

Main menu: button to access the **Main menu**

Errors: icon, indicating an error has occurred, pressing it opens detail window

Locked screen: the screen is locked








Wi-Fi: server connection status

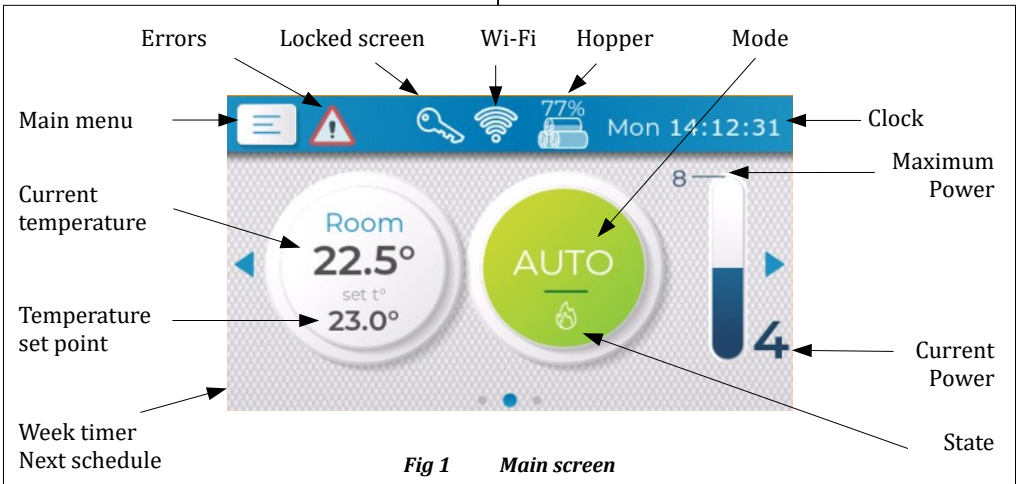
Hopper: pellet level in the hopper

Current Power: the current operating power when burning in kW or relative units.

Clock: show the current time and day of week

Current state:

-  Ignition
-  Kindle
-  Burn
-  Purge
-  Shutdown
-  Clean
-  Wait
- Empty Idle



Turning on the device

Press the mode button to turn the device on or off.

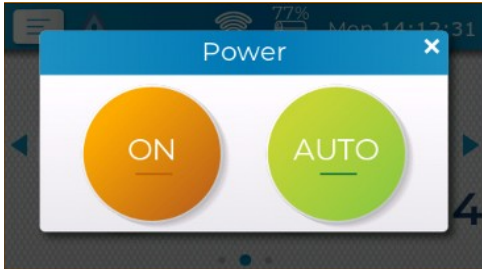


Fig 2 Turning on

On the window that appears, press and hold the button for the selected mode for 3 seconds to confirm your choice.

A sound signal is made to confirm that the command is accepted.

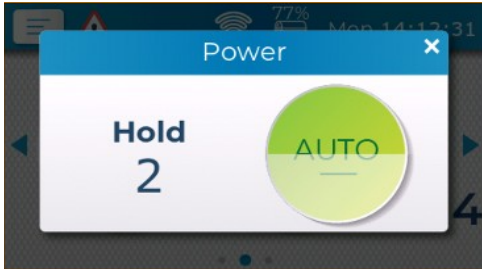


Fig 3 Hold

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

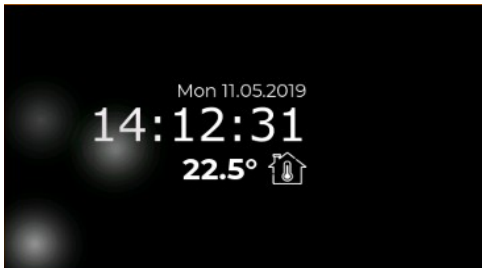


Fig 4 Device turned off

If a screen lock is enabled and the lock time has expired, a tap will open the **Enter Code** screen. Swipe the dots sequentially to enter the access code.

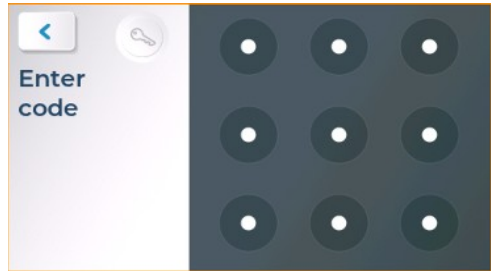


Fig 5 Enter code

Set temperature

Press the temperature button from the main screen in order to adjust the desired set temperature.

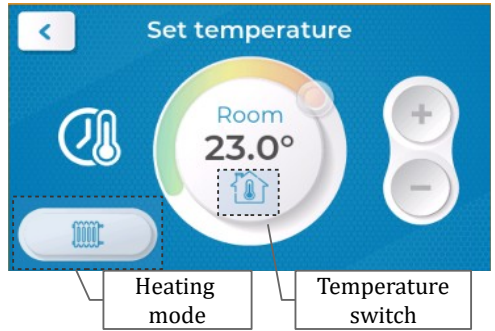





Fig 6 Set temperature

Press the knob  and slide it to the desired position. You can use the buttons  and  for precise adjustment, hold for faster modification.

Depending on the device configuration, you can change the set temperature type by tapping the icon of the heated object.

Press the **Heating mode** button to choose the heating priority (enabled only if the device is configured with DHW support)

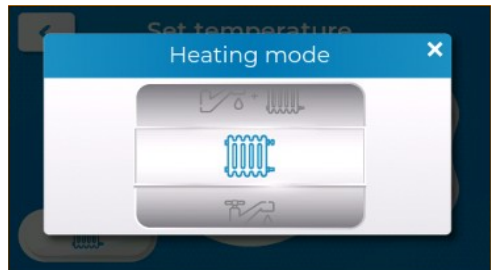








Fig 7 Heating mode

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

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

Additional screens

Touch and slide left anywhere on the main screen or press  to access **Quick settings** (Fig 8). Slide right or press  to access **Detailed information** screen (Fig 9).

The screen may look different, some icons may be missing or different, depending on the state and settings of the device.

Quick settings




Fig 8 Quick settings


■ Max power

The device modulates the power to achieve the temperature set. You can limit the maximum power (8 - maximum, 1 - minimum) with the slider.

■ Pellets

The pellet level in the hopper is automatically reduced, depending on the device consumption. Use the slider to adjust the fuel quantity or press  to increase the pellet weight in the hopper with 15 kg (1 bag).

■ Service

Indicates the remaining pellets up to the next device servicing, as well as the last service date. When the device is serviced, press  to reset the counter and the date.

Detailed information

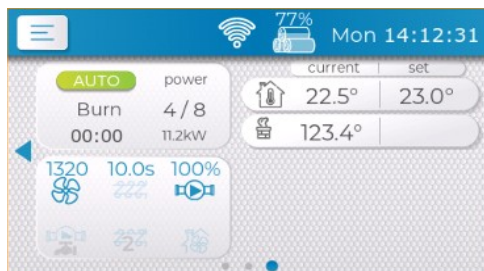


Fig 9 Detailed information

This screen provides information about the working state of all device's module along with the readings of all sensors.

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

Errors

If an error occurs while the device is operating, a pop-up window is displayed with the event description and periodic beeping sound is made. The device transitions to **OFF** mode. When the window is closed, the sound is stopped, but the error is not cleared. The active errors are cleared after the device is turned on again. If the error cause is still present, then the error is registered again.

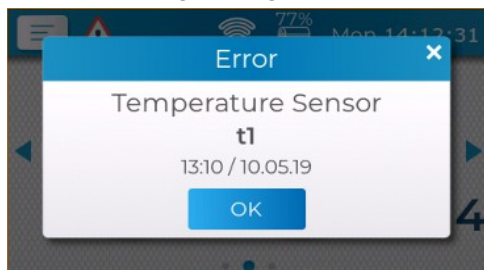


Fig 10 Error

Main menu

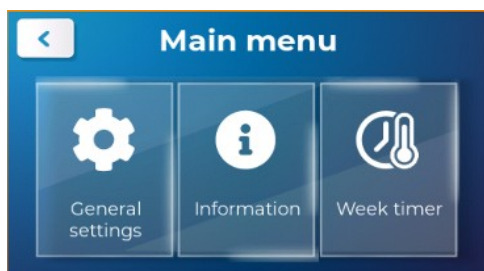



Fig 11 Main menu

The menu elements are depicted as tiles with icon and description. Press the desired tile to enter the desired screen.

Slide the tile area left / right to move the visible elements and browse the available items.

The button  returns to previous screen and to main screen if you are in the main menu.

General settings

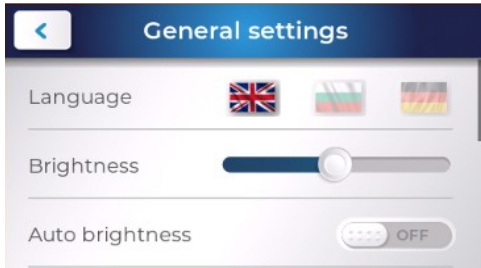


Fig 12 *General settings*

- **Language** – user interface language
- **Brightness** – screen brightness in active mode
- **Auto brightness** – the screen brightness is adjusted according to the readings of the ambient light sensor. Use the slider **Brightness** to tune the calculated brightness.
- **Screen lock**

Adjust the time after which the **Device turned off** screen is shown (Fig 4). If you enable screen lock, you will need to enter unlock code.

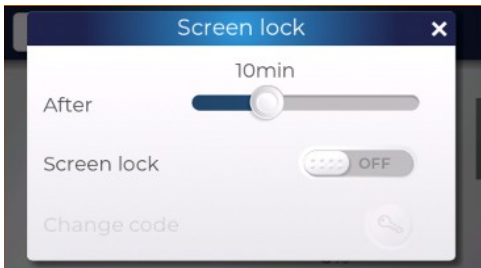


Fig 13 *Screen lock*

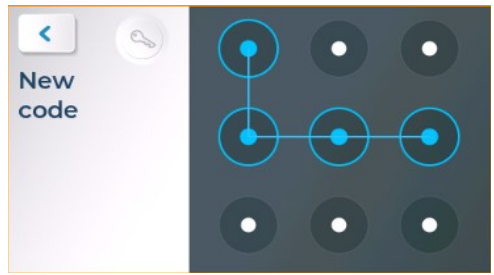


Fig 14 *New code example*

The user interface is like screen **Enter code** (Fig 5). First enter desired lock code, then confirm it. Minimum numbers of dots is 4, maximum is 9 (*diagonal lines are not recommended*).

- **Air** – adjust the main fan power based on the service settings.
- **Pellets** – adjust the pellet feeding, depending on the quality of the fuel. Increase or decrease the quantity in percent.
- **Date & Time**

Set the time and date that are used for the week timer schedules. The controller's clock has a built in battery, which keeps it running if the power is cut.

If you select **Auto sync** option and the device is connected to Internet, then the clock will be automatically synchronized, but manual adjustment is disabled.

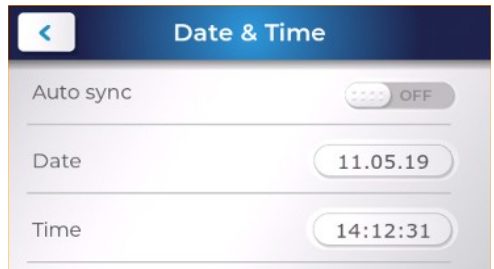


Fig 15 *Date & Time*

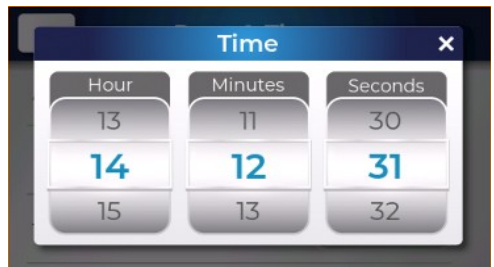


Fig 16 *Time*

- **Beeper volume** – adjust the sound signalization volume, beeper can also be turned off.

Week timer

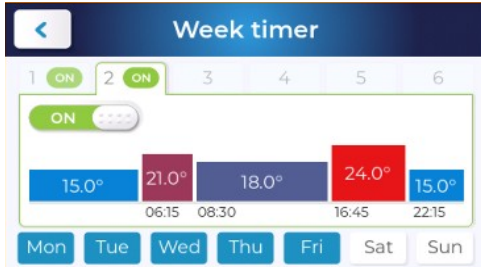


Fig 17 *Week timer*

The week timer can be used to set desired temperature for a particular time period of the day and day of the week. There are 6 programs available, each having 4 schedules with time of day and set temperature. The time of each consecutive schedule should be after the previous one.

For example the configuration shown on Fig 17 specifies the following temperatures and times:

- **05:00 - 08:30** **22.5° C**
- **08:30 - 22:30** **20.0° C**
- **22:30 - 05:00** **OFF**

Each program can be active and applicable to selected days of the week. In case more than one program is active for a particular week day, the priority has the one with bigger number.

If the schedules are less than 4 you can add additional one. Press **+** to open **New schedule** window.

Edit a schedule by touching the colour temperature tile, which opens **Edit schedule** window.

Button **Remove** deletes the schedule.

Button **OK** saves the edited time and temperature values.

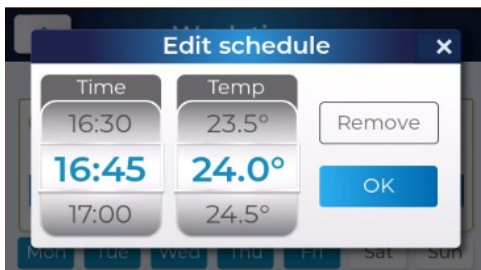


Fig 18 *Edit schedule*

Information



Fig 19 *Information*

Detailed records about the device usage:

- **Pellets** – counter for the pellets burned since the last reset. In order to reset the counter, press **Reset**, after confirmation the counter value is 0 and the date is set to the current one.

- **Version** – firmware version in the format – control module (display)

- **Starts** – lifetime starts counter

- **Feeder** – total work time of the feeder (HH:MM)

- **Igniter** – total work time of the igniter (HH:MM)

- **work total** – work time of the device (DDdHH:MM)

- **First start** – date of the first start

Manual feed

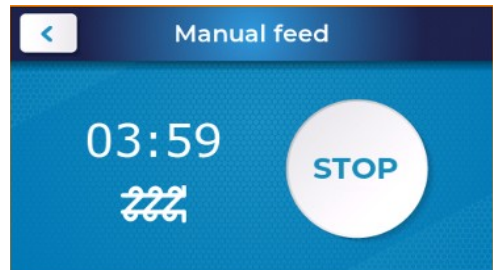


Fig 20 *Manual feed*

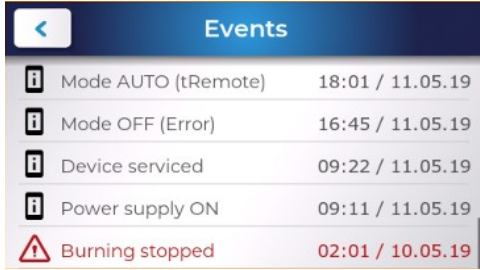
From this screen you can manually operate the **Feeder**. This is only possible if the device is in **OFF** mode.

This function is suitable to fill the feeder mechanism in case of first time device operation or in case the pellets are out during regular operation.

If the feeder is empty of pellets, press the button **START** and wait until pellets start popping out to the burning chamber. If the feeder is not filled with pellets, then during the ignition phase the pellet dose

will be smaller, which will probably lead to failed ignition attempt.

Events



Event	Time	Date
Mode AUTO (tRemote)	18:01	11.05.19
Mode OFF (Error)	16:45	11.05.19
Device serviced	09:22	11.05.19
Power supply ON	09:11	11.05.19
Burning stopped	02:01	10.05.19

Fig 21 Events

List of all the logged errors and events recorded during the operation of the device. A maximum of 80 records are stored and the oldest one is overwritten when the memory is full.

- **Errors** - The error list is helpful to diagnose the problem cause during device's operation. The user can remotely try to resolve the issue by reporting the error to the technical support and this way save service technician visit.
- **Actions** - User actions are recorded like mode switching, powering on / off, etc.

Chart

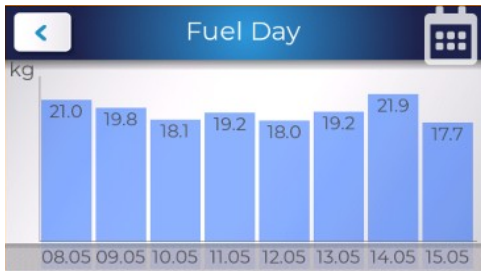




Fig 22 Chart

The fuel burned during device operation is recorded and visualized by bar type chart. The data is recorded for daily and monthly intervals. Swipe the chart area to scroll and press a bar to open a detailed view of the selected period.

In detailed view, the daily period is an hour, as in monthly period is a day. In the top part of the view you can find the date / month and the total fuel spent for the selected period. press  to get back to the previous view.

Press  to toggle the chart type - daily or monthly.

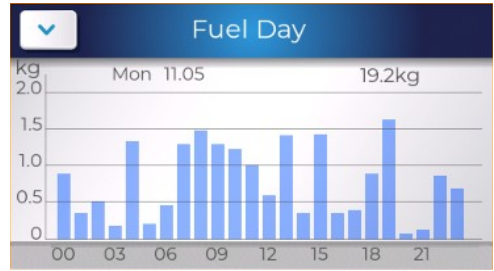


Fig 23 Detailed view

tRemote WiFi

This screen shows the current state of the WiFi module and if the device is connected to the remote control and monitoring system **tRemote**.

If you are configuring your device for first time, then it will be in **WiFi Configure** mode (see the *tRemote setup and operation manual for more details*).

When there is stable connection with the server, then the state displayed is **tRemote online**. The parameters of the connected WiFi network are shown and the field **tPell ID** is the device identifier used in the remote system. Use the QR code to enter the device identifier easily during the registration process.



Fig 24 tRemote online

Use the button **New WiFi** to setup a connection to new WiFi network. After confirmation, the current settings are reset and the device goes to **WiFi Configure** mode.

Service Menu

Warning! This menu should be used only by authorized personnel! The improper modification of parameters in this menu can hamper the correct device operation and lead to dangerous situations!

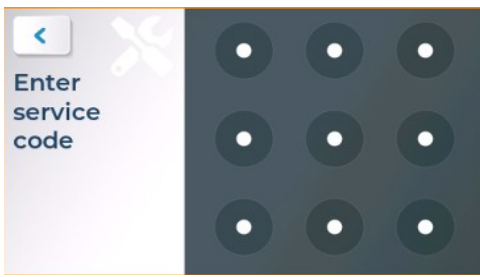


Fig 25 Service code

This menu is protected by code.

Enter the code as it is described on screen **Enter code** see Fig 5.

Principle of operation

Work mode

Depending on the mode, the controller goes through series of states, so it reaches the final state for the mode. Changing the mode, makes the controller enter sequence of states, guaranteeing the correct power up or shutdown.

The boiler pump is always active, as long as the conditions for its operation are met, independent of the current mode. Exception of this rule is the case of working DHW pump and temperature of the room being reached, then the boiler pump is turned off.

ON / AUTO

Final state: Burn

When Burn state is reached, the process is controlled so that the heat needed by the system is generated.

The difference between automatic AUTO and manual ON mode is the way of determining the temperature set point. In automatic mode, the week timer or the external thermostat is used, as in manual, the user manually sets the desired temperature, ignoring the week timer or external thermostat.

OFF

Final state: Idle

When the mode is set to OFF the device will safely discontinue burning and will reach the Idle state. The system will not automatically turn itself from OFF to ON mode.

States

The state sequence is as follows:

- 0 Idle
- 1 Clean
- 2 Ignition
- 3 Kindle
- 4 Burn
 - 4.1 Purge
- 5 Shutdown
- 6 Clean
- 7 Wait

An ongoing error monitoring (sensors or state specific) is performed during operation in all states. When an error is detected, the burning is discontinued in the appropriate sequence.

Clean

When cleaning, the cleaner mechanism is activated for a fixed time. The cleaning is performed when the device is powered on and off.

Ignition

A preset quantity of fuel is loaded and the lighter is activated. The device waits until the fuel is ignited by monitoring the temperature of flue gases or the flame intensity (depending on configuration). On successful ignition, it passes to the next state. If the ignition time runs out before ignition is detected, then another attempt is made, restarting the ignition process and loading 50% less fuel. When the maximum number of attempts is reached, the controller shuts down, and registers an error.

Kindle

Waiting for the burning process to stabilize. The flue temperature should raise over a set threshold or the intensity of the flame should be stable for a time above a set threshold. Meanwhile fuel is being periodically fed (if configured). If the ignition time expires and no stable burning is detected, then a next ignition attempt will be committed.

Burn

After a stable burning is detected, the controller goes to burning state. The power (combination of supplied air and fuel) is determined by the control algorithm according to temperature(s) set point and / or external thermostat. By varying the power, the generated heat is adjusted, satisfying the current needs of heating in the system.

The burning is interrupted in the following cases:

- User: issue command from main screen
- Clean time out: if a periodic clean is configured, then a shutdown is performed followed by clean and ignition, completing the restart cycle.
- Week timer: if there is a time set for turning off.
- No need of heating: when the power has been at minimum for a set time or the regulated temperature is exceeded, then the controller shuts down and transitions to WAIT mode.
- Loss of flame: flue gases temperature or flame intensity go below threshold. An error is registered.

Purge

During the burn state, periodically a purge is committed for a fixed time. The feeder is stopped and the fan power is increased, thus cleaning the burn chamber. After the purge time expires, the controller goes back to Burn.

Shutdown

The fuel is stopped and the fan power is set according to its shutdown setting. The controller waits for all the remaining fuel to burn out by monitoring the flame detector to go below the set threshold (flue temperature or flame intensity). After the Shutdown is complete, the controller transitions to Clean state.

Wait

As in OFF mode, the device is safely transitioned to an Idle state. However, the device will automatically transition to ON mode when the system needs to generate heat.

The device is in standby, awaiting for some of the heated objects to need heating. When all the current temperatures are above the set ones (or external thermostat), then the system should not generate any more heat and therefore stays in WAIT mode.

When the heating system cools down and a temperature drops below the set one, the device awaits a predefined time to transition back to burning and keep the system as close as possible to the temperature set.

Service parameters

Structure

- General
- Boiler / Ambient fan
- DHW
- Hardware setup
- Temperature control
- Protection
- Fuel
- Clean
- Ignition
- Kindle
- Burn
- Shutdown
- Purge
- Light calibration
- Change code
- Stop work
- Output test
- Reset

Parameter menus

In the table below is a description of all service parameters. They are grouped into sub menus, noted in table column **Menu**.

The fumes fan power is set in percents of the maximal revolutions, as 100% = **Fan Max** and 0% = 0 rpm.

Fuel feeding (operation of the feeder mechanism) is set in seconds with a precision of 0.1 sec and the stop time is determined of the total period as the sum of **on time + stop time = Feeder Period**.

Menu	Parameter	Description
General		
	Feeder period	Total time (run + pause). Feeder = run. <i>All parameters listed below, that set the feeder time, have the meaning of Feeder.</i>
	Feeder power	Phase modulated feeder power in percents.
	Feeder brake	Number of impulses to activate AC motor brake on feeder stop. <i>Minimum value of the parameter OFF.</i>
	Fan max	Maximum revolutions per minute of the fumes fan. It is used to calculate the percents, that set the fan power.
	Fan poles	Number of encoder impulses for 1 revolution of the fan. <i>Minimum value of the parameter OFF – fan speed control deactivated.</i>
	Flame detect	Flame detection method: <ul style="list-style-type: none">■ Opto: Light sensor, monitoring the flame intensity of the flame.■ Flue: Temperature of the flue gases.
	Heating type	<ul style="list-style-type: none">■ Water: water jacket device – all inputs and outputs are enabled■ Въздушно: device with ambient fan<ul style="list-style-type: none">▸ outputs disabled: Feeder2, DHW & Clean▸ inputs disabled: H2O, DHW, Light

Menu	Parameter	Description
Boiler / Ambient fan		
Depending on the value of parameter Heating type the menu refers to:		
<ul style="list-style-type: none"> • Boiler: water pump, control based on the temperature of H2O • Ambient fan: ambient fan, control based on the temperature of flue gas 		
	Min temperature	Minimum threshold temperature to turn on the circulation pump.
	Hysteresis	Hysteresis for turning on and off the circulation pump. Turn on temperature = Min Temperature + Hysteresis . Turn off temperature = Min Temperature - Hysteresis .
	Modulation	Enable circulation pump modulation.
	Range	Working temperature range, in which the pump power is being modulated proportionally between Min Power and Max Power .
	Min power	Minimum modulation pump power, for boiler temperature \leq Min Temperature .
	Max power	Maximum modulation pump power, for boiler temperature \geq Pump Min Temperature + Range .
DHW		
	Min temperature	Minimum threshold temperature to turn on the DHW pump.
	Delta temperature	The boiler temperature should be this many degrees higher than the DHW temperature in order to turn the pump on.
	Hysteresis	Hysteresis for turning on and off the DHW pump. Turn on temperature = Min Temperature + Hysteresis . Turn off temperature = Min Temperature - Hysteresis .
	wait DHW ON	Temperature difference below the set temperature in order to exit from Wait state.
	wait DHW OFF	Temperature difference above the set temperature in order to enter Wait state.
	Low Priority	In heating mode Heat+DHW , the DHW pump is not activated until the main heating circuit reaches the set temperature.
Hardware setup		
	DHW	General enable of DHW functionality.
	Feeder2 Output	AUX output function: <ul style="list-style-type: none"> ▪ OFF: Not in use ▪ Alarm: Activated upon error registration ▪ Refill: Fuel refill ▪ Feeder2: Secondary feeder
	Clean output	Clean output function: <ul style="list-style-type: none"> ▪ Clean: Cleaning mechanism, activated during the Clean state ▪ Chimney: Chimney fan, activated always when the main fumes fan is active.
	Chimney fan	Power in percent for the Clean output, when it is configured as a chimney fan.

Menu	Parameter	Description
	Level input	Level input function: <ul style="list-style-type: none"> ▪ OFF: Not in use ▪ Pellet: Level of the pellets inside the bunker ▪ Clean: Feedback for the position of the cleaning mechanism. ▪ Pressure: Error input for chimney pressure sensor, input E2
	Refill	Running time of the refill output when a pellet bunker low level is registered.
Temperature control		
	Thermostat	Thermostat is controlled by: <ul style="list-style-type: none"> ▪ Room: Room temperature. ▪ Boiler: Boiler temperature (water). ▪ Ext NO: External thermostat Normally-Opened. ▪ Ext NC: External thermostat Normally-Closed.
	wait time ON	Time to transition to Burn from Wait state. If the device is in Wait state and there is a need of heating more than the time specified, the ignition is started.
	wait time OFF	Time to transition to Wait from Burn state. If the device is in Burn state and is working in minimal power more than the time specified, the shutdown is started.
	wait temperature ON	Difference between the current and set temperature, under which the device immediately transitions from Wait to Burn state.
	wait temperature OFF	Difference between the current and set temperature, over which the device immediately transitions from Burn to Wait state.
	wait Boiler	Exceeding the set boiler temperature by this, forces a transition to Wait state.
	Power Levels	Number of power levels. Temperature control maximum power adjustment step is 2. Increasing the number of power levels effects in more fluid modulation, as decreasing it results in more rapid one.
	Fuzzy Period	Period for calculating the power change (modulation step). The more inertia the regulated object has, the bigger the period has to be and vice versa. If the work power oscillates between minimum and maximum, when the set point is reached, increase the period. In case of a significant overshoot of the set point, decrease the period.
	Flue Temp	Flue gases temperature set point. Temperature control algorithm alters the power, so this set point is not exceeded. Keeping the flue gases temperature guarantees that the overall efficiency of the unit will not drop below a certain limit.
Protection		
	Flue max	Maximum flue gas temperature. Exceeding it, registers the error <i>Overheat Flue</i> (if flue gases are used to detect flame).
	Boiler max	Maximum boiler temperature. Exceeding it, registers the error <i>Overheat Water</i> .
	E1 clean	Goes directly to Clean state if an error is detected on E1 input
	E2 time	Stable time for active level of E2 error input in order to register error.
	E2 invert	Invert the active state of the E2 input (normally closed sensor).

Menu	Parameter	Description
	Restore Power	If there is a power break for a period less than the parameter's value, then when the power is restored, the controller returns to Burn state. Otherwise it goes to Shutdown state and the error <i>Power failure</i> is registered if the parameter Power Failure is set.
	Power Failure	Weather to register error, if the conditions, described for parameter Restore Power , are met. Registering an errors turns the work mode to OFF.
Fuel		
	Feeder Flow	Feeder fuel delivering capability measured in pellets kg passed per minute.
	Bunker Volume	Bunker volume in kg, used to calculate the bunker fuel level.
	Service Energy	Quantity of pellets burned after which a servicing is needed.
	Show KW	Energy density of the fuel in kWh/kg .
		Allow the user to view the current power in absolute units (kW).
Clean		
	Period	Clean reset period. When the device is in Burn state and the set time expires, a reset procedure is conducted (shutdown, clean and re-ignition). <i>The minimum value of the parameter is OFF.</i>
	Fan	Fan power during Clean state.
	Duration ON	Duration of Clean state when the device is turned on.
	Duration OFF	Duration of Clean state when the device is turned off.
	Output	Active time for the cleaner output. <i>The minimum value of the parameter is OFF.</i>
Ignition		
	Duration	Ignition attempt time. Includes the combined time for states Ignition and Kindle. After the attempt time expires, another retry is performed.
	Retries	Number of ignition attempts. Exceeding it registers error <i>Ignition failed</i> .
	Fan	Fumes fan power during the Ignition state.
	Load Pellets	Feeder work time for the loading process in Ignition state.
	Flue Delta	Relative temperature raise of flue gases compared to the start of ignition. Exceeding this temperature raise is considered for successful ignition.
	Feeder 2:1	Secondary feeder work time in percent, compared to main feeder. For example if the parameter is set to 200%, then the secondary feeder will work twice longer than the main feeder.
Kindle		
	Fan	Fan power during Kindle state.
	Feeder	Feeder time during Kindle state.
	Flue burning	Flue gases temperature, exceeding it marks successful Kindle state.
	Light level	Light sensor level, exceeding it is considered for successful ignition.
	Light time	Time, during which the level of the light sensor is constantly above Light Level . When time lapses, Kindle state is successful and over.
	Igniter	Time to have the lighter output active in Kindle state. <i>The minimum value of the parameter is OFF.</i>

Menu	Parameter	Description
Burn		
	Min fan	Fan power on minimal work power.
	Min feeder	Feeder time on minimal work power.
	Max fan	Fan power on maximal work power.
	Max feeder	Feeder time on maximal work power.
	Feeder 2:1	Secondary feeder work time in percent, compared to main feeder. For example if the parameter is set to 200%, then the secondary feeder will work twice longer than the main feeder.
Shutdown		
	Fan	Fan power during Shutdown state.
	Light Level	Light sensor level, below which the countdown of Light Time begins.
	Light Time	Time, during which the level of the light sensor is constantly below Light Level . When time lapses, Shutdown state is over.
Purge		
	Period	Purge period. When the device is in Burn state and the set time expires, it transitions to Purge state. Upon completion it returns back to Burn state. <i>The minimum value of the parameter is OFF.</i>
	Time	Duration of Purge state.
	Fan	Fan power during Purge state.
	Clean period	Time to periodically activate Clean output.
	Clean time	Duration when Clean output is active.

Additional menus

Light calibration

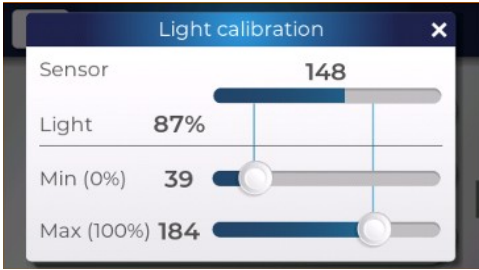


Fig 26 Light calibration

Here you can set the minimum and maximum value for the light sensor level. They define the limits, that are used to calculate the flame intensity in percents (0% = **Min**, 100% = **Max**).

The screen consists of the following rows:

- **Sensor**: indicates the reading of the light sensor input at the moment (in absolute value)
- **Light**: the calculated value in percent (relative value)
 - **Min(0%)**: slider for adjusting the value representing minimum light (0%)
 - **Max(100%)**: slider for adjusting the value representing maximum light (100%)

Change code

You can change the code, used to access the service menu. First enter the current code, then the new code needs to be entered and confirmed for second time. The new code is stored and active.

The user interface for entering codes is the same one, used to enter access code for accessing the service menu.

Stop work

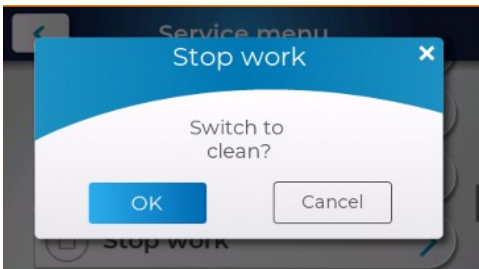


Fig 27 Stop work

The device can be forced to stop, ignoring the conditions for needed to complete a shutdown procedure. If the device is working, first a transition to **Clean** state is made, as a repetition of Stop Work command switches the device to **OFF** mode.

Output test

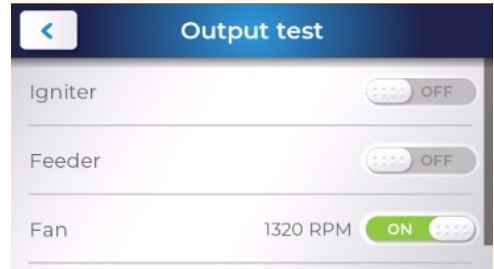


Fig 28 Output test

Warning! Improper activation of the controller's outputs can lead to dangerous situation!

Every single one of the controller's outputs can be manually activated. This screen is only accessible if the controller is in **OFF** mode and in Idle state.

- **Fan**: Revolutions per minute measured by the hall sensor (I2). Tests the correct operation of the sensor and determines the maximum speed of the fan installed.
- **Pump & Cleaner**: Use the slider to adjust the power of the desired output.

Reset

You can reset the system counters, the events log and load the factory settings. Press the according button and confirm in order to execute the action.

Errors

When an error is registered, the controller goes to shutdown state if it is in Burn state.

The only exception is error **Overheat Bunker**. When it occurs, the controller goes straight to Clean state even if the work mode is OFF.

The possible errors are:

- **Temp sensor**: Temperature sensor (from t1 to t4) is either broken or shorted (according to the error description).
- **Ignition failed**: The device failed to ignite.
- **No pellets**: The pellet level sensor has determined that there is no more fuel and refill time has expired.
- **Cleaner**: The cleaner mechanism is not in the right position according to the level input sensor (I3).

■ **Burning stopped:** In Burn state, a loss of flame is detected according to the flue gases temperature or light intensity.

■ **Power failure:** The power was cut for time exceeding the recovery time.

■ **Fume pressure:** error input **E2** activated.

■ **Clock:** Error occurred in the real time clock module. Does not force the device shutdown.

■ **Overheat:** Overheating is registered in some of the following modules (according to error description):

▸ **Water:** boiler temperature exceeded the maximum.

▸ **Flue:** flue gases temperature exceeded maximum.

▸ **Bunker:** error input **E1** activated.

■ **Fan:** Fan speed input is behaving erratically, check if the fan is blocked or if the encoder is working properly.

Actions

The possible errors are:

■ **Pow Supply ON:** Device connected to power.
■ **Pow Supply OFF:** Device disconnected from power.

■ **Mode ON:** Device switched to ON mode.

■ **Mode AUTO:** Device switched to AUTO mode.

■ **Mode OFF:** Device switched to OFF mode.

■ **Service Menu:** Service menu accessed.

■ **Service:** Device serviced.

Temperature Control – Fuzzy Logic algorithm

The goal of the algorithm is to reach the set temperature as quickly as possible, and after reaching it, maintain it stably.

The temperature control is applied at discrete periods, and depending on the frequency, the reaction speed changes. A current power correction is calculated periodically, the time set by the **Temperature Control/Fuzzy period** parameter. Too frequent corrections lead to work in extreme situations, so it is important that the speed of response is taken into account with the inertia of the object being heated. In the opposite case, an overshoot of the set temperature is usually observed.

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

For each monitored temperature (room, water, DHW and flue gas, each having a corresponding set temperature) a power correction is calculated. Of all the corrections, the one with the minimum value is used, thus not allowing any of the set temperatures to be exceeded.

Connection diagram

The connection of an external main switch and power supply fuses for L (live) and N (neutral) is mandatory and must be taken into account with the total consumption of all modules!

It is mandatory that the housing of the device, as well as all units, are grounded (PE)!

Inputs		
Pt1000	t1 / tFumes	Temperature sensor flue gas
NTC 10K	t2 / tH2O	Temperature sensor boiler
NTC 10K On - Off	t3 / tRoom	Temperature sensor room temperature Thermostat
NTC 10K	t4 / tDHW	Temperature sensor DHW
Light sensitive	i1 / Opto	Light sensor flame intensity
Active level GND	i2 / RPM	Hall sensor for fan revolutions counting
	i3 / Level	Pressure switch e2 Sensor for pellet level / position of cleaner mechanism
Opto-insulated input 230V AC	e1 / Error	Error Bunker fire (Overheat Bunker)
230V 50Hz	N~L	Power supply, internal fuse 6.3A
	PE	Earth terminal
Outputs		
Relay	LIGHTER	Lighter
	FEEDER	Feeder main (fuel feeding mechanism)
	FEEDER 2	Feeder internal
Triac	FAN	Fumes fan
	PUMP	Boiler pump / ambient fan
	DHW	DHW pump
	CLEANER	Cleaner / Chimney fan
Display		
Plug the display cable into the RJ connector socket.		

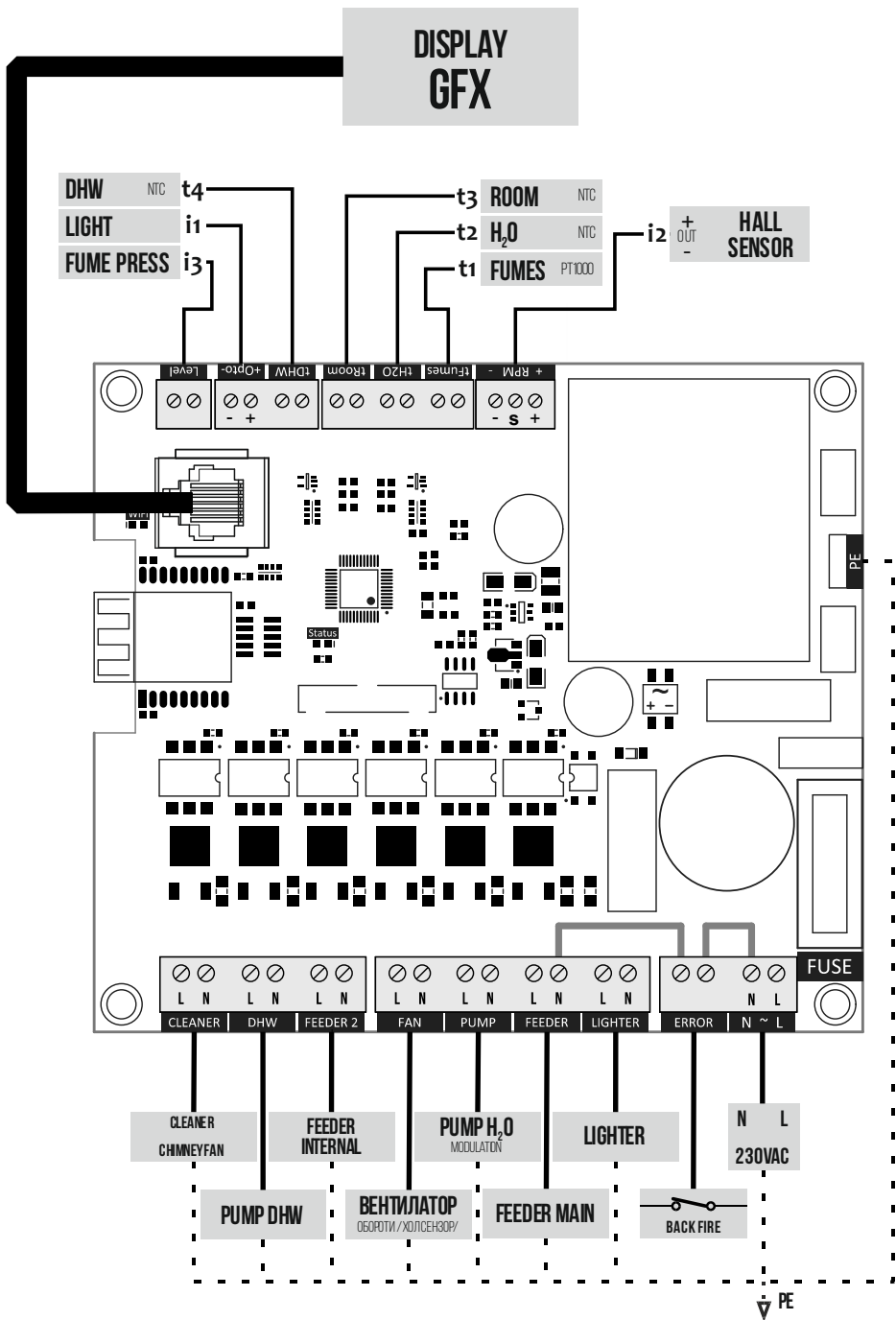


Fig 29

Connection diagram

Assembly

The control module is mounted using the plastic standoffs provided in the kit.

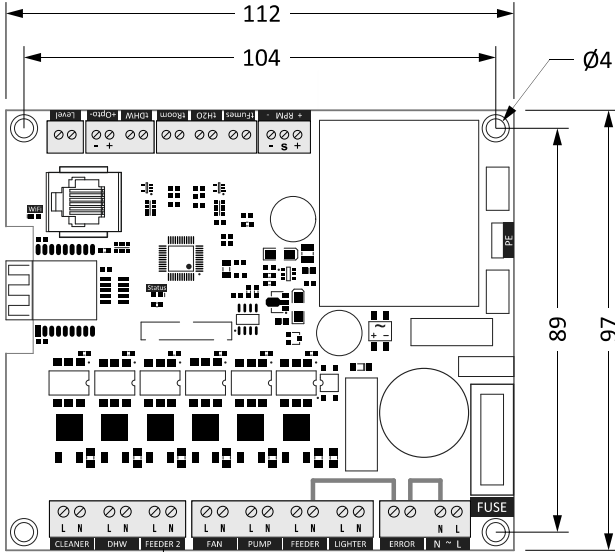


Fig 30 Control module

The display is mounted on a flat surface with a rectangular opening measuring 121×79 mm (Fig 31) with a thickness of 1 to 3 mm. Fixing is done by pressing until the periphery rests on the board, with the side teeth locking the box.

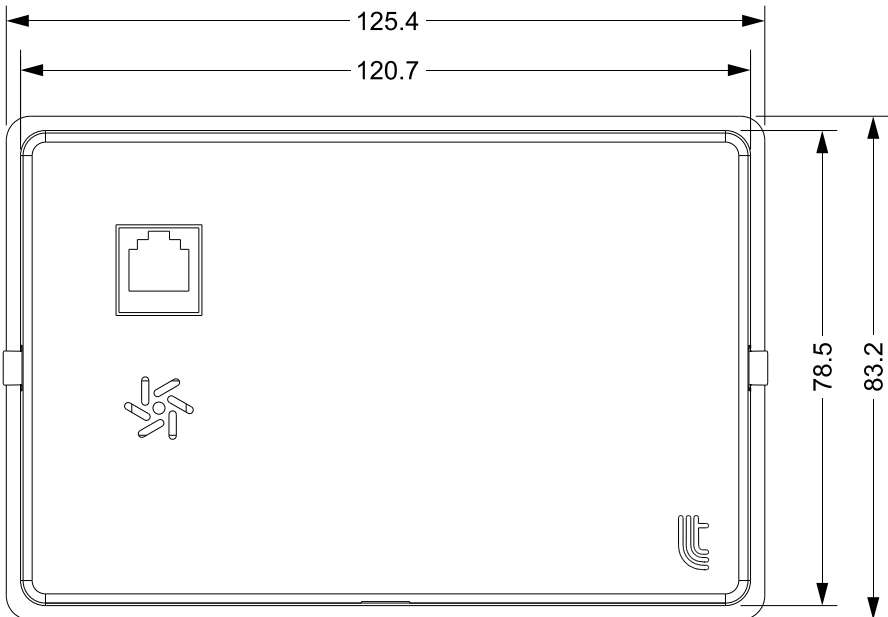


Fig 31 Display module

Technical data

Power supply voltage	230 V, 50 Hz
Controller power consumption	4.5 VA
Total outputs power	6.3 A
Ambient temperature	0 ... 40 °C
Protection rating	IP 20
	Control 112×97×28 mm
Dimensions	Display 126×84×18 mm
Display	TFT IPS 4.3" 480×272 px
Temperature sensor Pt1000	-40 ... 250 °C
Temperature sensor NTC	-40 ... 125 °C

Limited Warranty

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

- Incorrect installation
- Repair and/or modification attempts by the customer
- Visible damages of housing and/or the inner parts of the product
- Damage caused by lightning storms and/or electric shocks
- Use in inappropriate conditions (temperature and humidity)

Technogamma LTD

4004 Plovdiv, Bulgaria
9N Kuklensko Shose str. fl. 3, office 6
Phone: +359 32 699-240
E-mail: info@technogamma.bg

www.technogamma.bg