V-FIRE SC Pellet Burner – Instruction Manual (EN)

General safety precautions

- The pellet burner is designed and manufactured in accordance with international safety standards. The warnings given here are dictated by safety considerations and must be read carefully.
- The appliance must not be used by persons (including children) with reduced physical, sensory or mental capabilities or lack of experience, unless they are supervised or instructed by a person responsible for their safety. Supervise children to ensure they do not play with the appliance.
- The pellet burner must be used only by adults, in accordance with the instructions provided in this booklet.
- Do not unplug the appliance from the mains socket by pulling the cable; hold the plug instead.
- In case of a fault, do not under any circumstances reach into the internal mechanisms in an attempt to repair them.
- Always keep children away from the operating machine.
- Before cleaning the burner, make sure it is unplugged from the socket.
- If the power cable is damaged, contact the manufacturer.
- The socket used to connect the burner must be earthed.

V-FIRE self-cleaning pellet burner

The V-FIRE SC pellet burner is designed for automatic combustion of wood, straw and agro pellets with a size of 6–8 mm. Thanks to its automatic mechanical cleaning, the V-FIRE SC40 pellet burner can also burn low-quality straw, lavender and agro pellets.

The V-FIRE SC40 is used for heating residential and other buildings that require a power of up to 35 kW. The whole cycle of ignition, maintaining the set temperature, cleaning and extinguishing is automatic. Ignition is carried out by a ceramic heater blown with air. The burner automatically varies its output in the range of 3.5–35 kW, monitoring and maintaining the set water temperature in the boiler. For normal, trouble-free operation, the burner only needs periodic refilling of the hopper with pellets and removal of the ash collected in the area in front of the combustion chamber of the boiler (the ash pan).

The burner has periodic mechanical cleaning, so the grates always stay clean. This helps better combustion of the pellets and prevents slag formation. The V-FIRE SC has automatic mechanical cleaning. Cleaning is done by moving the combustion grate backwards, so that it is scraped by the upper grate. The burner works without problems with low-quality pellets that produce more ash and form slag. The burner can also be controlled by a room thermostat, which optimises pellet consumption.

The burner has up to three programmable timers for switching the burner on/off during the day.

Only high-quality materials and components are used in the manufacture of the burner: gear motors – MELLOR; electric actuator – Belimo, Switzerland; heater – FKK KYOTO, made in Japan; latest-generation NATURELA controller. The combustion head (nozzle) is made of heat-resistant stainless steel AISI 310 / 1150 °C.

The burner is designed to be easily mounted on all types of boilers using an additional flange.

Features:

- Control of a heating circulation pump, as well as a domestic hot water (DHW) boiler pump.
- Easy and intuitive setting of all parameters related to the combustion process.
- Date and time keeping, with up to three programmable periods per day in which the burner is allowed to operate.
- Full self-diagnostics of hardware and sensors. When a problem is detected, a short message with the cause is shown and, if necessary, the operating mode is changed automatically.
- Automatic cleaning can be set as often as every 1 hour, if necessary.
- Option to install a Wi-Fi modem in the NRC-6 for connection to the Naturela system, for remote monitoring and control via the Internet.
- Operation with up to 4 preset profiles for different fuels.
- Automatic shutdown when a problem occurs – sensor fault, blockage, fuel run-out or backfire in the internal auger.

Technical specifications

Parameter	Value
Heat output, kW	4 ÷ 35
Fuel	Pellets 6 and 8 mm
Ignition	Heater 300 W
Power supply	Single-phase 220 V
Power consumption in operation	15 ÷ 150 W/h
Power consumption in standby	2 W/h
Weight, kg	27
Overall dimensions W x H x L, mm	350 x 300 x 600
Burner dimensions, mm – part outside the boiler	350 x 300 x 400
Combustion chamber dimensions, mm – part inside the boiler	140 x 330
Minimum opening in the boiler door for mounting the burner, mm	140
Minimum boiler combustion chamber size for trouble-free operation W x H x L, mm	250 x 250 x 400

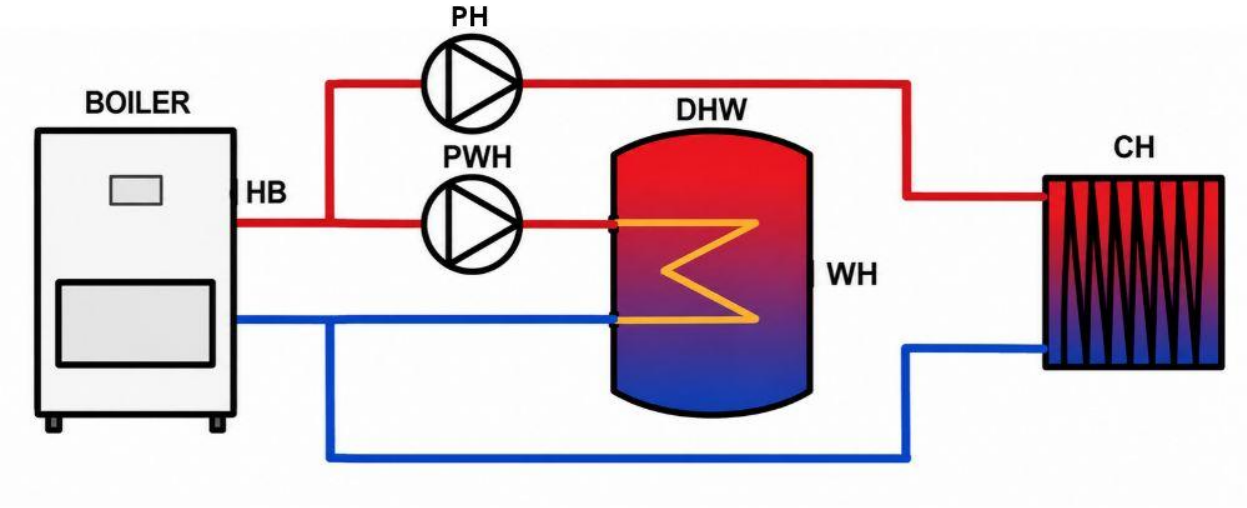
Introduction

The NPBC-V3C-1 controller is a new, upgraded version of the already popular NPBC-V3M1 controller. It uses a new "controller" module with a colour TFT display – NRC-6 – and an "execution" module NPBC-V3M. Some of the important advantages of this version are:

- A clearer and more intuitive user interface with 6 control buttons and a new, more modern design of all settings menus.
- Additional help screens shown when parameters are entered incorrectly or when a parameter in another menu needs to be corrected.
- Option to install a Wi-Fi modem in the NRC-6 for connection to the Naturela system, for remote monitoring and control via the Internet.
- Operation with up to 4 preset profiles for different fuels.
- Statistical information on fuel consumption and the option to enter a calibration constant for the auger.
- More accurate information when hardware or software problems are registered, with a report of the time and date they occurred.
- More burner status and operating parameters shown on the screen at the same time.
- A Micro USB connector on the front panel of the control module for connection to a PC, with software for direct control and monitoring.

The NPBC-V3C-1 controller runs software for burners that use a photosensor to detect the lit fire. To dose the amount of pellets fed to the fire, the hopper auger is switched on in pulses. The controller drives an optional internal auger, used only to move pellets inside the burner.

The controller drives two fans: one supplies fresh air to the combustion chamber, and the other is an auxiliary fan, for example when forced extraction of flue gases from the boiler is needed. The controller can regulate the speed of both fans. The NPBC-V3C-1 can measure and control the flue gas temperature using a high-temperature pt100 sensor mounted at the start of the chimney. An additional powerful fan for blowing ash out of the combustion chamber during the burner cleaning procedure, or a mechanical cleaning mechanism, can be connected to the controller.



Hydraulic diagram of the external heating installation and the hot water installation controlled by the NPBC-V3C.

How the controller works

A burner controlled by the NPBC-V3C-1 can operate either in continuous mode or in timer mode. In timer mode, the burner works only in the intervals of the day and days of the week set by the user. During operation it passes through several phases: cleaning, ignition, fire stabilisation, combustion with power modulation according to the current and set boiler temperature, intermediate cleaning during combustion, extinguishing, and cleaning after combustion ends. The current phase is shown as green text on the bottom line of the main screen.

Every ignition of the burner starts with a cleaning cycle, to remove all residues from the previous burn. First, for a time set in menu "Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning", column "Fan", row "Start", only the main fan runs. Then the additional cleaning fan switches on (if fitted and not disabled in the settings) for the time set in column "FC". After that the burner moves to the ignition phase.

The ignition procedure starts by loading the first dose of pellets into the combustion chamber. Ignition is done with an electric heater and air forced by the burner fans. The ignition procedure, performed after the first dose is loaded, has three stages. In the first stage only the electric heater works, without the fan, so that the ignition temperature is reached faster. In the next two stages air is supplied to the combustion chamber while the heater is running; this carries the heater's heat to the pellets and provides the oxygen needed to ignite the fuel. Usually in Stage 2 the fan is set to a lower speed so as not to cool the emerging flame, and once the fire is more stable the airflow can be increased in Stage 3.

In menu "Service settings" -> "Combustion settings" -> "Fuel X" -> "Ignition" you set the maximum duration of each ignition stage, as well as the speed of the main and chimney fans. When the photosensor measuring the flame brightness detects that the pellets have ignited, the heater is switched off and the burner moves to the fire build-up procedure, which aims to stabilise the fire while the combustion chamber is still not hot enough.

If the pellets do not ignite within the set time, a new portion of pellets is loaded and a new ignition attempt is made. To avoid clogging the burner with unlit pellets, the amount of new pellets is halved with each attempt. New pellets are fed only for the first 3 attempts, at 100%, 50% and 25% of the set amount. When the set maximum number of attempts is exhausted, the burner stops and shows a "failed ignition" message. The parameters for loading the first dose and igniting it are in menu "Service settings" -> "Combustion settings" -> "Fuel X" -> "Ignition". The parameters for detecting a lit or extinguished fire are in menu "Service settings" -> "Flame detection".

The next phase is a gentle build-up of the fire. If pellets and air for maximum output were fed while the flame is unstable and the chamber cold, the flame could be smothered or blown out. To prevent this, the burner first waits for the first dose to burn, then smoothly increases the output from the lowest power P1 up to the highest power needed, depending on the difference between the set temperature and the boiler water temperature. The build-up is configured in menu "Service settings" -> "Combustion settings" -> "Fuel X" -> "Build-up".

The next step is combustion control. The controller supports settings for 4 different power levels. Three of them are used during normal operation to heat the boiler. The fourth is for keeping the fire alive when the boiler water does not need heating; this avoids having to extinguish, clean and relight the burner. Of course, if no new energy is needed for a longer time, the burner will go out.

The dose of pellets fed into the chamber, which determines the current output, depends on the fuel auger capacity, the auger run time and the cycle between two auger starts. The parameters for each power level are: fuel auger run time, cycle between two consecutive auger starts, and the speeds of the main and chimney fans. They are set in menu "Service settings" -> "Combustion settings" -> "Fuel X" -> "Power P1" / "Power P2" / "Power P3" / "Maintain".

The burner automatically chooses its power level depending on the difference between the set and current boiler temperatures. The choice is made at the start of each fuel feed cycle. This is all set in "Service settings" -> "Power modulation". That menu also sets the maximum time the burner may stay at fire-maintain power; when it expires, the burner goes out. If during the "Maintain" phase the temperature difference reaches that of a working power level, and there are still embers in the burner, it will relight from the embers rather than the heater.

When the burner is switched off – by the On/Off button, by the timer, or via input OD – it immediately goes to the extinguishing phase. Fuel feeding stops while the fan keeps running gently to fully burn the remaining pellets and prevent backfire into the pellet hopper. When the photosensor detects that the fire is out, the burner moves to the cleaning phase and then to its initial state.

The burner is cleaned by raising the main fan speed to 100%, together with an additional powerful fan or other mechanical cleaning system on output FC, if installed. The cleaning settings differ depending on whether it is before ignition, after extinguishing, or after a registered problem. The procedure is:

1. The burner is extinguished and the flame is allowed to disappear.
2. The main fan runs at maximum for the time set in "Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning", column "Fan", row "Start", "Stop" or "Alarm".
3. After that time, an auxiliary fan or mechanical cleaning system may switch on and run together with the main fan for the time set in "Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning", column "FC", row "Start", "Stop" or "Alarm". If 0 is entered, output FC will not work and this step is skipped!

Apart from ignition, extinguishing or a registered alarm, the controller allows additional automatic cleaning cycles. Enabling automatic cleaning, and the burner run time after which it occurs, are set in "Service settings" -> "Combustion settings" -> "Fuel X" -> "Cleaning". During automatic cleaning the burner is first extinguished, cleaned, and then relit automatically.

The controller also uses another method of intermediate cleaning, in which the fire is not extinguished; only the fan speed is increased, or output FC is activated for a mechanical cleaning mechanism. This is set in "Service settings" -> "Combustion settings" -> "Fuel X" -> "Interm. clean.". The parameters are: the interval at which intermediate cleaning repeats, fan speed during cleaning, cleaning duration, and whether to use output FC. Pellet feeding is not interrupted during this cleaning method.

Software version changed to 32/16

- If timers are active and the burner is on, pressing and holding the "On/Off" button for more than 2 seconds disables the timers.
- The first dose loading time is increased from 120 to 240 seconds.
- The controller and software version screen also shows the Wi-Fi modem software version, if it is above 24.

Software version changed to 40/18

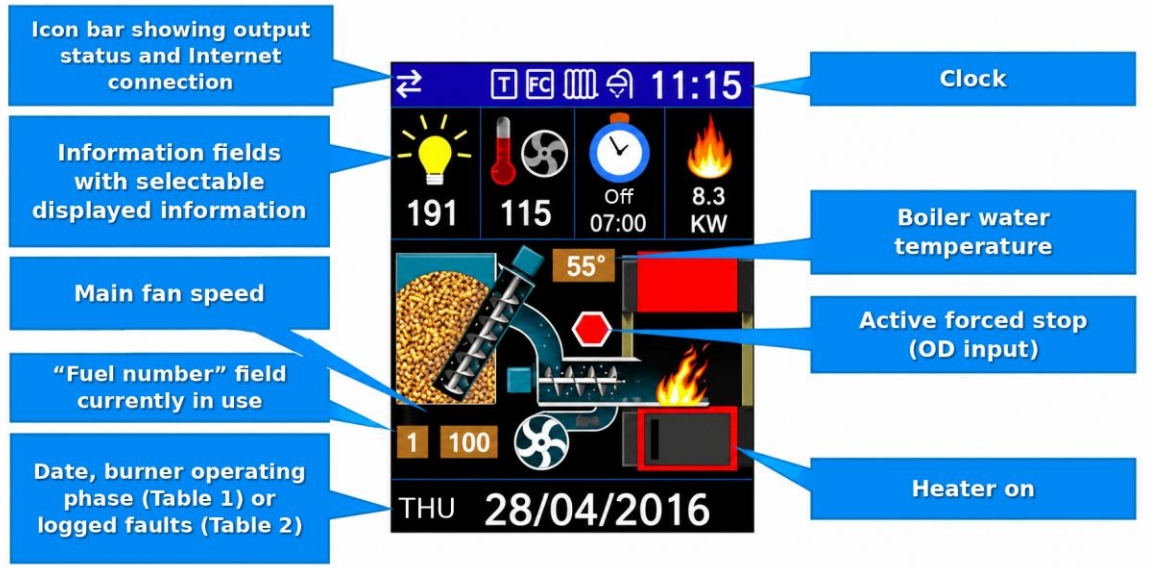
- The way the burner is switched on has changed. The switch-on menu now offers the modes "Off", "On" and "Timers". A new menu "Fuel selection" has been added to the user settings for choosing the fuel profile to be used.

Operating instructions

The NPBC-V3C-1 controller is operated through its "Control module" using 6 buttons. The function of each button is shown below:



After power-up, the controller shows its main screen, which looks like this:



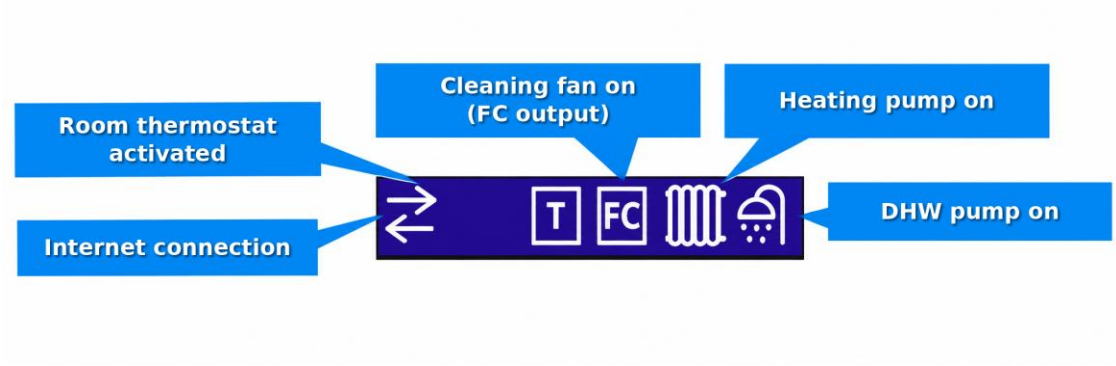
While the burner is running, the operation of the two augers and the fan is shown with animated pictures in their places. When a lit fire is detected, a flame appears in the boiler. If several messages need to be shown on the bottom line, they alternate every 4 seconds. The date is shown in white, the operating phase in green and registered problems in red.

If the clock has not been set, it shows --:--. For normal burner operation you will need to set the clock.

The selectable information fields can show the following:

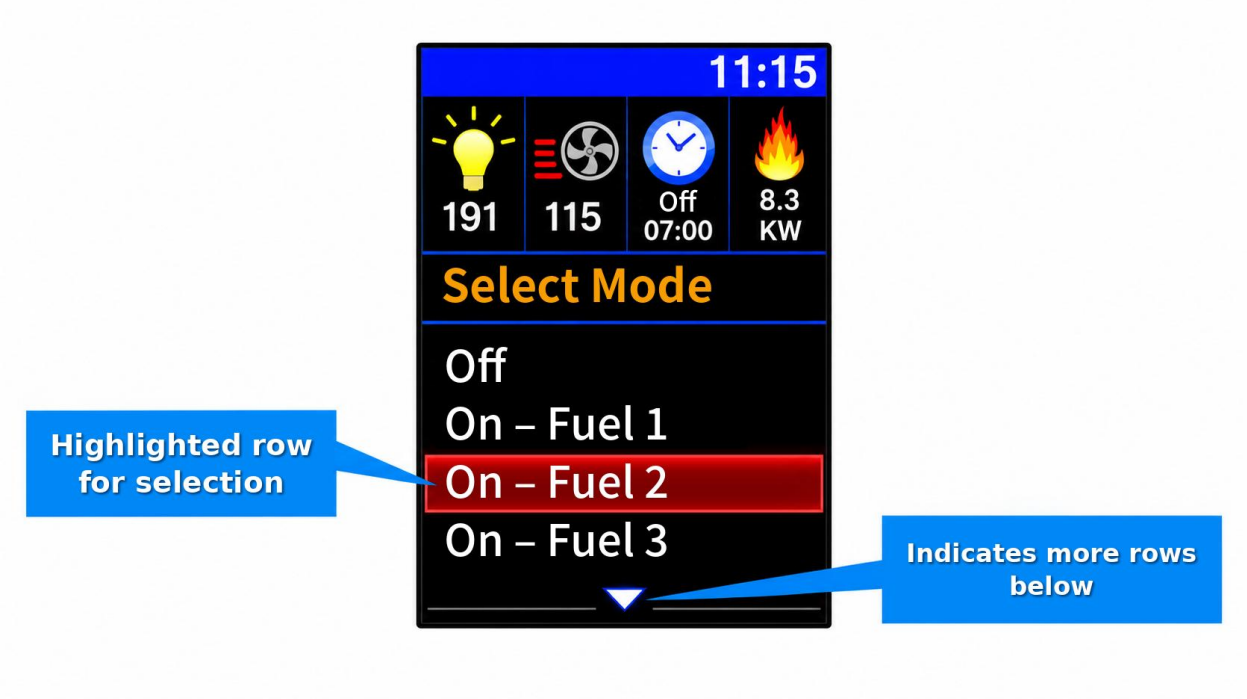
Icon	Displayed information
	Brightness level measured by the photosensor
	Chimney fan speed
	Information on the next timer action. If timers are not enabled or the burner is switched on, nothing is shown under the icon. If at least one timer is active and the burner is switched on, the next timer action and the hour or day of the week when it will happen are shown under the icon.
	Current calculated burner output. For this value to be reliable, you must enter a calibration constant for the auger in "Service settings" -> "Basic settings" -> "Fuel auger capacity".
	Temperature measured by the DHW sensor.
	Temperature measured by the flue gas sensor.

Icons in the top blue bar:



Switching the burner on/off

Pressing the On/Off button opens the menu for choosing the fuel type or switching off.



Use "▲" or "▼" to move the red highlighted row up or down, showing which fuel will be selected for "On" mode, or "Off" mode. The next press of On/Off switches to the selected mode. If no button is pressed for more than 5 seconds, or "◄" is pressed, the menu closes without changing the mode or state. The "Fuel number" field on the main screen shows which fuel settings the burner is currently using. If this field is missing, the burner is off or will be switched off. To be sure the burner is off, check that no green text with one of the operating phases from Table 1 appears on the bottom line.

Table 1

No.	Operating phases	No.	Operating phases
1	**Cleaning**	6	**Power P1**
2	**Loading**	7	**Power P2**
3	**Ignition**	8	**Power P3**
4	**Build-up**	9	**Intermediate cleaning**
5	**Maintain**	10	**Extinguishing**

In "Off" mode the burner will not operate. If the burner was lit when switching to this mode, it goes into the fire extinguishing procedure. Full extinguishing and cleaning take some time. It is normal for the burner and boiler units to keep running after switching to "Off".

The circulation pumps may keep running after the burner has gone out, as long as their operating conditions are met. This way the remaining heat in the boiler water is used.

When the burner is switched on, the "Fuel number" field appears first. If all ignition conditions are met – e.g. boiler temperature not reached, room thermostat not activated, forced-stop input OD inactive, no serious registered problems, and permission if a timer is enabled – the burner automatically proceeds to ignition. Then all procedures set for that fuel run automatically: ignition, fire stabilisation, maintaining, power modulation, intermediate cleaning, extinguishing and full cleaning.

In Timers mode the burner works in the intervals in which it is allowed to operate. These intervals are set in the Timers menu in the user settings. If no intervals have been set, an error message is shown and the burner stays off. The controller remembers the selected mode, and as soon as intervals are set in the user settings menu, the burner switches to Timers mode without you having to select it again:



Changing the set boiler water temperature

Pressing "▲" or "▼" on the "Main screen" opens the set temperature adjustment screen. The temperature changes each time you release and press the button again. If "▲" or "▼" is held, the temperature changes automatically at up to 5 degrees per second. To exit and save, press ↲ (Menu). If no button is pressed for 5 seconds, the screen returns to the main screen without saving the change.

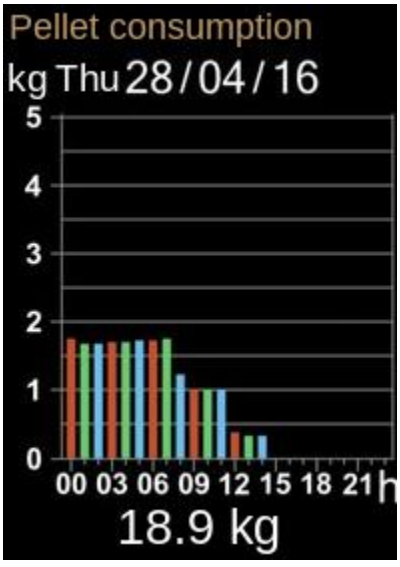


Displaying additional burner information

Pressing "►" on the "Main screen" opens the additional information screens.

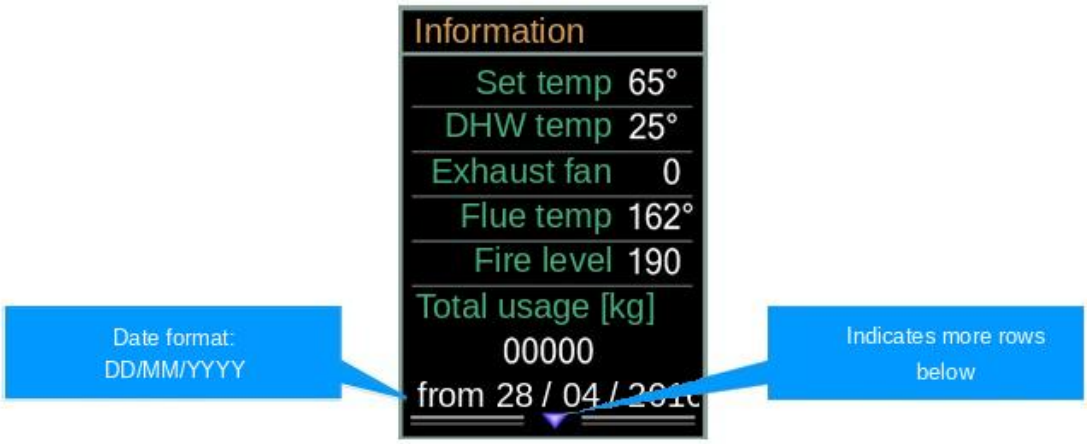
Hourly pellet consumption statistics

The first screen is "Pellet consumption", with charts of pellet consumption for the last 4 days. The current day is shown first; use "▲" or "▼" to browse the other days (up to 4). The data is shown as a full-screen histogram, with the hours of the day on the horizontal axis and kilograms of pellets consumed per hour on the vertical axis. The date is shown at the top and the day's total consumption at the bottom.



Current parameter status

Pressing "►" on the "Pellet consumption" screen opens the "Information" screen. It shows the set temperature, domestic hot water (DHW) temperature, photosensor brightness level, flue gas temperature, current flue fan speed, and pellet consumption since the last reset.



Pressing and holding Menu for more than 2 seconds resets the total pellet consumption reading. The date and time of the reset are also stored, so you know over what period the next "Total consumption" has accumulated.

Pressing "◄" on the "Information" screen returns to the previous "Pellet consumption" screen.

Besides these measured parameters, other information important for burner operation can be shown permanently in the information fields of the main screen.

Wi-Fi modem and Internet connection information

To reach the "WiFi connections" screen, press "▼".



The fields are:

- ID – unique identifier of each modem
- IP – IP address of the modem
- WiFi mode – modem state, which can be:
    - Idle – the modem has not yet connected to a Wi-Fi router with Internet
    - Access point – the modem is in Access point mode and can accept the SSID and password of the local Wi-Fi network to connect to it

- AP Associated – the modem has connected to the router
- Internet Access – there is an Internet connection
- Connected – the modem has connected to the information system server

- Snd/Rcv – data packets sent / received via the Internet

If no Wi-Fi modem is connected to the controller, the message "No WiFi modem" is shown.

Controller version, its software and the NRM-W3 Wi-Fi modem software version

To reach the versions screen, press "▼" on the "WiFi connections" screen.



Diagnostics

Pressing "►" on the "Information" screen opens the "Diagnostics" screen: a list of every registered problem with its exact time and date. If there are more than 4, use "▼" or "▲" to show the next or previous page. Holding Menu for more than 2 seconds clears the accumulated diagnostic information. The star symbol marks the latest entry.



The messages you may see on this screen are listed in Table 2. Messages 1 to 13 are also shown as fault messages on the bottom line of the main screen.

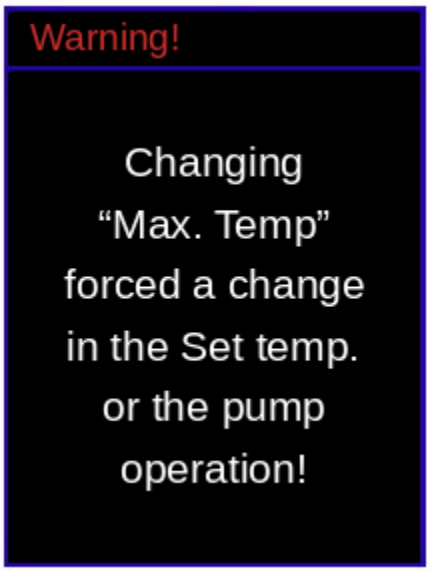
Table 2

No.	Message	Clearing the error	Description
1	Backfire	with button "◄"	The "backfire" thermostat has tripped
2	Boiler sensor open	automatically	Boiler temperature sensor open circuit
3	Boiler sensor short	automatically	Boiler temperature sensor short circuit
4	Frozen boiler	with button "◄"	Time and date when a frozen boiler condition was registered
5	Failed ignition	with button "◄"	
6	RB sensor open	automatically	Backfire temperature sensor open circuit
7	RB sensor short	automatically	Backfire temperature sensor short circuit (if a sensor is used)
8	Boiler (DHW) sensor open	automatically	DHW tank temperature sensor open circuit
9	Boiler (DHW) sensor short	automatically	DHW tank temperature sensor short circuit
10	Pt100 sensor open	automatically	pt100 flue gas temperature sensor open circuit
11	Pt100 sensor short	automatically	pt100 flue gas temperature sensor short circuit
12	High flue temp.!	with button "◄"	Flue gas temperature is very high
13	Dangerous flue temp.!	with button "◄"	Flue gas temperature is unacceptably high
14	Settings menu	---	The system settings menus have been entered
15	No exec. module	---	No connection to the "Execution module"
16	Power on	---	Time and date when controller power was switched on
17	Power off	---	Time and date up to which the controller ran before power was lost
18	Start	---	First entry after controller restart or after clearing the diagnostics buffer

Pressing "◄" on the "Diagnostics" screen returns to the previous "Information" screen.

Automatic warning messages

In some cases, screens with a red "Attention!" heading and a message explaining the reason may appear. For example, the screens below:





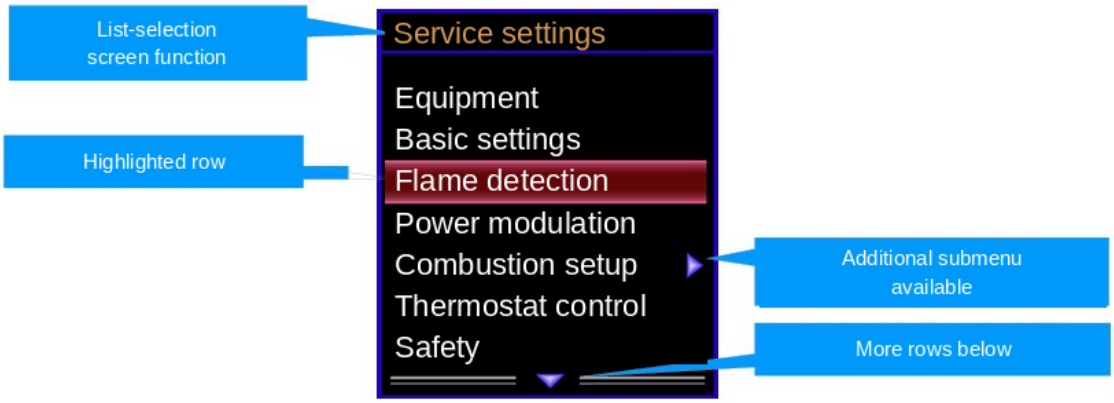
Parameter settings

The NPBC-V3C controller has two groups of parameters with different access restrictions: "User" and "Service". To enter user parameter settings, briefly press Menu. To enter service parameter settings, press and hold Menu for at least 2 seconds and then, if required, enter an access code.

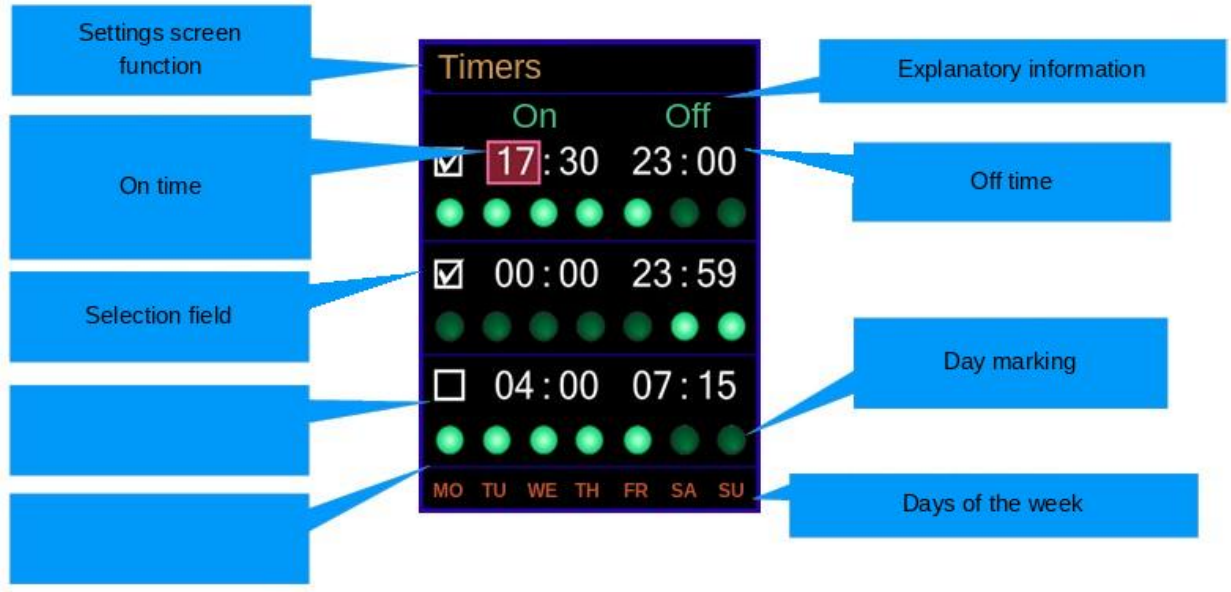
Ways to change operating parameters

When setting the parameters needed for the controller, the display looks like one of the following:

- **Selection from a list** – the red line marks the highlighted row. Move it with "▲" or "▼". Pressing "►" selects the option in the highlighted row and opens its settings screen. If there are more rows below the visible part of the screen, a down arrow is shown; if there are more rows above, an up arrow is shown. If there is an arrow to the right of a row, it opens a further sub-menu instead of a settings screen. When viewing a sub-menu, pressing "◄" returns to the previous menu.



- **Settings screen** – on entering such a screen, a pink frame appears around the first parameter, meaning it can be edited. Use "◄" or "►" to move the frame onto the parameter you want to edit (left/right or up/down respectively). Use "▲" or "▼" to change the highlighted parameter: its value increases or decreases, or it is checked or unchecked. Parameter fields are of these types: numeric parameters, checkboxes (enabled / disabled, selected / not selected), or a list of text values. Numeric parameters are checked against their limits; when a limit is reached, the parameter stops changing, though a short beep still sounds on each press.

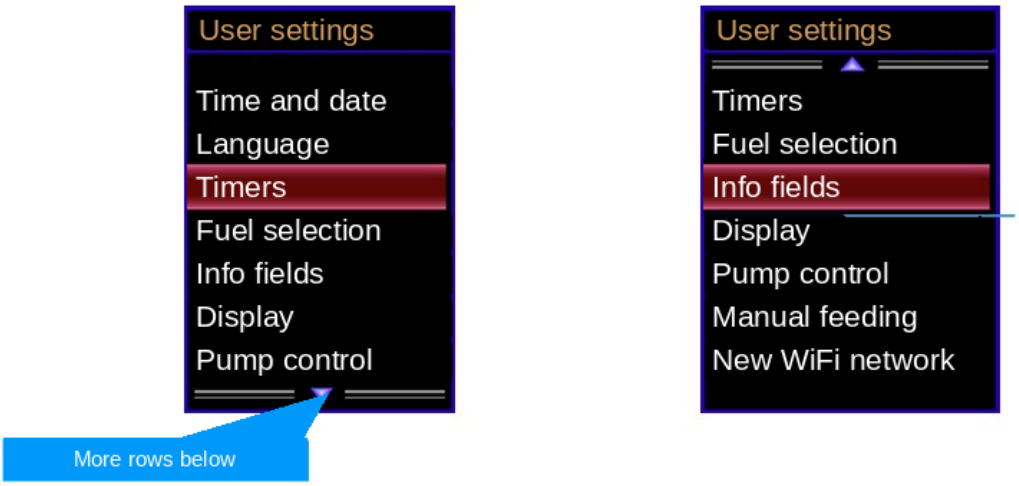


When you have finished the corrections, exit with ↲ (Menu) to save the changed parameters and return to the previous screen. There is a maximum idle time; when it expires without a button press, the screen returns to the previous one without saving the changes made.

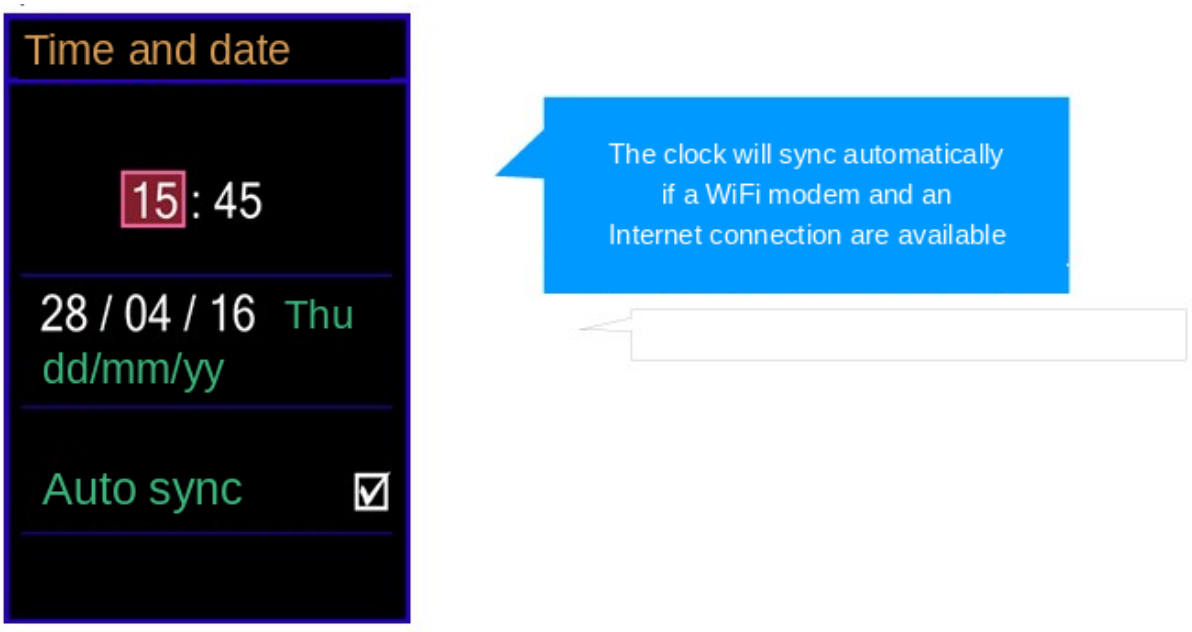
Holding down an arrow button usually repeats its function automatically, 5 times per second. This increases or decreases the selected parameter's value, or moves the frame between parameters!

User parameter settings

When the main screen is displayed, a short press of Menu opens the screen for choosing a parameter group to edit. Move the red line with "▲" or "▼". Press "►" to select the settings group in the highlighted row and open its settings screen. Then proceed as described above:



Time and date – sets the controller clock. The time format is 23:59 and the date dd/mm/yy. The day of the week is derived automatically once a correct date is entered. If you change the hours or minutes, the seconds are reset to zero when you leave this menu. If you change only the date, the seconds are not reset. For automatic time synchronisation to work, the controller must have a modem and a connection to the Naturela information system via the Internet.

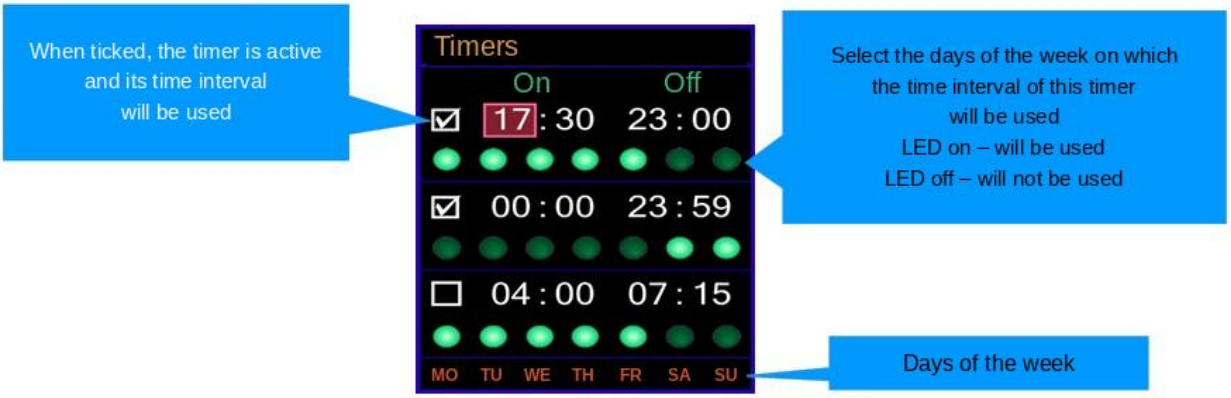


Language – changes the language.

Use "▲" or "▼" to move the red line to choose a language. Press "►" or Menu to select it; you then return to the main selection menu, now in the new language. If there is a down arrow after the last row or an up arrow before the first row, there are more rows outside the visible area. Pressing the down or up arrows scrolls the screen to show them.



Timers – sets and enables time intervals during which the burner is allowed to operate. If at least one of the three timers is active, the burner will work only in the intervals given by the active timers! Outside those intervals the burner will be extinguished. Of course, other factors also affect ignition, such as: burner switched on, boiler water temperature not reached, input OD inactive, room thermostat inactive, etc.

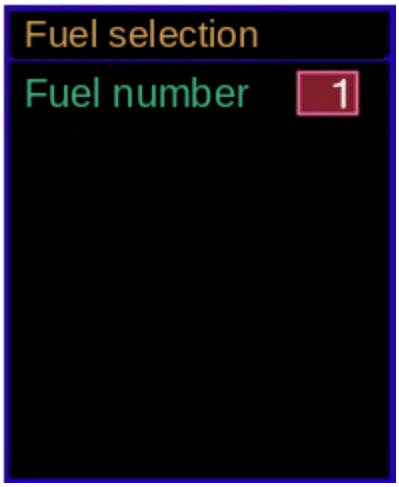


Note that the time in the "On" column cannot be later than the time in the "Off" column! Such values cannot be entered, so you may first need to change the "Off" time and then the "On" time!

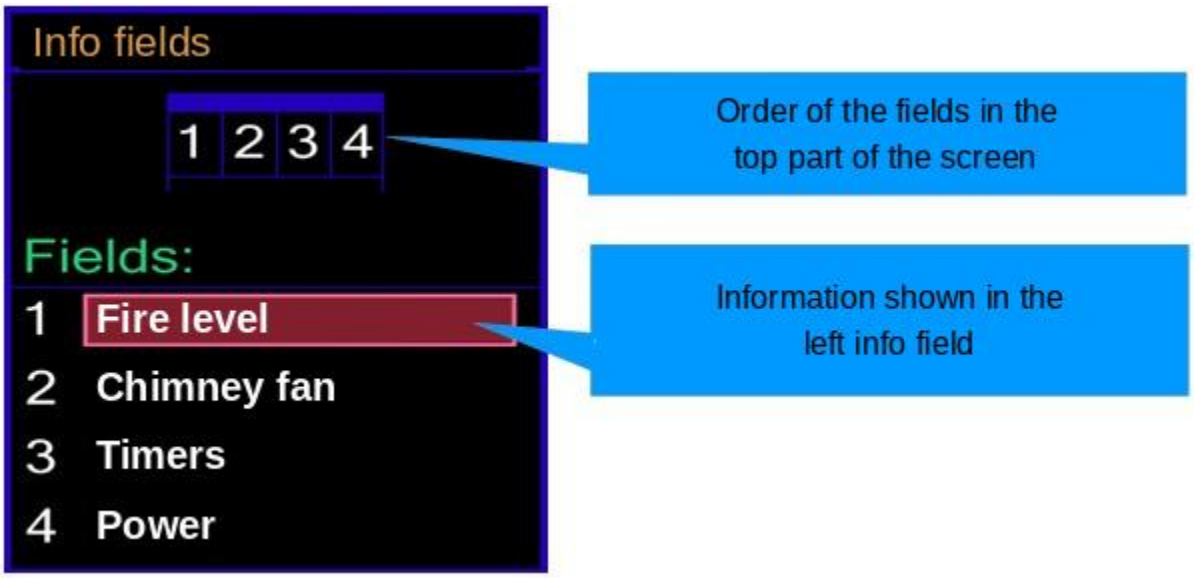
To see more clearly whether timers are enabled and controlling the burner, and what their next on/off action will be and at what time, you can show the timer information in the information fields at the top of the screen.

If timers are active and the burner is switched on, pressing and holding "On/Off" for more than 2 seconds disables the timers.

Fuel selection – selects the preset fuel profile currently in use. All parameters of the individual profiles are in the Combustion settings menu in the service settings:



Info fields – sets the information shown in the four information fields at the top of the screen.



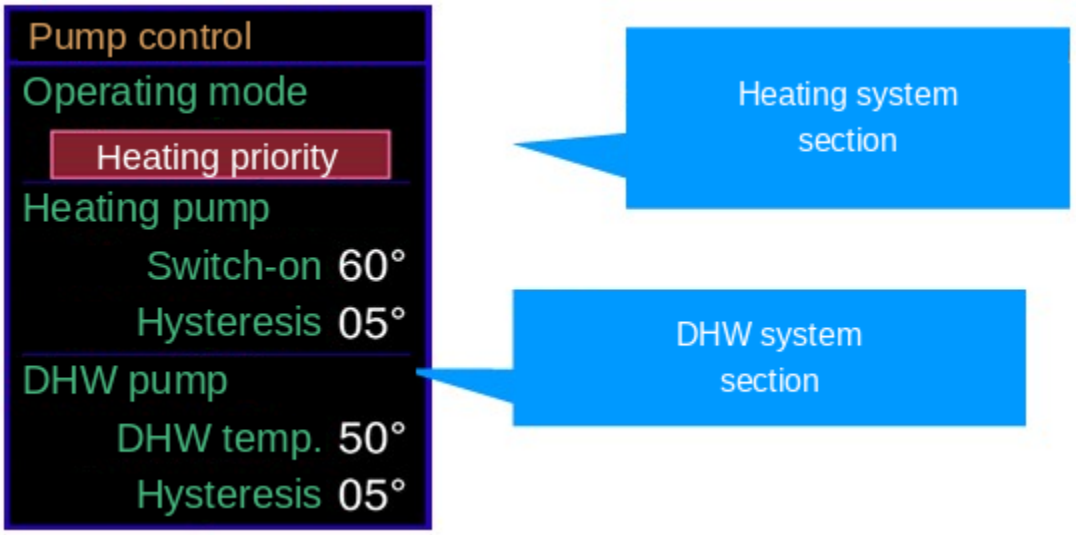
The possible labels and information in each field are:

- **Flame level** – brightness level measured by the photosensor
- **Chimney fan** – chimney fan speed
- **Timers** – next action controlled by the timers
- **Power** – calculated instantaneous output from burning the pellets
- **DHW temp** – temperature of the hot water boiler
- **Flue temp** – flue gas temperature

Display – the Brightness field changes the display brightness. The NRC-6 does not dim the screen automatically.



Pump control – sets the operating mode of the pumps of the external heating installations, and their on and off temperatures. The pumps are: the heating installation pump, connected to output PH, and the domestic hot water boiler pump, connected to output PWH.



The "Operating mode" field can take the following values:

- **Heating prior.** – only the building heating installation is served.

The heating circulation pump switches on when the boiler water reaches the temperature set on the "On" row in the heating area. It keeps running until the water drops below the "On" temperature minus "Hysteresis". When the room thermostat trips because the set room temperature is reached, the pump keeps running, but the burner starts reducing its output one level at a time, at intervals set in "Service settings" -> "Thermostat control". Finally it also passes through "Maintain" power. If the room thermostat returns to its normal state before the burner goes out, the burner continues according to the boiler water temperature. If the thermostat has been tripped for longer (all times in "Thermostat control" plus the "Maintain fire" time in "Service settings" -> "Power modulation" have elapsed), the burner goes out. It relights after the thermostat resets, provided the boiler water is below the set temperature minus the difference for switching from the second to the first power level (row P2 in "Service settings" -> "Power modulation").

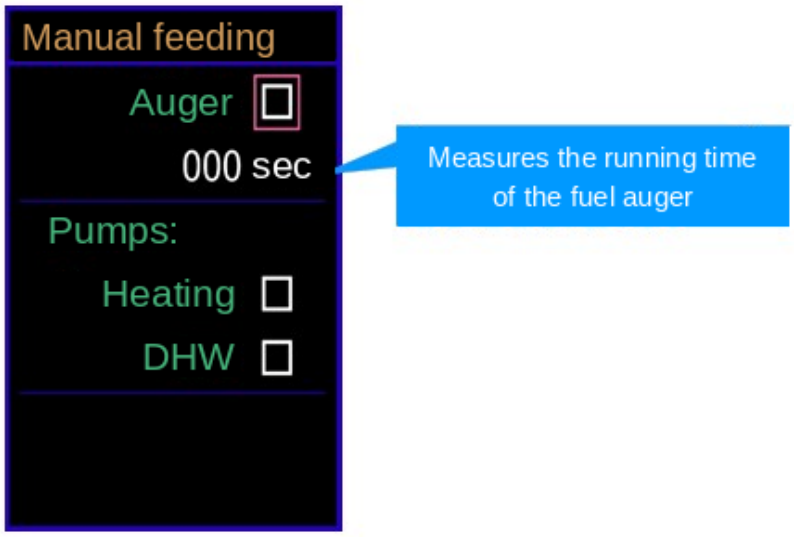
- **DHW prior.** – the domestic hot water (DHW) boiler is heated with priority. The DHW pump switches on when all of these conditions are met:
    - Boiler water temperature is above 35 °C
    - The difference between boiler water and DHW tank temperatures is above 5 °C
    - DHW tank temperature is below the "DHW temp" set in the DHW area

Once the set temperature is reached, the circulation pump switches off and switches on again when the DHW tank temperature falls below "DHW temp" – "Hysteresis" from the DHW area. To heat the DHW tank quickly, the heating circulation pump stops while the DHW pump runs. If a room thermostat is enabled in "Service settings" -> "Equipment", row "Room T-stat", the heating pump stops when the thermostat trips. Also, if the DHW tank water is hotter than "DHW temp" – "Hysteresis", the burner goes to the "Maintain fire" power level. If the room thermostat resets or the DHW tank temperature falls, the burner returns to normal operation according to boiler temperature.

If the situation does not change, the burner goes out after the time allowed for maintaining the fire expires. It relights when the boiler water drops below the set temperature minus the difference for switching from the second to the first power level (row P2 in "Service settings" -> "Power modulation"). If a room thermostat is enabled, then in addition either the thermostat must not be tripped, or the DHW tank temperature must fall below the set hysteresis.

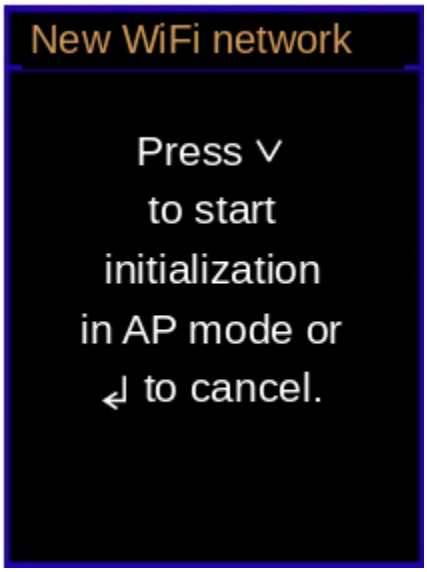
- For normal heat exchange, the set boiler temperature must be at least 5 degrees higher than the set DHW temperature!
- If no room thermostat is enabled, the room temperature is considered not reached and the heating pump will run unconditionally!
- **Heating + DHW** – both installations work: heating and hot water. Burner and pump operation is the same as in "DHW priority" mode, except that the heating circulation pump can run at the same time as the DHW pump.
- **Summer mode** – the boiler works only to heat the domestic hot water tank. The difference from "DHW prior." is that the boiler lights only when the DHW tank needs heating and goes out once it is heated. In this mode the heating installation is not controlled.

Manual loading – manual switching on of the fuel auger or the circulation pumps. This menu is useful for: filling the auger when it is empty; running the auger to measure the amount of pellets fed per unit of time, for calibration; switching on the circulation pumps for testing or filling their installation with liquid. As in all other menus, "▲" or "▼" checks or unchecks the box, switching the output on or off. "◄" or "►" moves the frame onto the desired output.

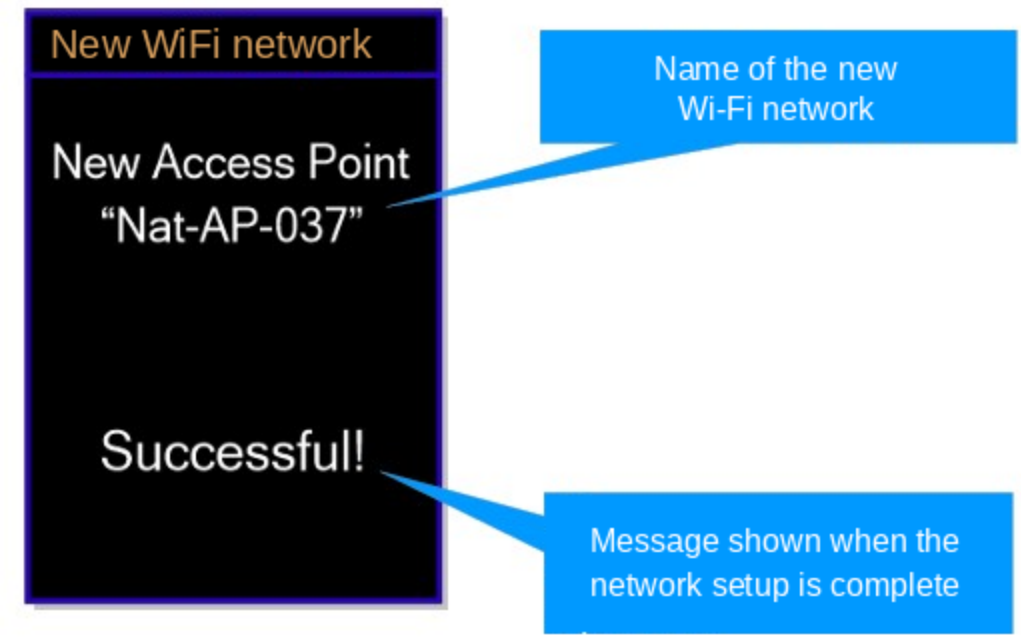


The maximum time "Manual loading" stays active without a button press is about 6 minutes. Then all outputs switch off and the previous screen is shown. This mode can be used to calibrate the fuel auger: first fill the auger, then run it for some period, e.g. 3 minutes, with the pellets falling into a large enough container. Then weigh the collected pellets and multiply the number by 20. This gives how many kilograms of pellets the auger delivers per hour.

New Wi-Fi network – if the NRC-6 has a Wi-Fi module for Internet connection and it is being installed for the first time, or the Wi-Fi network it connects to must be changed, use this menu.



Pressing "▼" switches the module to Access point mode and shows the screen below; you can then enter the name of the new network, the password and the encryption method.



Pressing ↲ (Menu) exits this function without changing the modem state.

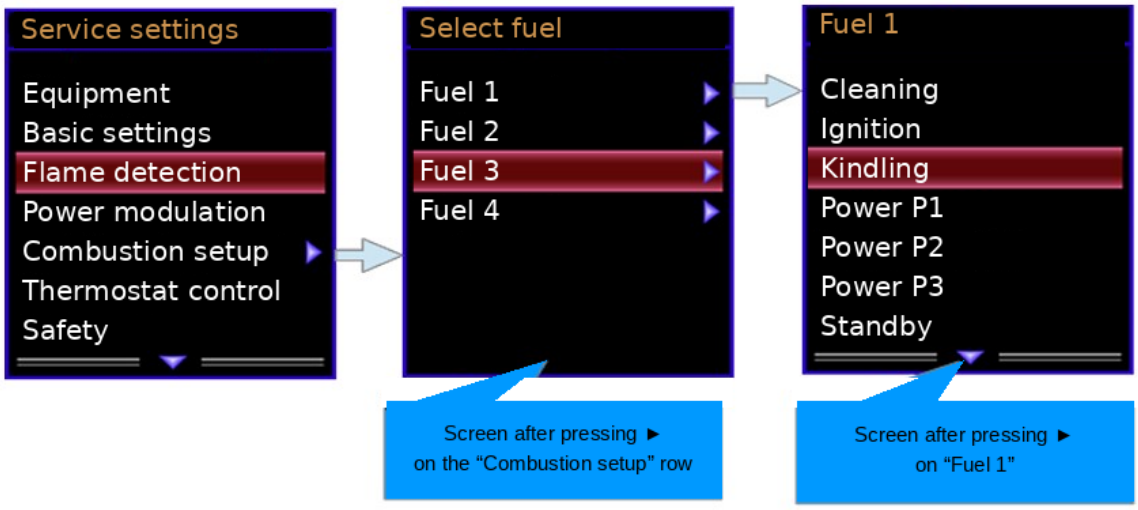
Service parameter settings

These parameters relate directly to the control of ignition, combustion and safety of the burner. For this reason, access to all sub-menus in this section can be restricted with an access code. The code is set in "Service settings" -> "Change code"; the same menu can also disable the code request. To enter the service settings menus, press and hold "Menu" for more than 2 seconds. If the personal code request is enabled, the screen below appears:



Use "▲" or "▼" to set the value of the current digit, and "►" or "◄" to move through the digits. To confirm the code, press ↲ (Menu).

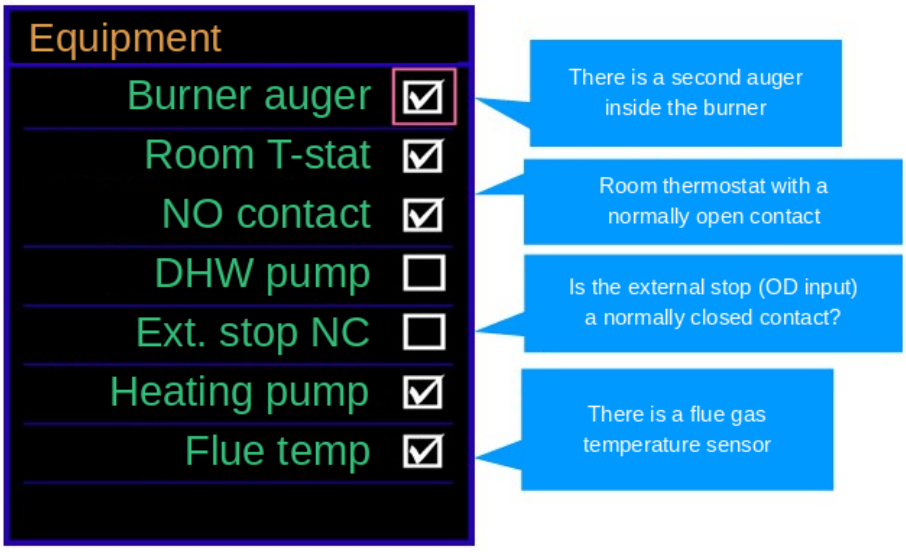
After the correct code is entered, the service settings menu selection screen appears. Note that the NPBC-V3C controller supports up to 4 different fuel profiles. Some settings do not depend on the fuel and are common to all fuels. However, many parameters depend on the fuel they are intended for, so you must first choose a fuel. The fuels are named Fuel 1, Fuel 2, Fuel 3 and Fuel 4. When a row has a right arrow, it leads to a new sub-menu:



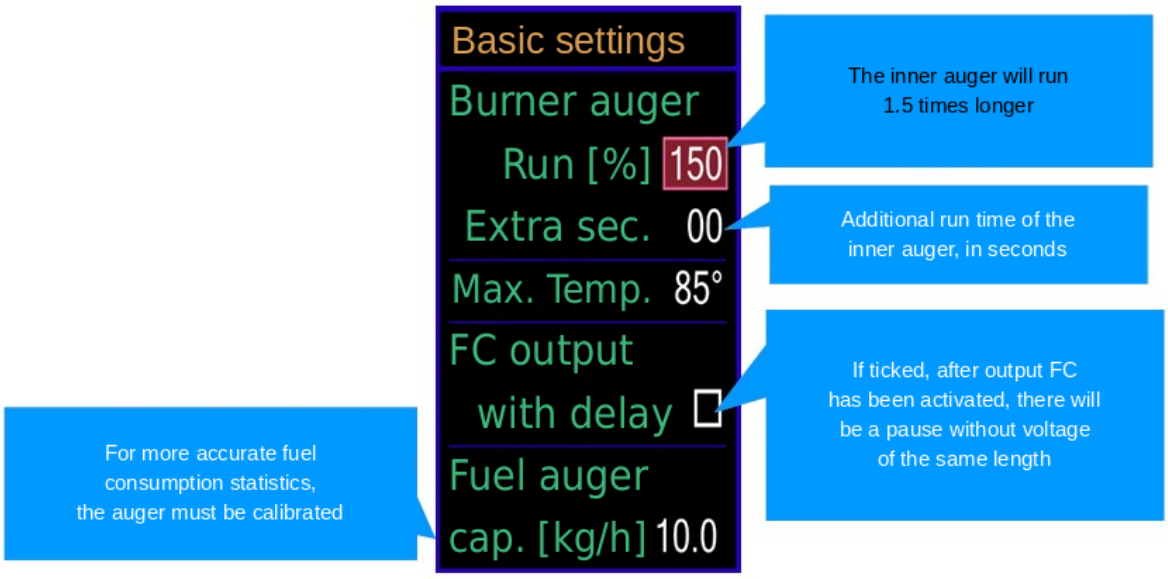
In hierarchical selection menus, "►" and "◄" move to sub-menus or back to previous menus.

Fuel-independent service settings

Equipment – sets the presence or absence of optional burner elements, and the contact polarity of the room thermostat and of the forced-stop circuit connected to input OD.



Basic settings – sets the control of the internal auger (burner auger), the maximum permitted boiler temperature, the fuel auger capacity, and whether output FC (cleaning fan) has an additional pause when used to drive a linear actuator, giving it time to return to its initial position after moving forward.

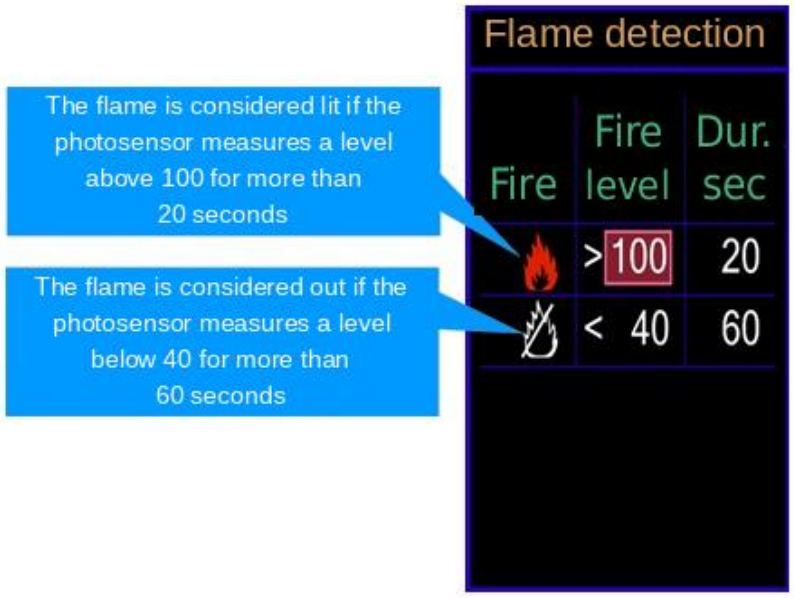


The internal auger switches on together with the fuel auger. The internal auger run time in seconds is:

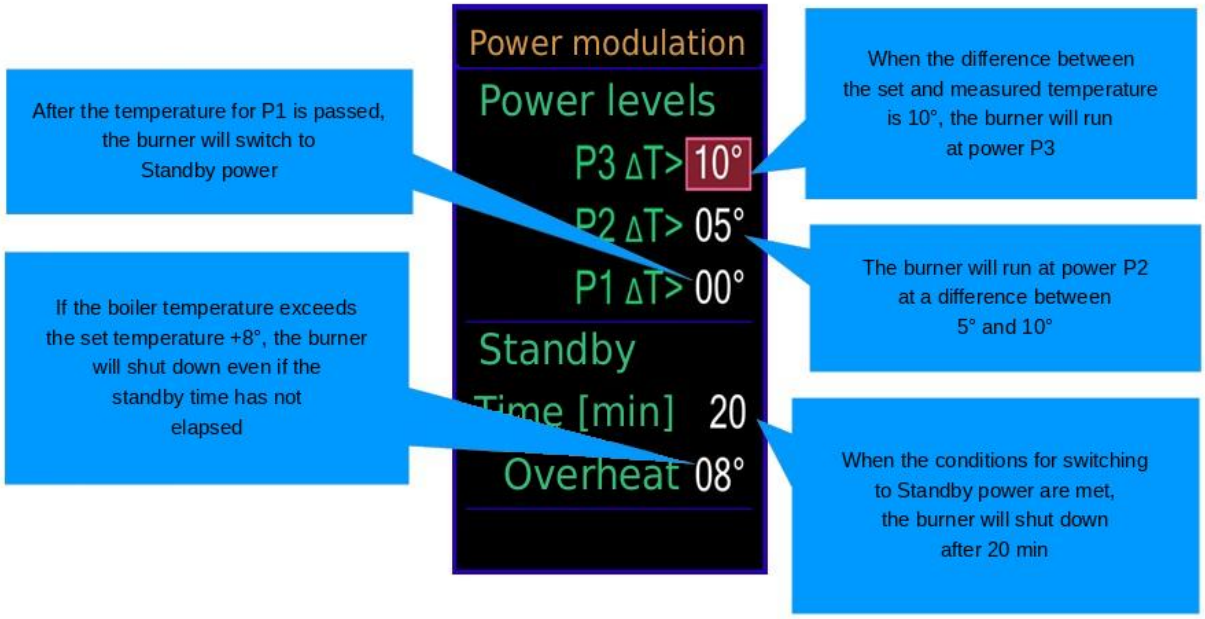
```
T_{ia} = \frac{T_{fa} \cdot Run}{100} + Extra\,sec.
```

where T_fa is the fuel auger run time in seconds.

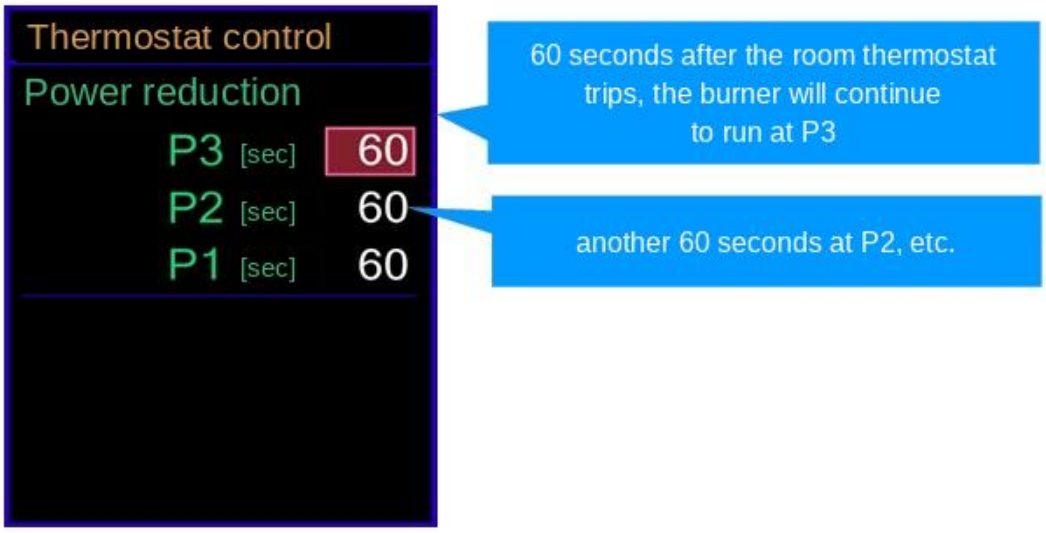
Flame detection – sets the photosensor brightness required to detect a lit or extinguished fire, and how long that brightness must be measured for reliable detection.



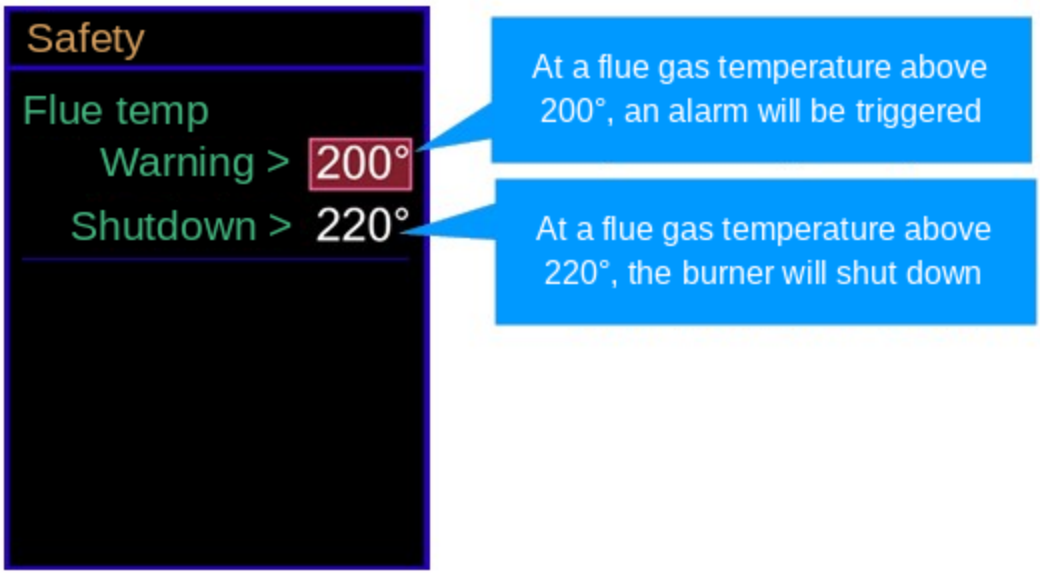
Power modulation – sets the differences between set and measured boiler temperature at which the burner switches from one power level to another. It also sets the conditions for the fire "Maintain" power level: waiting time, and maximum overheating above which the burner is extinguished.



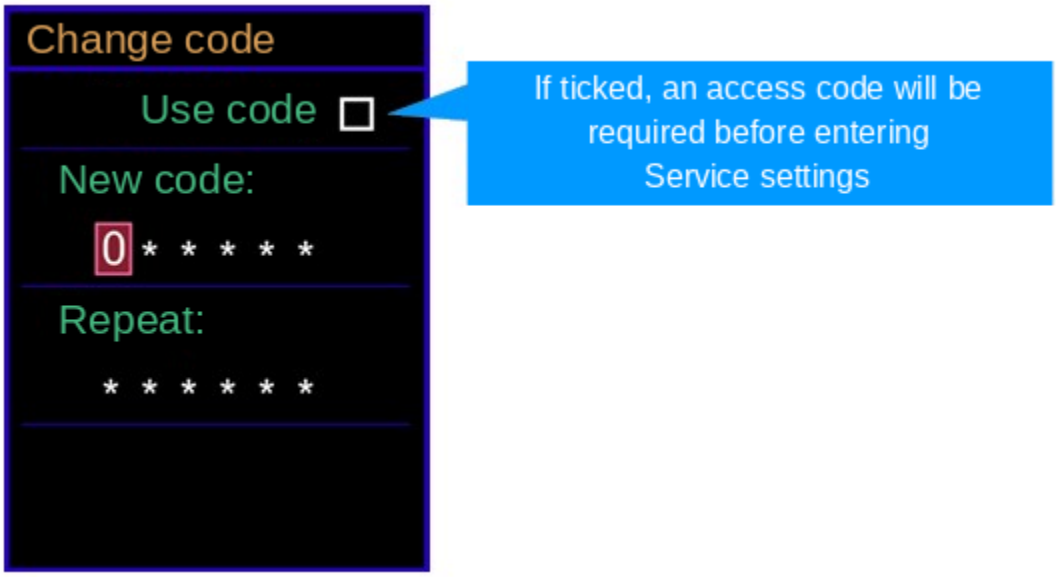
Thermostat control – sets how the burner output is reduced when the room thermostat trips and the pumps are in "Heating prior." mode. In this mode, after the thermostat trips, if the burner was running at P3, for example, it stays at that level for the time set below, then moves to P2, P1 and "Maintain". It stays at Maintain for the time set in "Service settings" -> "Power modulation", row "Time". These settings control how smoothly the heat supplied to the heating installation is reduced once the desired room temperature is reached.



Safety – if a flue gas temperature sensor is installed, it can be used to raise an alarm or extinguish the burner when the temperatures set in this menu are exceeded.

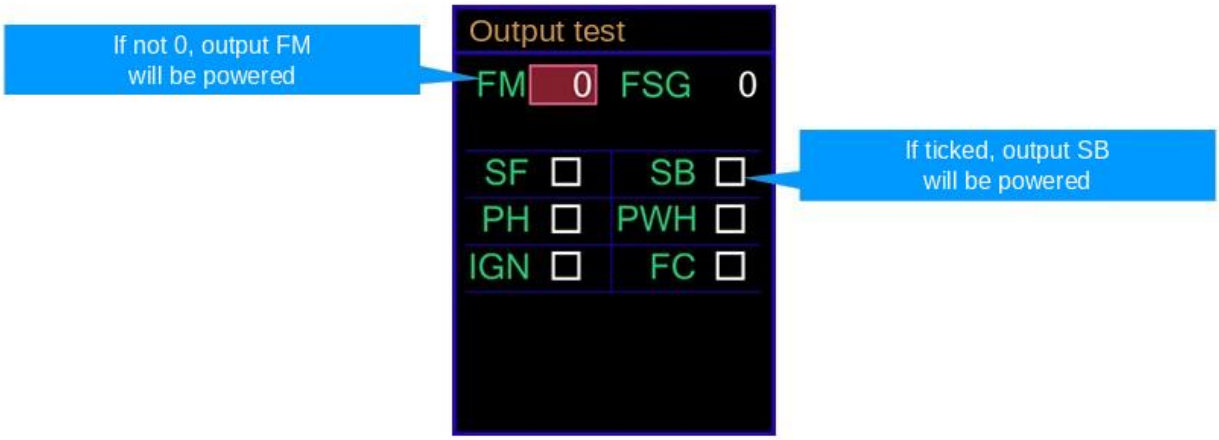


Change code – enables or disables the access code for the service settings menus. The code consists of digits only. For security, only the digit being changed is visible. If you enable the code on this visit to the menu, you must enter a new code, otherwise the setting will not take effect!



You do not have to enter all the digits, but when repeating and when entering the access code you must leave out the same digits in the same way!

Output test – this menu lets you control all controller outputs directly. The burner must be switched off for this. The menu stays active for a maximum of 5 minutes without a button press; then the outputs switch off and the previous screen is shown.



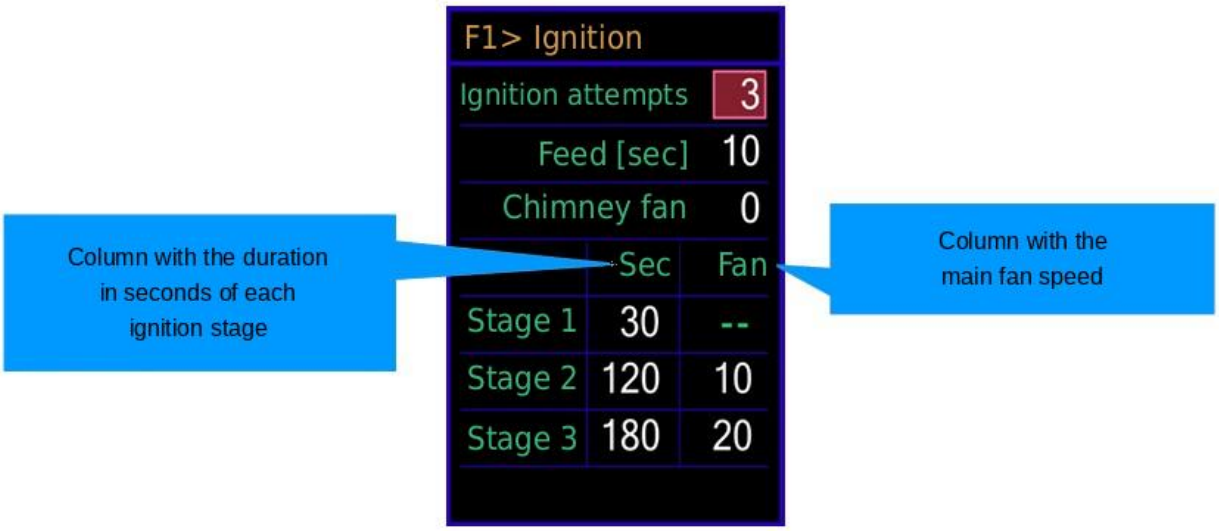
Fuel-dependent service settings

To enter these settings, go to the main service settings screen, highlight "Combustion settings", press "►", choose a fuel and press "►" again.

Cleaning – sets the duration of cleaning cycles, with the run times of the main and additional cleaning fans. It also sets whether there are automatic cleaning cycles and at what interval. Automatic cleaning cycles follow this sequence: extinguishing, post-extinguishing cleaning, and relighting. Cleaning runs before ignition (row Start), after extinguishing or during automatic cleaning (row Stop), and on a registered "Backfire" alarm (row Alarm).

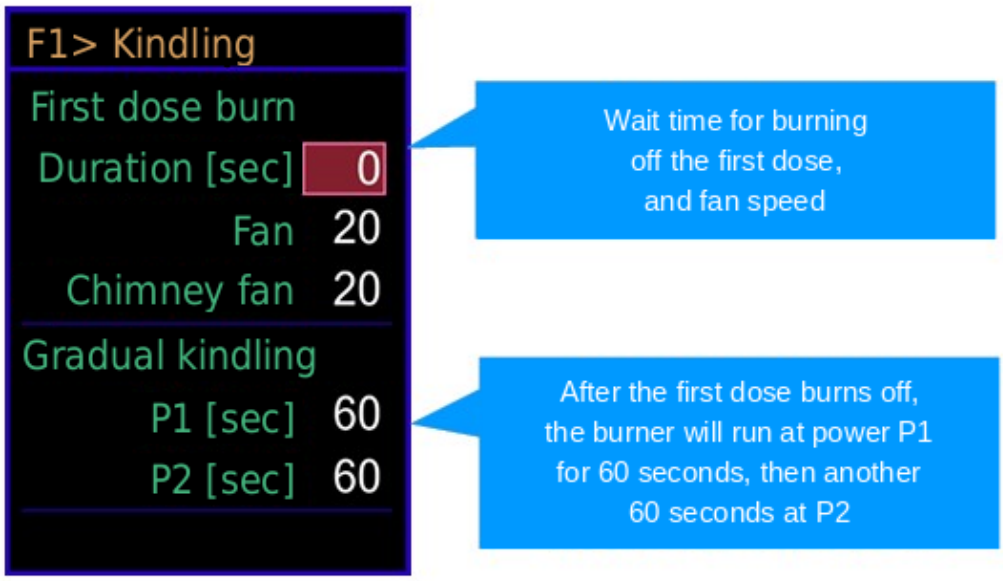


Ignition – sets the number of ignition attempts, fuel auger run time for loading the first pellet dose (Loading), chimney fan speed during the whole ignition period (Chimney fan), the maximum duration of each of the three ignition stages, and the main fan speed in each stage.



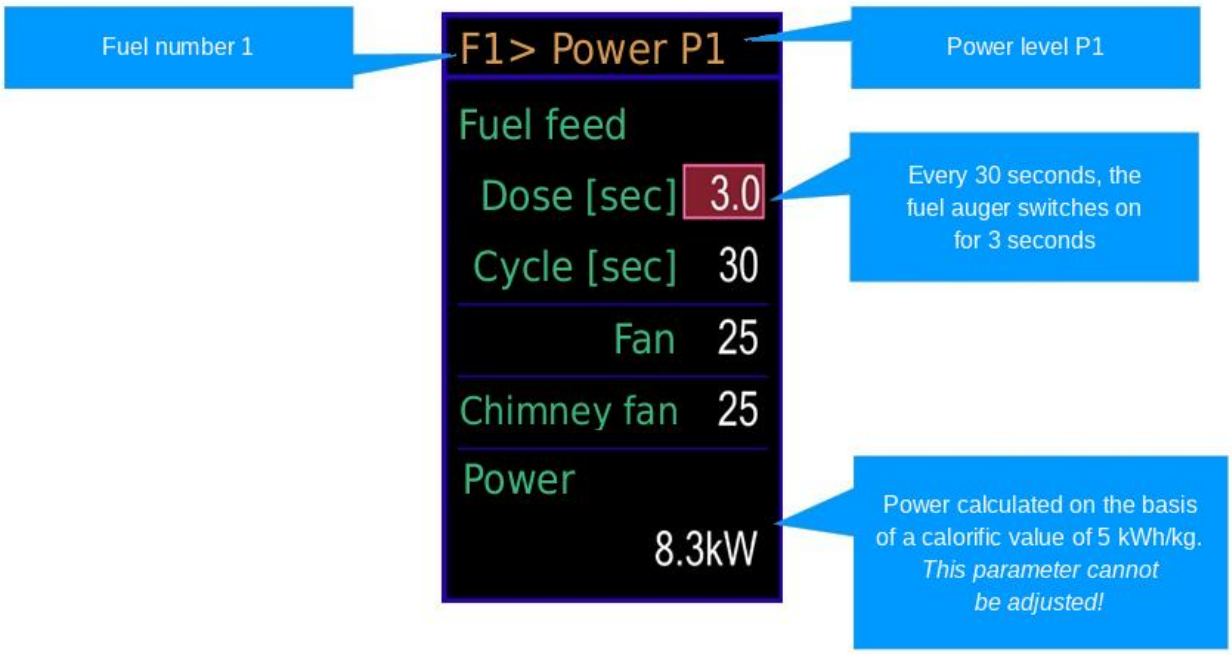
If the photosensor detects a lit fire, the ignition procedure stops immediately and the burner moves to build-up!

Build-up – sets the smooth build-up process that stabilises the fire after ignition. The upper field sets the main and chimney fan speeds and the duration (Durat. [sec]) of burning the first dose. No new pellets are fed while the first dose burns. The lower field sets how long each power level is held while output rises smoothly from the lowest, P1, up to the nominal level, depending on boiler water temperature.



Power P1, Power P2, Power P3, Maintain – identical menus for setting the operating parameters of each power level, from the lowest P1 to fire maintenance. To dose pellets precisely, set row Portion (fuel auger run time) and row Cycle (time between two fuel feeds). For the fire to burn properly, it needs

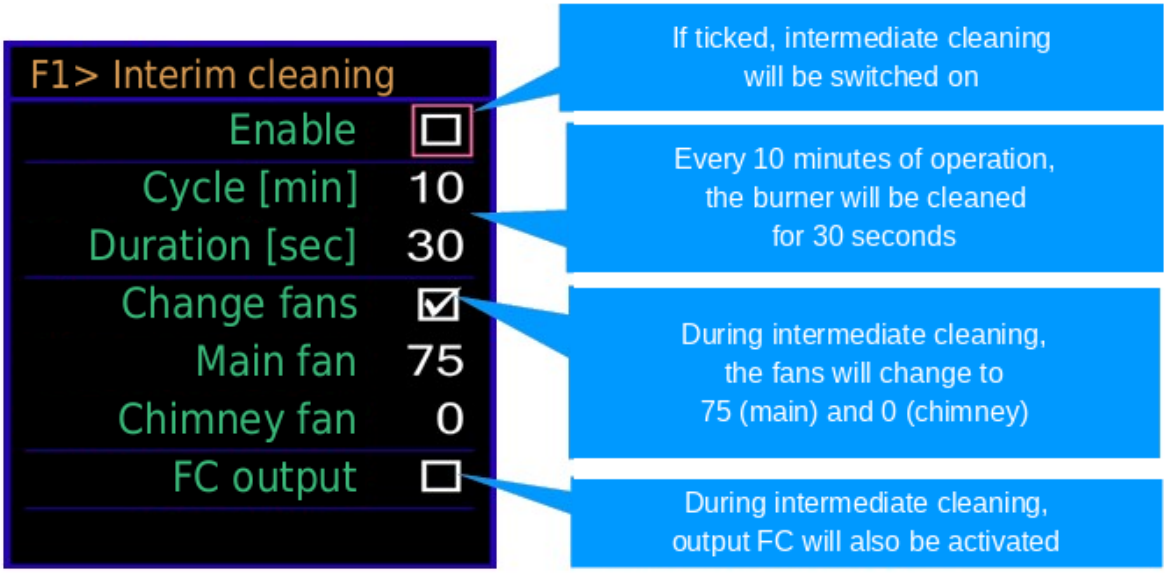
the right amount of air, so the main fan speed (row Fan) and chimney fan speed (row Chimney fan) must also be set.



We recommend setting P3 to the maximum output you want from the burner. P2 should ideally be 50% of P3, and P1 20% of P3. With these settings the controller can modulate burner output smoothly between 20% and 100%, changing power at each new cycle if needed. For example, if you need 75%, the controller alternates between P3 and P2 at equal intervals, so the average output is (100+50)/2 = 75. The switching time depends on the inertia of the whole system and on the temperature differences set in "Service settings" -> "Power modulation". The shortest switching interval between two power levels can be one cycle, about 20–30 seconds. Over such a short period the heating installation temperature will not change enough for you to feel the power pulsing. Adding "Maintain" power, which is lower than P1, gives the burner an even wider modulation range.

Important: when setting the Maintain parameters, do not lengthen the cycle between two pellet feeds so much that the pellets in the upper chamber burn out and leave too few embers to ignite the next pellets!

Interm. clean. – sets an extra feature of the NPBC-V3C called "Intermediate cleaning". While the burner works normally, only the fan speed is increased; this temporarily raises the fire temperature and burns slag and ash more completely. A mechanical cleaning mechanism connected to output FC can also be activated periodically while the fire burns, to scrape off stuck slag or ash. To do this, check row "FC output" and perhaps uncheck row "Change fan".



V-FIRE SC settings

Menu	Parameter	Unit	Min	Max	SC 40	SC 50	SC 100	SC 300
Display	Brightness	level	2	10	7	7	7	7
Pump control	Heating pump – On	°C	35	80	50	50	50	50
Pump control	Heating pump – Hysteresis	°C	2	7	5	5	5	5
Pump control	DHW pump – DHW temp.	°C	30	70	50	50	50	50
Pump control	DHW pump – Hysteresis	°C	2	7	5	5	5	5
Basic settings	Burner auger – Run	%	150	150	150	150	150	150
Basic settings	Burner auger – Extra	seconds	4	4	4	4	4	4
Basic settings	Max. temp.	°C	85	85	80	80	80	80
Basic settings	Fuel auger capacity	kg/h	1	400	22	22	150	300
Flame detection	Ignition	level	50	150	50	50	50	50

Flame detection	Ignition	seconds	20	240	20	20	20	20
Flame detection	Extinguishing	level	10	150	10	100	10	10
Flame detection	Extinguishing	seconds	100	240	100	100	100	90
Power modulation	P3 ΔT	°C	2	10	10	10	10	10
Power modulation	P2 ΔT	°C	1	5	5	5	5	5
Power modulation	P1 ΔT	°C	0	2	2	2	2	2
Power modulation	Time	minutes	0	120	120	120	120	120
Power modulation	Overheating	°C	0	20	10	10	10	10
Cleaning	Start – Fan	seconds	10	600	30	30	30	30
Cleaning	Start – FC	seconds	0	250	0	0	60	60
Cleaning	Stop – Fan	seconds	10	600	180	180	300	300
Cleaning	Stop – FC	seconds	0	250	210	210	250	250
Cleaning	Alarm – Fan	seconds	10	600	0	0	0	0
Cleaning	Alarm – FC	seconds	0	250	0	0	0	0
Cleaning	Cycle – automatic cleaning	minutes	10	990	120	120	120	120
Ignition	Ignition attempts	number	0	5	3	3	3	3
Ignition	Load	seconds	1	120	34	34	40	20
Ignition	Chimney fan	speed	0	100	-	-	-	-
Ignition	Stage 1	seconds	0	600	200	200	200	200
Ignition	Stage 1	speed	-	-	-	-	-	-
Ignition	Stage 2	seconds	10	540	200	200	200	200
Ignition	Stage 2	speed	0	100	52	52	15	15

Ignition	Stage 3	seconds	10	540	200	200	200	200
Ignition	Stage 3	speed	0	100	54	54	20	20
Build-up	Duration	seconds	0	300	200	200	200	200
Build-up	Fan	speed	0	100	53	53	20	20
Build-up	Chimney fan	speed	0	100	-	-	-	-
Build-up	P1	seconds	10	600	10	10	10	10
Build-up	P2	seconds	10	600	60	60	60	60
Power P1	Portion	seconds	0.1	25.0	3	8	10	10
Power P1	Cycle	seconds	4	120	45	45	45	45
Power P1	Fan	speed	0	100	42	42	15	15
Power P1	Chimney fan	speed	0	100	-	-	-	-
Power P2	Portion	seconds	0.1	25.0	5	5	15	25
Power P2	Cycle	seconds	4	120	45	45	45	45
Power P2	Fan	speed	0	100	47	50	20	20
Power P2	Chimney fan	speed	0	100	-	-	-	-
Power P3	Portion	seconds	0.1	25.0	9	9	9	15
Power P3	Cycle	seconds	4	120	45	45	45	45
Power P3	Fan	speed	0	100	50	50	25	25
Power P3	Chimney fan	speed	0	100	-	-	-	-
Maintain	Portion	seconds	0.1	25.0	2	6	0.5	0.5
Maintain	Cycle	seconds	4	120	45	45	25	25
Maintain	Fan	speed	0	100	33	33	10	10
Maintain	Chimney fan	speed	0	100	-	-	-	-
Intermediate cleaning	Cycle	minutes	1	15	5	5	5	5
Intermediate cleaning	Duration	seconds	4	120	30	30	30	10

Intermediate cleaning	Main fan	speed	0	100	60	60	30	30
Intermediate cleaning	Chimney fan	speed	0	100	-	-	-	-
Thermostat control	P3	seconds	10	240	60	60	60	60
Thermostat control	P2	seconds	10	240	60	60	60	60
Thermostat control	P1	seconds	10	240	60	60	60	60
Safety	Warning >	°C	150	300	-	-	-	-
Safety	Shutdown >	°C	151	350	-	-	-	-

Warranty card

VF ENGINEERING LTD · BG 206781322 · 10 Shabla St., Batak · +359884576656 · http://v-fire.eu/

Seller: ……	Buyer: ……
/Seller's stamp/	/Buyer's name/

Date of purchase: .....

Model	Serial No.	Warranty period (months)
V-FIRE SC		

Warranty conditions

1. The warranty period starts from the date of purchase by the end customer, stated above.
2. Warranty service is provided only with correctly completed and valid warranty documents and on presentation of valid payment documents (receipt, invoice). The warranty is void if the invoice or warranty card is damaged, corrected or altered.
3. The warranty is valid only for faults caused by a manufacturing defect that appear within the warranty period.
4. Claims for incomplete delivery are accepted only at the time of purchase.
5. The product is accepted for warranty repair only in packaging that ensures safe transport. Warranty service requires that the product has no mechanical deformation and that the warranty stickers are intact.
6. The warranty covers all burner components.

Date received	Date repaired	Description of repair and parts replaced	Technician's name	Signature and stamp
