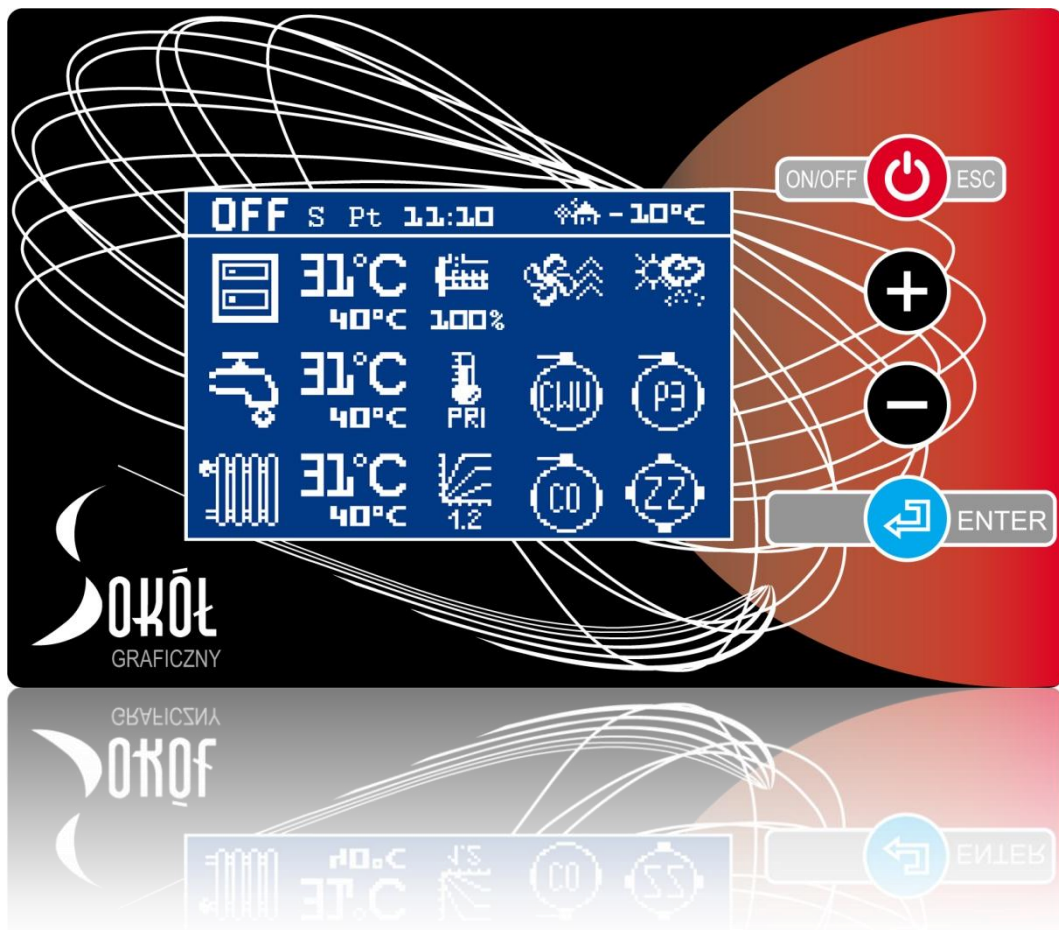




Fuzzy Logic 310LG RTC

User manual



Solid fuel boiler controller
with gutter burner ignition

On behalf of Pionier Elektryk, thank you for choosing the FL 310LG RTC controller. The FL 310LG RTL has been designed and developed by a team of dedicated engineers. who have used their collective talents to create a product that is efficient, user- friendly and safe to use. As a user of the FL 310LG RTL myself, I sincerely recommend it to you and encourage you to read the following instructions. Also please visit our website at www.pionier-elektryk.pl, where you can find professional help and valuable guidance with respect to its installation and use.

Andrzej Kowalewski,

Founder, Pionier Elektryk



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1. TECHNICAL PARAMETERS

Table. 1.1. Technical parameters

Power	~230V/50Hz
Power consumption	< 5VA
OPERATING COMPONENTS	
C.O. pump	100W
C.W.U. pump	100W
Circulation pump	100W
Additional pump	100W
Blower	150W
Feeder	200W
Igniter	900W
Calorifier disinfection	100W
Motorised valve	50W
Lambda probe power supply	18W
WORKING TEMPERATURE RANGE:	
Boiler temperature	55-80°C
C.W.U. temperature	5-80°C
Temperature tolerance	+/-5°C
Temperature of boiler environment	2-55°C
Humidity range	5-95%
Boiler temperature alarm	90°C
Feeder temperature alarm	80°C

2. INTRODUCTION

The FL-310LG controller is an advanced microprocessor-based system designed to adjust the operating parameters of solid fuel-powered boilers (i.e. pellet, grain, granulated coal, wood and the like). The controller automatically calculates time of fuel supply which is suitable for existing conditions and the amount of dispensed air necessary for proper combustion which significantly improves the ecological performance, efficiency and economic operation of the boiler. The clock program provides a number of important and at the same time innovative functions. These include the ability to set a weekly schedule of work for the circulation and additional pump as well as the burner. Proper adjustment of these functions will increase the usability of the boiler and contribute towards its efficiency.

The controller offers the user a choice of three automatic working modes which enable the central heating and hot water supply to be adjusted to meet specific needs. This provides a significant convenience to the user by eliminating the need to adjust the working parameters of the system as soon as conditions change inside or outside the building.

A thermostatic room controller is also available as an optional extra which enables a constant temperature to be maintained in the room or areas of the building most frequently used.

The measurement of exhaust gas temperature and the level of oxygen contained in exhaust gas emissions enables a high level of boiler efficiency to be achieved. The lambda probe is the central element responsible for the combustion process and in conjunction with other elements of the boiler helps to maximize the effectiveness of its operation. This in turn leads to a reduction in boiler operating costs and cleaner exhaust gas emissions.

The controller is equipped with a graphical LCD display which enables the user to change the value of editable parameters and control other settings responsible for optimum operation of the boiler. This is an intuitive program and the interface is easy to use even for a beginner with limited knowledge.

3. SYSTEM CONTROLS

The FL-310LG controller, controls and monitors the work of the boiler, which primarily requires to be equipped with a feeder tray, fan and circulation pumps for both the central heating and hot water circuits(for domestic use). In addition, it is **strongly** recommended to install **an oxygen sensor (Lambda probe), igniter and a valve actuator for the central heating system and a circulation pump.**

For proper operation of the controller, sensors must be connected for measuring the temperature of:

- Water in the hot water calorifier [CNT-125]
- Outside air (for "Feather" based working mode) [CNT-125]
- Exhaust gas [CPT-300]
- Boiler heat exchanger [CNT-125]
- Feeder tray mechanism [CNT-125]

WARNING!

The controller is manufactured from materials and includes components that are not biodegradable and which may otherwise be considered hazardous. For safe disposal it should either be returned to the manufacturer or given to a refuse collection agency specializing in the recycling of non-biodegradable and hazardous waste. Under no circumstances should it be discarded with municipal waste.

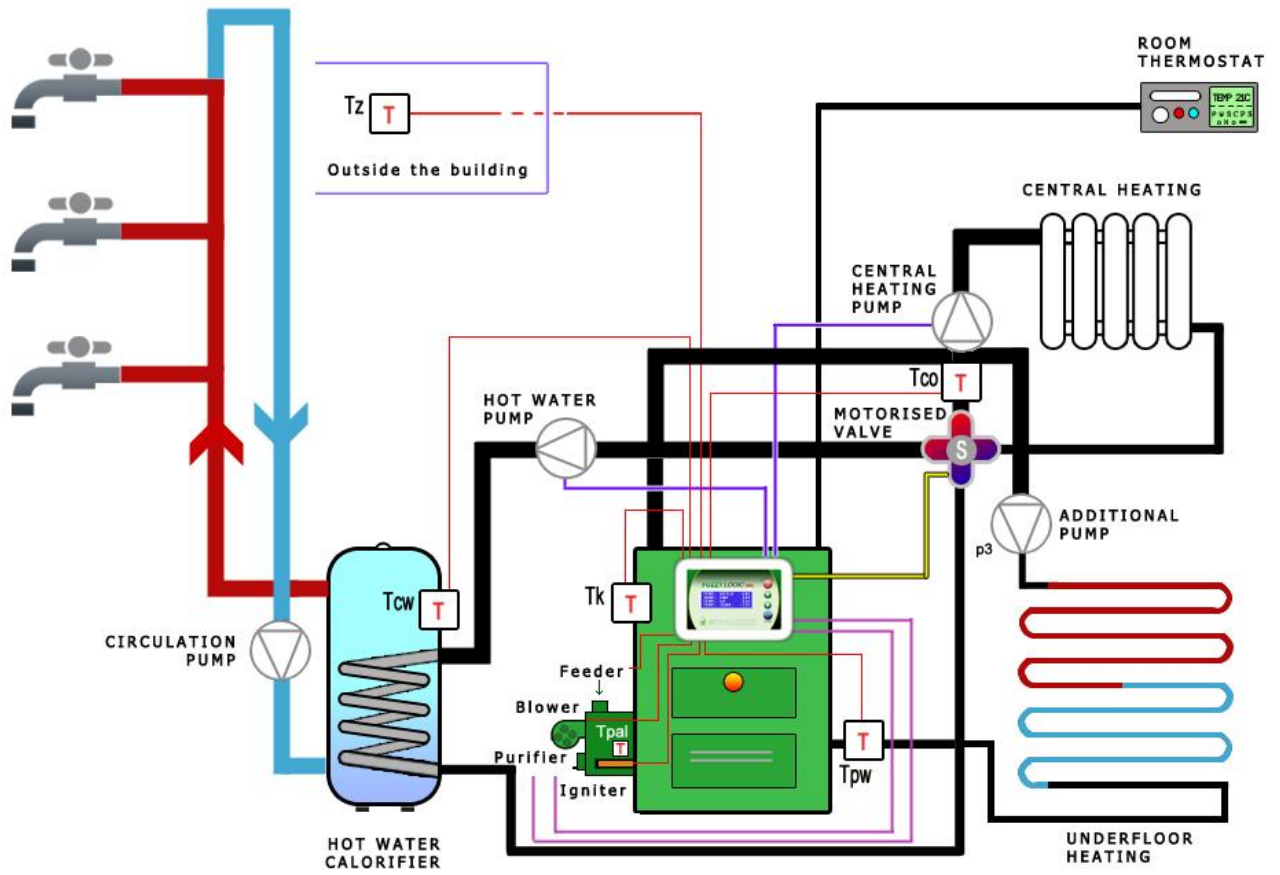


Fig. 3.1.1. General Arrangement Diagram

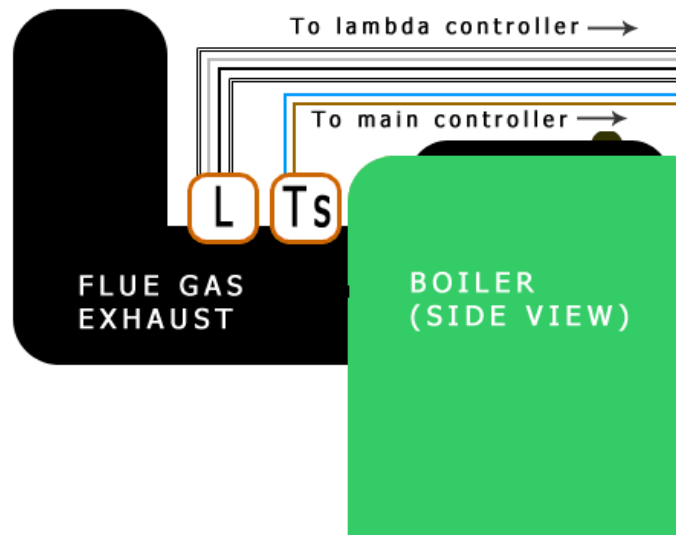


Fig. 3.1.2. General Arrangement Diagram Cont.

Table. 3.1. Technical parameters

Sensors	
Tco	Central heating temperature
Tcw	Hot water temperature
Tk	Boiler temperature
Tz	Outside air temperature
Ts	Exhaust gas temperature
Tpw	Return water temperature
Lambda	Lambda sensor
Tpd	Feeder tray temperature
Reg.pok	Room thermostat (set temperature)

4. SAFETY

- The controller should not be connected to the mains power supply until after it has been installed and all ancillary components have been properly connected.
- The operator panel and the control module form a combined unit and cannot be used separately.
- The automatic safety function incorporated in the controller cannot be used in isolation to protect the heating system which, itself, needs to be provided with an adequate arrangement of pressure relief valves.
- The socket-outlet through which the controller is connected to the mains power supply must be properly earthed and provided with an earth pin (for use with a two-pin earthed plug), or an earth pin receptacle (for use with a three-pin earthed plug).
- The hot water calorifier (DHW) should be provided with a pressure relief valve.
- When connecting any devices to the controller, make sure that the controller is physically disconnected from the mains power supply. Failure to do so can cause risk of electric shock and/or damage to the controller and ancillary devices.
- If the power cord becomes damaged, it should immediately be replaced with a new cable of the same specification as the original.
- Do not dismantle the controller or attempt to make any changes to the control system. This can result in poor performance or permanent damage being caused to the controller as well as to other components of the system. Under such circumstances the manufacturer is not liable for any and all damage arising from tampering with or modification of the device.

5. ELECTRICAL INSTALLATION

When connecting the controller always observe statutory safety requirements. The control unit must only be installed by a suitably qualified person or by an authorized installer and strictly in accordance with current regulations, standards and codes of practice. The manufacturer is not liable for any damage arising from breach of these instructions. The operating panel should be installed permanently in the outer boiler casing, which will extend its life. The control module must also be protected against mechanical damage. This unit should be connected to a mains electricity supply that features both an Earth Leakage Trip (ELT) and surge protection.

The controller operates with CNT-125 sensors for temperatures ranging from -40°C to 125°C and CPT-300 sensors for temperatures ranging from -40°C to 350°C. Strap-on temperature sensors must be securely fastened at the measuring points shown in this manual and provided with thermal insulation in order to achieve the best possible accuracy of measurement.

5.1. Controller inputs

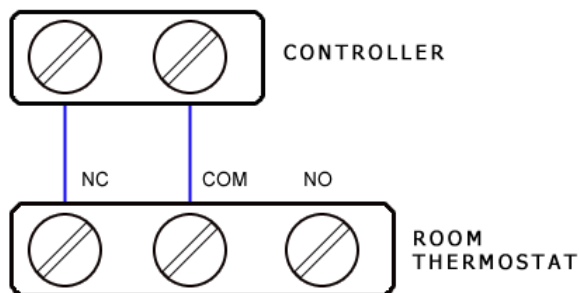
Table. 5.1.1. Description of controller inputs

Tk	The boiler temperature sensor in the boiler prepared measuring point
Tcwu	The water temperature sensor in the hot water calorifier
Tpod	The feeder temperature sensor is to be securely attached to the worm drive casing with a suitable sized hose clamp as close to the combustion chamber intake as reasonably practical. The sensor should also be thermally insulated so that the measurement it records is accurate and not influenced by ambient conditions.
Tspal	The exhaust gas temperature sensor is to be placed in the temperature measuring port of the boiler exhaust outlet.
Tco	The central heating temperature sensor is to be securely attached to the hot water supply pipe with a suitably sized hose clamp immediately behind the pump and check valve. The sensor also needs to be thermally insulated so that the measurement it records is accurate and not influenced by ambient conditions.
Lambda	The oxygen sensor and its measuring module must be connected to a separate input used exclusively for measuring the quality of flue gas emissions.
Tzew	The outdoor air temperature sensor should be mounted on the north side of the building and in such a position that it is not subject to direct sunlight. To ensure that it accurately records ambient air temperature it should not be placed close to any potential heat source such as a chimney, door or window.
Reg.pok.	The thermostatic room controller (available as an optional accessory), is used to maintain the desired room temperature.
Tpow	The return water temperature sensor , which measures the temperature of water returning to the boiler, should be securely attached to the return pipe as close to the boiler as practical. The sensor should also be thermally insulated so that the measurement it records is accurate and not influenced by ambient conditions.

WARNING!

Room thermostat contacts should remain closed until the set temperature has been reached. The thermostat should be positioned in a location where the temperature is most constant e.g. away from direct sunlight and not in the immediate vicinity of an external door, window or heat source such as a TV, heater or radiator. If a room thermostat is not installed the driver input to REG.POK and GND should be closed or the value of the parameter temp.reduction set to 0 (zero).

Fig.5.1.1. Connection of the room thermostat to the controller



5.2. Controller output

Table.5.2.1. Description of outputs

Z0	Closing of the four-way mixing valve (actuator).
Z1	Opening of the four-way mixing valve (actuator)
CW	hot water pump
CO	Heating pump
ZP	Igniter
P3	Additional pump
C/K	Circulation pump or backup boiler
LZ	Power-up oxygen sensor
DM	Blower with vents
ZTK	Boiler thermal protection
POD	Feeder motor
N	Neutral terminals, AC power (230V, 50Hz).
L	Hot terminal, AC power (230V, 50Hz).

WARNING!

Connections must only be made while the controller is physically disconnected from the mains power supply by a suitably qualified person or by an authorized installer.

6. DRIVER MENU

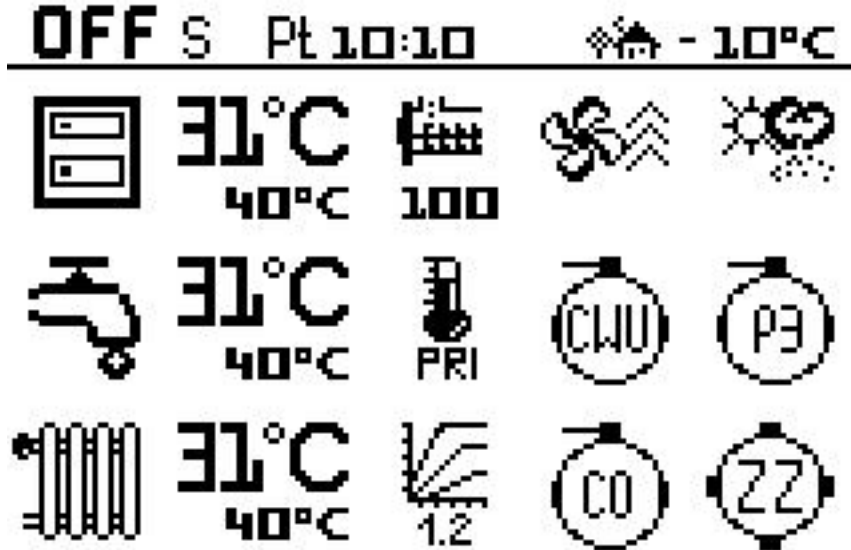


Illustration. 6.1 Main screen



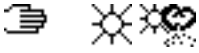
An icon displayed on the operator panel display indicates that the item or function to which it relates is switched on. If an icon is not displayed on the operator panel display the item or function to which it relates is switched off. The operator panel display shows the following:

1st line:




- System status (**ON**–switched on, **OFF**–switched off)
- A letter indicating the current state of the burner (**S**–Start/firing, **P**–sustaining, **N**–Normal mode, **D**–burner off)
- The day of the week and time of the day
- Outside air temperature Tz - 10°C

2nd line:

31°C 40°C	Current boiler temperature (above). Target boiler temperature (below).
100	Fuel feed active (above). Current burner power % (below).

	Igniter active.
	Operating status of air blower
	Mode of operation (manual, summer, weather).

3rd line:

	Current temperature of hot water (above). Target temperature (below).
	HW priority active
	Hot water pump active (CWU/HW). Additional pump active (P3).

4th line:




	Current central heating temperature (above). Target temperature (below).
	Currently selected heating curve.
	HC pump active (left). Valve actuator active [ZZ-closing, ZO-opening] (right).

Table.6.1. The Structure of the main menu

BOILER	mode	One of the three modes of automatic burner operation
	hysteresis	When the temperature drop is equal to this value below target value the burner will start
	target temperature	The boiler temperature beyond which the burner will stop, start or sustain burning
	system password	Allows access to edit advanced parameters
HEATING CIRCUIT (HEATING)	target temperature	After reaching this temperature the pump is turned off (where no actuator valve is installed) or (where an actuator valve is installed) the valve will begin closing
	heating curve	This parameter is used to choose the basis for calculating the level of heating required in relation to outside air temperature.
	heat.curv correct (heating curve correction)	Calculated target temperature can be raised or lowered by applying a suitable correction curve.
	Temp reduction (Temperature reduction from room controller)	HC target temperature is automatically reduced by a preset value when the room controller signals that HC target temperature has been reached.
	heatingPump-pause (HC pump stop time)	With the system set to HW priority the HC pump is switched off until the target HW temperature has been reached. However, If the system detects that the indoor temperature has fallen below minimum level, it will override HW priority and switch the HC pump on. (Frost protection)
	heatingPump-start (HC pump on time)	With the system set to HW priority and with the HW temperature having been reached, the HC pump is now switched on.
HOT WATER CIRCUIT (WATER)	Target temperature	The hot water temperature above which the hot water pump is switched off
	hysteresis	When the temperature of hot water drops below the value of this parameter and is below the target temperature the hot water pump will start
	water priority	This function gives priority to heating hot water to the required temperature before allowing pumps outside the HW circuit to be switched on.
	disinfection	This is the procedure for disinfecting the hot water calorifier by heating it to about 71°C
	...day	day of the week on which disinfection starts
	...hour	hour of the day disinfection starts
	prior.BoilerTemp	When the system is set to HW priority, the value set in this

	(temperature as priority)	parameter will mean a temporary boiler temperature target.
BURNER	fuel	Choice of fuel supply. One of the fuels defined in the menu.
	support-STOP	waiting time between the boiler having reached its target temperature and the switching on of the feeder tray in the sustain burning mode (applies only where EkoGroszek (pea coal) is used as feedstock)
	support-STRT	Feeder tray working time in sustain burning mode after the boiler reaches its target temperature. (applies only where pea coal is used as feedstock)
	supp.BlowerAddit (blower outlet)	The value of this parameter represents the time the blower is working to sustain the heat in a measured amount of fuel between the time the boiler shuts down after reaching its target temperature and start of the next heating cycle. (applies only where pea coal is used as feedstock)
	antiblockade (anti-lock)	When the boiler reaches its target temperature the feeder tray is switched on every 20 minutes. The value of this parameter represents the period of time the feeder tray is active.
	test mode power	When test mode is enabled, in order to establish certain output parameters, the burner maintains a constant output level equal to the value of this parameter
	fuel trans.100% (Administration at 100%)	Time of administration of a single dose of fuel at 100% power of the burner. For the other powers of the burner, the feeder working time is calculated by FuzzyLogic on the basis of this parameter
	initial feeder (initial application)	When the boiler reaches its target temperature, residual fuel in the combustion chamber will be burned-off. When the burner starts up again after a fall in boiler temperature, it will do so from an initial application of clean fuel. The feeder tray working time needed to provide that application is equal to the value of this parameter)
	inflammation (fuel ignition)	After an initial amount of fuel, has been fed into the combustion chamber the igniter switches on for a set period of time to raise the temperature in the fuel to a combustible level. That time is set by this parameter. It is the time defined by this parameter that is used. Where an igniter is installed with a power rating exceeding 600W, to avoid damage to the igniter element the parameter must be set to a value of 0 (zero). Ignition will then be carried out using blower + igniter
	igniter + blower	During firing mode the blower is used in conjunction with the igniter. This enables proper ignition of the fuel to occur without risk of the igniter overheating
	fire testing (Trial Firing)	The burner attempts to start not by using the igniter but by using the residual heat in the combustion chamber from a previous heating cycle. During this period the burner operates in normal mode and attempts to stir up flame in conjunction with the blower.

	starting power	Minimum burner power with which the burner starts and which FuzzyLogic can reduce
	fire extinguish. (Burning off)	Sets the parameters for burning off residual fuel in the combustion chamber at the end of a heating cycle. Also sets the parameters for shutting down after turning off the system (transition from ON to OFF)
BLOWER	oxygen 100% oxygen 80% oxygen 60% oxygen 40% oxygen 20%	Values of oxygen for a corresponding burner power. The value for intermediate powers is calculated by FuzzyLogic
	correction	When the value of oxygen sensed by the lambda probe is beyond the scope defined for a given burner power, the system enables blower power to be adjusted
	blower @100% blower @ 80% blower @ 60% blower @ 40% blower @ 20%	Power of the blower for each burner power value. Power for intermediate values is calculated by FuzzyLogic
	inflammation (Blower Power)	Power of the blower during firing when the blower works with the igniter
	suport power (Blower Power)	During sustaining heat when the period of administration of fuel and air occurs, this value determines the power of the blower
	fire extinguish. (Burning off)	parameter for blower power while burning off residual fuel in the combustion chamber at the end of a heating cycle
	TIME	DATE day hour minute
circulation pump		Value- ON -indicates that the work schedule of the circulation pump is switched on.
additional Pump-P3 burner		Value- ON -indicates that the work schedule of the additional pump is turned on. Value- ON -indicates that the work schedule for the burner is turned on.
CIRCULATION PUMP calendar		Representation of the days of the week (on the right) and the schedule for the given day (3 timelines in the centre) of circulation pump activity

	<p>Copy</p> <p>Edit</p> <p>ADDITIONAL PUMP P3</p> <p>calendar</p> <p>Copy</p> <p>Edit</p> <p>BURNER</p> <p>calendar</p> <p>copy</p> <p>Edit</p>	<p>Copy the work schedule of the circulation pump, selected from another calendar.</p> <p>Edit changes to the daily work schedule of the circulation pump</p> <p>Representation of the days of the week (right) and the schedule of the day (3 timelines in the centre) additional pump P3 activity</p> <p>Copy schedule for additional pump P3, selected from another calendar</p> <p>Editing changes in the daily work schedule for additional pump P3</p> <p>Representation of the days of the week (right) and the schedule of the day (3 timelines in the centre) for burner activity inc. extinguishing and lighting</p> <p>Copy the selected burner schedule to another calendar</p> <p>Making changes in the schedule of the selected burner</p>
<p>SENSORS</p>	<p>Boiler temperature</p> <p>water temp</p> <p>heating temp</p> <p>exhaust temp</p> <p>feeder</p> <p>outside temp</p> <p>return temp</p> <p>O2</p> <p>blower correct.</p> <p>return min.temp</p>	<p>Real time measurements from all sensors (including the lambda sensor and oxygen correction)</p>
	<p>feeder max temp.</p>	<p>The maximum working temperature of the feeder tray. When it is reached an alarm switches on</p>
	<p>boiler max.temp</p>	<p>The maximum working temperature of the boiler. When it is reached, an alarm switches on and preventive measures are initiated, e.g. switching the pumps on.</p>
	<p>boiler min.temp</p>	<p>The value defining the minimum temperature which the boiler can adopt as a target temperature. In addition, it determines</p>

		the temperature of the boiler at which the circulation pumps are switched on
	heating max.temp	After detecting this temperature by the HCSensor the mixing valve actuator is closed. If there is no actuator, the HCpump will be switched off.
	pump min.temp	When the temperature of the boiler drops to this value circulating pumps are switched off
OPTIONS	extra pump (Auxilliary pump P3)	If an additional pump is connected this parameter should be set to YES
	boiler-reserve (backup boiler)	If the terminals of the circulating pump are also connected to a backup boiler then this parameter should be set to YES. Otherwise the circulating pump will be activated according to its schedule
	test mode	In order to temporarily turn off (for 45 min) FuzzyLogic, in order to set the parameters of oxygen at constant power of the burner, this parameter should be set to YES
	lambda sensor	If a lambda sensor is connected then this parameter should be set to YES
	kontrast LCD	Selects display brightness/contrast
	resetParam(OFF) (factory settings)	To restore factory default settings press + while system in OFF state
	language	Select one of the languages of the system
TEST	Feeder tray Blower extra pump HC pump water pump Igniter Valve close Valve open lambda sensor	Testing controller connections

7. BOILER CONTROL PROGRAMME

7.1. Sensor measurements

All sensors connected to the sensor controller continue to function regardless of system state (ON/OFF). Even if the boiler stops working or some other malfunction occurs the sensors continue providing data to the controller. This enables the controller to detect when a defect has been overcome and the system can be returned to normal operation i.e. when a temperature that is too high or too low is again within acceptable range.

7.2. LCD display

The LCD display backlight will automatically turn off if no key is pressed for a period of 5 minutes and the screen will go blank. Pressing any key will turn the backlight back on and return the screen to normal. The **Options** sub-menu **kontrast LCD** is used to set screen brightness on a scale of 0 – 10, where 0 is blank and 10 is full bright. The recommended brightness level is 4.

7.3. Controller driver pin test

When the system is at idle (OFF on the LCD display) this idle period can be used to test the driver pin of the controller i.e. to test an output of the controller. To do this enter the sub-menu **TEST** and select an output. This starts a countdown of 90 seconds during which period the output is tested. At the end of 90 seconds the countdown function automatically turns off. To test another output repeat the process. Leaving the test sub-menu returns all tested outputs to their pre-test state. The burner ignition system can be run in test mode but to protect the igniter element against overheating and possible damage the test time is limited to 10 seconds.

7.4. Edit/Test mode

This mode is used to adjust the most important parameters of the controller's function. The password is used to unblock the access that enables the blower vents and oxygen feed program to be edited. Unless Test mode has already been turned off manually, entering this area of the program automatically turns off FuzzyLogic for a period of 45 minutes to allow sufficient time for setting up the parameters referenced. During this period, the burner operates at the constant output value specified in the sub-menu BURNER.

WARNING!

Adjusting the blower vent and oxygen feed settings is a skilled task and should only be performed by a suitably qualified person or an authorized agent. Under no circumstances should an unqualified person attempt to edit or make changes to this element of the system.

7.5. Lighting

When the burner is activated after the system is switched from OFF to ON, or when it attempts to relight from idle following a previous heating cycle, it will automatically start from the ignition stage if suitable conditions are not detected to maintain a stable flame. It will go through each step sequentially and will repeat this process up to three times in order to ignite the fuel. If after the third attempt the fuel fails to

ignite satisfactorily, the controller displays the caption UNSUCCESSFUL FIRING* and shuts down the system. If the fuel ignites successfully, the burner goes into normal operation mode and the counter recording the number of firing attempts is reset to zero. The sequence of steps is shown below and may vary depending on the mode of operation selected

Stage 1. **Initialization**

This is the start of a new heating cycle after the boiler has been idle for a short period. An initial measure of fuel is fed into the burner to start the new cycle and the system then automatically switches to Stage 2.

Active Element: **fuel feeder**.

Stage 2. **Flame trial**

At Stage 2, the system attempts to relight the burner using the residual heat from its previous period of activity to kindle flame in the initial dose of fuel introduced at Stage 1. To achieve this the blower is activated to introduce air to assist the combustion process and measured amounts of fuel continue to be fed into the burner at evenly spaced intervals. If Stage 2 fails to relight the burner the system proceeds to Stage 3.

Active elements: **blower + fuel feeder**.

Stage 3. **Pre-ignition**

Pre-ignition is the process of heating the igniter element to a temperature sufficient to ignite the fuel accumulated in the burner. When this temperature is reached the system moves on to Stage 4.

Elements switched on: **igniter**

WARNING!

It is important to pay particular attention to the type and rating of the igniter installed as it can easily be damaged by overheating. If it is a high power element (over 600W) the parameter defining the duration of the pre-ignition stage should be set to 0 (zero) which will bypass stage 3

Stage 4. **Ignition**

In Stage 4, energy is transferred from the pre-heated igniter element via the blower which forces high temperature air through the fuel to cause combustion. When flame is produced the blower continues working in order to spread and strengthen it.

Elements switched on: **Igniter + blower**.

7.6. Normal mode

Following a successful lighting/re-lighting of the boiler, the system switches to normal operating mode and stays in this condition until it is either manually turned off or starts to burn-off after completion of the heating cycle. Normal operating mode is characterized by the way in which the system automatically calculates fuel delivery (amount of fuel delivered and time intervals of delivery) and blower volume. Extending the duration of this procedure contributes to raising burner power and this in turn impacts on

changes in the operating parameters of these two elements which are calculated automatically. Knowing the power of the burner enables the system to determine the required value of many other parameters (e.g. the volume of oxygen needed to ensure efficient combustion) and make them all dynamically interdependent. Normal operating mode also activates and controls the: DHW circuits, HC circuit with motorized valve(s), circulation pump and additional pump (where fitted), all of which come on-line after the boiler has reached operating temperature.

7.7. Anti-block (for pelleted feedstock only)

When operating in MANUAL or WEATHER mode, the boiler shuts down after reaching target temperature. Every 20 minutes the feeder tray will be turned on and will run for a period of time specified by the value of the parameter antiblockade. This is to prevent a total loss of the heat in the burner needed for the next restart.

7.8. Support (ekoCoal feedstock only)

After the boiler reaches target temperature the *maintainance of heat/ support* stage follows. This stage is necessary to pre-heat and/or maintain the heat of pea coal in the combustion chamber. After the lapse of a period of time specified by the value of the parameter **support-STOP**(maintenance), in the BURNER sub-menu, the blower is turned on. After 60 seconds the blower will shut down and the feeder tray will activate for the period of time specified by the value of the parameter **support-STRT**. Once this time has elapsed, the feeder tray will shut down and the blower will continue to work for the time specified by the value of the parameter **supp.BlowerAddit**. The blower will then stop and after the waiting time specified by the value of the parameter **support-STOP**, the process will start again.

7.9. Additional pump

The controller makes provision for an additional pump to be incorporated into the system which can be used, for example, to provide under-floor heating or divide the heating circuit into two separately controllable zones via the TZM valve. The additional pump is connected to terminals P3 (pump P3) of the controller and can be set up to operate in one of two ways, controlled either by time or by temperature.

Method 1. Time control

If the additional pump is required to be run at specified times of the day, this is programmed as follows. First go to MAIN MENU. Select the **CLOCK** menu and then select sub-menu **P3**. In sub-menu P3, use the **EDIT** function to enter the times of the day pump P3 is required to run. Return to the **CLOCK** menu and select **clock options**, the first icon in the menu. In this sub-menu set the parameter additional/extra pump to **ON**.* Return to MAIN MENU, select **OPTIONS** and set the parameter **extra pump** to **YES**. The additional pump will now run at the times scheduled.

***NOTE:** If this parameter is not set to ON, the system will disregard the time schedule that has been set and control the additional pump by temperature as Method 2 below.

Method 2. Temperature Control

If pump P3 is required to be available continuously as opposed to being controlled by a time schedule, go to the CLOCK menu then to the sub-menu **clock settings** the first icon on the **CLOCK** menu. Set the value of the parameter **extra pump** (additional pump) to **OFF**, the clock system will now ignore the settings of the work schedule of P3. Go to MAIN MENU and in the **OPTIONS** menu set the value of the parameter **extra pump** (additional pump) to **YES**. This confirms to the controller that pump P3 is connected. Pump P3 will now run on demand according to the temperature of the boiler and/or the hot

water circuit (HW). If the priority is set to HW and the water in the calorifier is not heated, pump P3 will start up only at the intervals determined by the parameters in the HC menu (hating pump-STOP minutes heating pump-STRT work minutes) until the hot water reaches its target temperature. If hot water priority is not on or hot water is heated then when the boiler reaches min. temperature P3 is turned on and switched off only when the temperatures drops to its allowable minimum at the pump.

7.10. Circulation pump

The circulation pump is connected to terminals C/K of the controller. Its function is to provide hot water to each draw-off point at the desired temperature and in the shortest possible time after a tap is turned on. The pump is time controlled and can be scheduled to run at specific times of the day and on specific days of the week. To schedule the pump first go to the **MAIN MENU**, select the **CLOCK** menu and then the sub-menu **CIRC**. Enter the times of the day and days of the week on which the pump is to run. When this has been done, go back to the **CLOCK** menu and select the sub-menu **Clock Settings**. Under the sub-heading **circulation pump** set the value to **ON**. The pump will now run at the times scheduled.

NOTE: If a back-up boiler is installed on the system the pump will only run when the primary boiler is in operation. It will not run when the backup boiler is working.

7.11. Backup Boiler

The controller provides the facility for a backup boiler to be incorporated in the system which can be placed online if the primary boiler fails to ignite. To setup the backup boiler first go the **MAIN MENU** and then select **OPTIONS**. Select the sub-heading **boiler reserve** and set the value to **YES**. With the value set at **YES**, should the primary boiler fail to ignite after three firing attempts the caption LIGHTING FAILED will appear on the controller display. In such circumstance the controller output assigned to the circulation pump will start but now in relation to the secondary boiler.

WARNING!

If the parameter boiler reserve in the OPTIONS menu, is set to YES, the circulation pump schedule will not be activated.

7.12. Burning

When the outside air temperature rises, the need for heating inside the property is reduced and thermal energy accumulated in the tray of the boiler is not required to the same extent as in cold weather. As the weather warms the heating circuit can be turned off by selecting **SUMMER** in the boiler menu, which switches off the HC pump that services the heating circuit. With the boiler now working to provide hot water only it remains idle for longer periods of time between firings and (where pelleted feedstock is being used) any residual fuel that remains in the combustion chamber after the hot water target temperature has been reached is rapidly burned-off to clear the burner ready for the next restart. This rapid burn-off is achieved by running the blower vent for a set period of time, with the duration of blower vent activity being determined by the value set under the sub-heading **flame extinguish** (burning-off) which can be found in the BURNER sub-menu. The burning-off of residual fuel will also occur if the controller is switched to **OFF**.

7.13. Time control of the burner

The controller enables the burner to be programmed so that it only runs between the ON/OFF times scheduled in the clock menu. To setup the schedule first go to the **CLOCK** menu and then to the sub-menu **BURNER**. Use the **EDIT** function to input the start and finish times required for each cycle. Return to the **CLOCK** menu and select the sub-menu for clock Settings which is the first icon on the **CLOCK** menu. Select **BURNER** and set the value to **ON***. Using this function to control boiler operation can yield significant cost savings and it eliminates the need for the user to turn the boiler on and off manually.

* If the boiler is required to run continuously as opposed to being time controlled, set this value to **OFF**.

7.14. Mixing valve

If the system is fitted with a HC temperature sensor coupled to the controller, the presence of a HC loop mixer valve actuator should be declared in the program by setting the value of the parameter autom.mixer (Valve Actuator) to **YES**. This will enable the system to open and close the valve in order to maintain the desired temperature in the central heating system. If the HC sensor detects a temperature behind the valve that is too high, the valve will slowly close until the temperature has been reduced to its desired level and becomes stable. Conversely, if the temperature behind the valve is detected as being too low, the valve will slowly open until the temperature has increased to the desired level. The value of using a HC loop mixer valve actuator can not be overstated. By automatically maintaining the temperature of water in the heating circuit at the correct level it: significantly decreases boiler operating costs, optimizes the comfort level of the user and eliminates the need to constantly make adjustments to the heating circuit temperature manually.

8. OPERATOR CONTROL PANEL

Use of the control panel is based on 4 keys (**Escape, Plus, Minus, Enter**) that are situated vertically to the right of the LCD display. The function(s) performed by these buttons are as follows:

- **ESCAPE** – The ESCAPE button is multi-functional. When pressing ESCAPE for a minimum of 3 seconds it will change the operating mode of the boiler from OFF to ON or vice versa. Pressing ESCAPE when in a sub-menu of the program will cause a return to the previous menu. Pressing ESCAPE after changing the value of a parameter will restore the original value. Pressing ESCAPE while editing will cancel the current editing process without making changes.
- **+/- buttons** – These two buttons are used to navigate through the main menu and its sub-menus. They are also used for changing values in sub-menus after previously pressing ENTER.
- **ENTER** – The Enter button is also multi-functional. Press ENTER to access the main menu. Press ENTER to access a sub-menu (after first using the +/- keys to select the appropriate sub-menu). Press ENTER to start editing the value of a parameter and press ENTER again to confirm the changed value. In the TEST menu, press ENTER to include or remove an element.

IMPORTANT!

Depending on the settings selected, the editing of some functions are locked. For example, when choosing the value YES for the back up boiler in the OPTIONS menu, editing the schedule for the circulation pump is inaccessible.

9. BOILER

9.1. Boiler operating modes

The BOILER sub-menu provides a choice of three modes of boiler operation:

- **MANUAL** - In this mode operating parameters can be set according to preference, which may be the required temperature of the boiler or CO.
- **SUMMER** - in this mode the heating pump is switched off and only comes online in an emergency situation (e.g. overheating of the boiler)
- **WEATHER** – the parameters of boiler target temperatures and HC are calculated on the basis of outside air temperature and the heating curve selected.

9.2. Boiler target temperature

In **MANUAL** mode and **SUMMER** mode, boiler target temperature is the desired temperature which has been set and which the boiler is required to reach and maintain. In **WEATHER** mode, boiler target temperature is automatically calculated on the basis of outside air temperature.

9.3. Hysteresis

Hysteresis is the number of degrees Celsius below target temperature to which the boiler temperature can fall before the burner relights in order to restore target temperature.

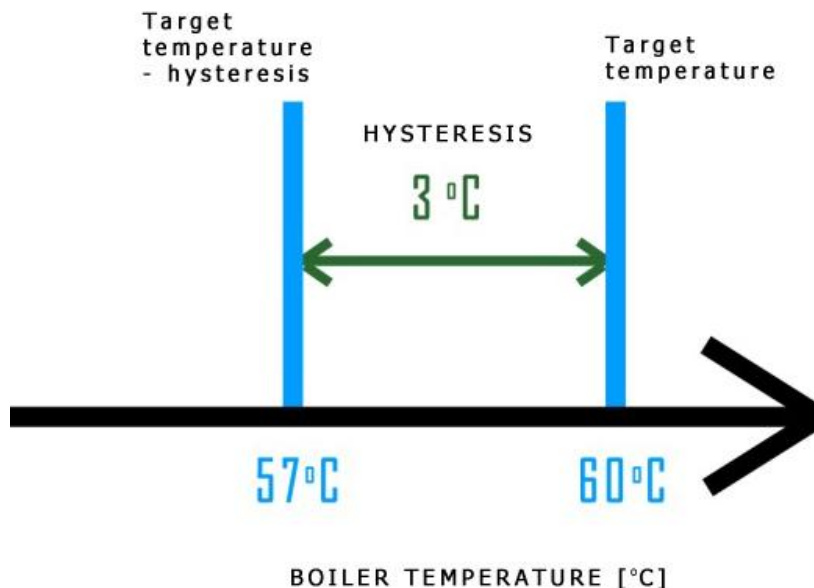


Fig .8.1.3. Boiler hysteresis

If the boiler target temperature is 60°C and the hysteresis of the boiler is 5°C, the burner operates until the temperature reaches 60°C (blower and feeder switched on). It then goes into temperature maintenance mode (coal), stationary mode (pellet/corn) or post-combustion mode (burning-off), and finally to idle mode with the feeder and blower turned off. The boiler temperature will slowly decrease, and when it drops to 55°C (60°C - 5°C) the burner relights.

9.4. System Password

A system password, for use by installation and service engineers, is provided to gain access to certain parameters that are otherwise blocked against editing.

10. HEATING CIRCUIT - HC

10.1. HC target temperature

HC target temperature is the temperature which the system endeavors to maintain. In WEATHER mode, target temperature is calculated against outside air temperature and a selected heating curve, supplemented by input from a room thermostat (where fitted). If a mixing valve actuator is installed, the actuator will slowly and systematically open or close the valve depending on the actual temperature of water in the heating circuit relative to HC target temperature.

10.2. Lowering target temperature by room thermostat

The parameter **reduction** (lowering by room thermostat) in the HC sub-menu, is the value by which the target temperature should be lowered when the room thermostat signals the controller that the temperature in the room or area in which it is located has reached the desired level. The room thermostat can also be programmed to lower the HC target temperature when the property is unoccupied and/or lower it at night when the occupants of the property are in bed. This avoids the property being overheated unnecessarily and lowers the cost of running the heating system by reducing fuel consumption

10.3. Heating curve

The heating curve is a standardized function from which the target temperature of the HC circuit is calculated based on outside air temperature. The controller enables one of several predefined heat curves to be selected by the user. If the curve selected does not meet the user's expectation in terms of heating effect, the curve can either be corrected (see 8.2.4. below) or an alternative curve can be selected in its place. The heat curve with the higher ratio (0.4 – 2.2) will, on the basis of outside air temperature, calculate a higher HC target temperature. As depicted in the graph below, when the outside air temperature is at 20°C, the lines representing it and HC temperature are close together. However, as the outside air temperature decreases (moving along the horizontal axis to the right) they diverge. This illustrates how the system increases HC target temperature as outside air temperature falls and decreases HC target temperature when outside air temperature rises.

The maximum target temperature calculated on the basis of any particular curve is equal to the value set in the parameter **mixer.max.temp** (maximum mixing temperature) minus 5°C. This parameter is located in the **SENSORS** menu.

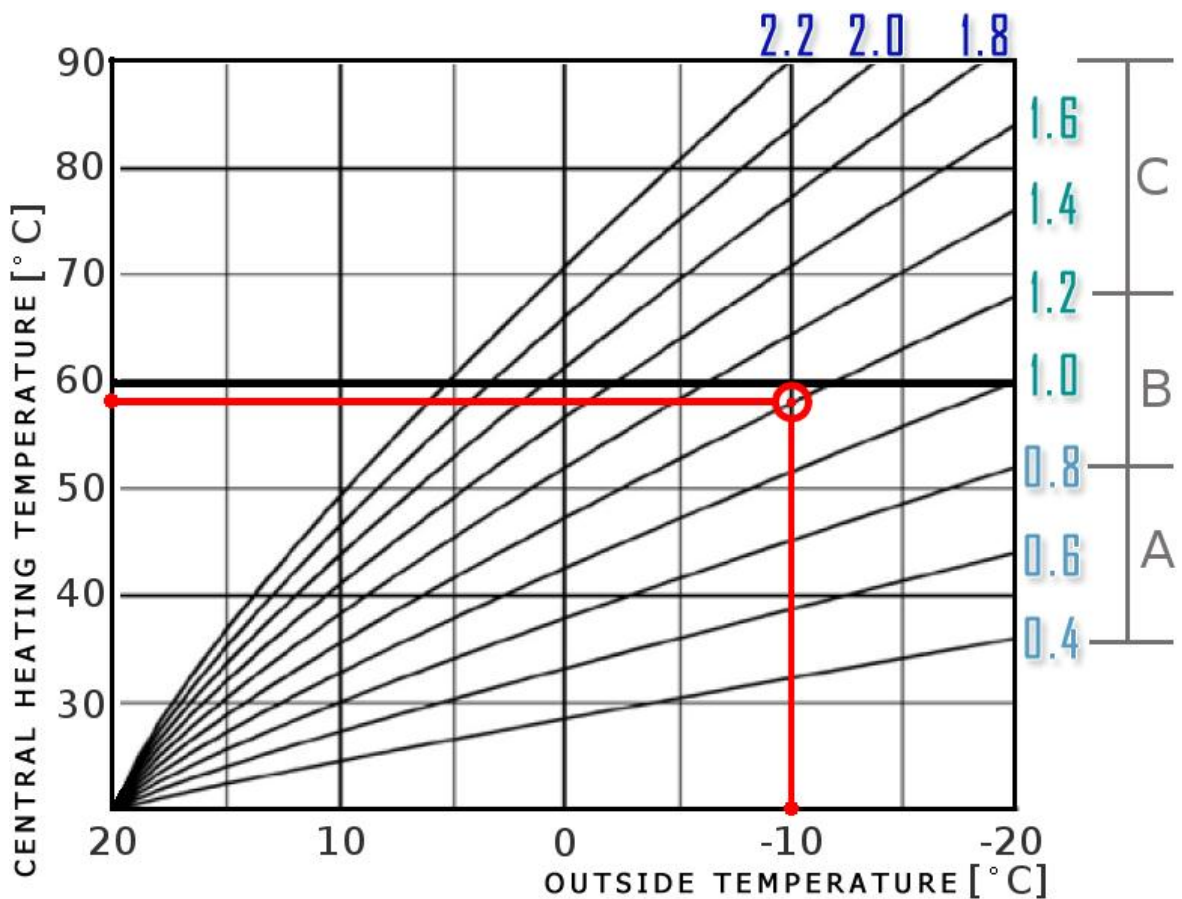


Fig.10.3. Heating curves

LEGEND	
A	Under-floor Heating
B	Low-temperature heating system
C	High-temperature heating system ($T > 75\text{ }^{\circ}\text{C}$)

10.4. Curve correction

With the system operating in WEATHER mode, the condition may arise where the HC target temperature calculated against a selected heating curve does not produce satisfactory results. In such circumstances the user should correct the curve and/or select an alternative curve. To adjust the curve, go to the **HC** menu and select curve correction. Edit the curve value using the **+/-** keys. Changing the value of this parameter alters the position of the curve on the graph. Raising the curve increases HC target temperature, lowering the curve decreases HC target temperature. Fig 8.2.4. below provides a guide to what action should be taken given a particular type of room temperature condition.

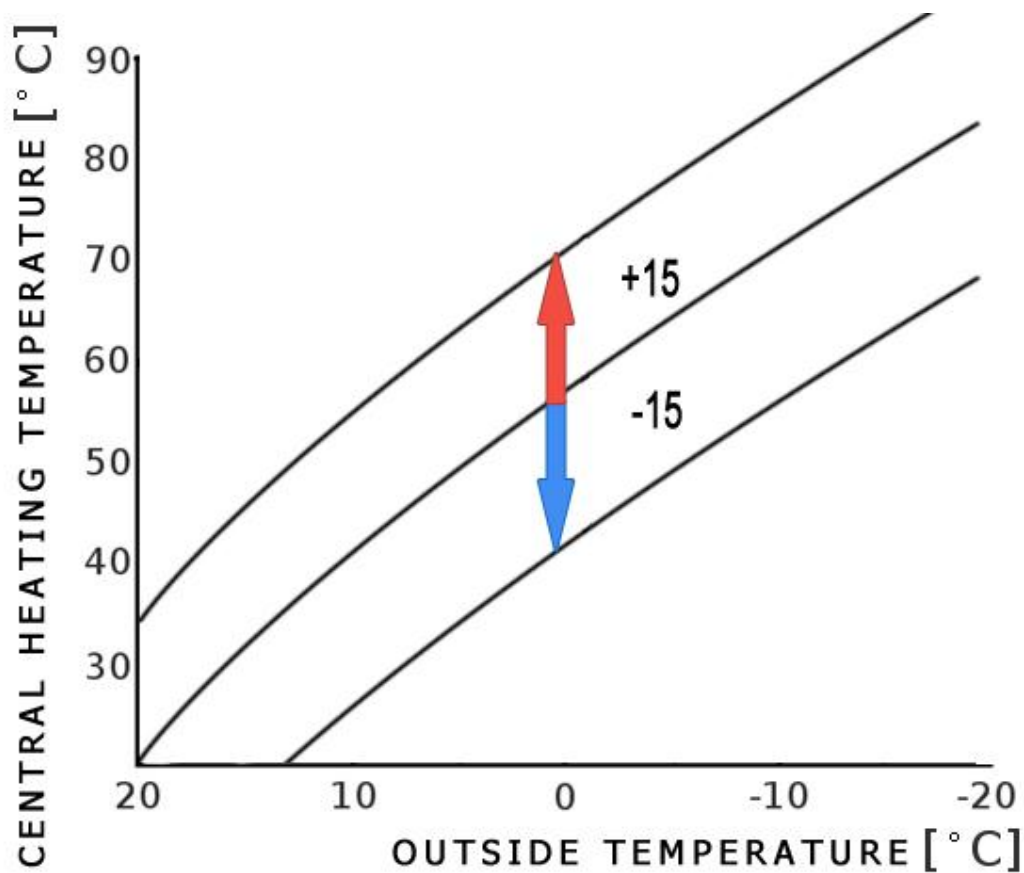


Fig. 10.4. Moving the selected heating curve

Tab.10.4. Adjusting the heating in the weather mode

Room temperature	Actions to be taken
Always to cold	Increase correction of the curve
Always to warm	Reduce correction of the curve
Too cold only during freezing weather	Select a higher ratio curve
Too warm only during freezing weather	Select a lower ratio curve
OK during freezing weather, at other times too cold	Select a lower ratio curve Increase correction curve
OK during freezing weather, at other times too warm	Select a higher ratio curve Reduce correction curve

11. HOT WATER (domestic purposes) - HW

11.1. Target temperature

The value set in the parameter target temperature specifies the temperature of the hot water which the controller endeavors to maintain. The system determines that the water is sufficiently heated when the temperature of the water reaches this value. Among other actions this will result in switching off the hot water pump.

11.2. Priority

When the value of the parameter **priority** is set to YES the system is directed to heat the hot water before activating the HC and P3 pumps. Only when the system detects that the water has been sufficiently heated will it allow the HC and P3 pumps to be switched on. This ensures that the hot water supply is maintained at the correct temperature for when it is needed.

11.3. Temperature priority

The parameter **prior.BoilerTemp** specifies the value which the boiler will use as the HW target temperature when the **priority** command has been selected. The value assigned to this parameter should be such that, that the target temperature is high enough to rapidly make up any shortfall in hot water supply where the water in the calorifier has either not heated sufficiently since last being drawn off, or is currently being drawn off in sufficient quantity to create such a situation.

11.4. Decontamination

Decontamination is the process of disinfecting the hot water calorifier which, for best practice, should be carried out at weekly intervals. When the decontamination procedure starts, the boiler temporarily adopts a target temperature of 77°C until the hot water has been heated to the decontamination temperature of 71°C. To schedule decontamination go to the parameter **decontamination/disinfection** (YES/NO) and under **...day** enter the day of the week the procedure is to be performed, and under **...hour** enter the hour of the day at which the procedure should start. For best practice, the start time should be during a period of the day when there is no requirement to draw off hot water, typically in the early hours of the morning.

12. BURNER

12.1. Fuel

This parameter specifies the type of fuel that is to be burned in the boiler. After selecting the fuel to be used, the controller sets the values of corresponding parameters such as oxygen volume and blower power. **Remember** that when choosing a fuel such as pellets, the backup parameters cannot be edited.

12.2. Support/Sustain (applies only where ecoCoal feedstock is used)

Backup occurs during a period of burner inactivity after the boiler has reached or exceeded its target temperature. Its function is to provide backup power to prevent the total extinction of heat in the burner to facilitate re-ignition when the next burner cycle starts. The parameter **support-STOP** (sustaining stop) in the **BURNER** menu, determines the time that the burner must remain idle until the blower

starts up in backup mode. When the blower is enabled it runs solo for a period of 60 seconds, after which the feeder tray (activated by the value set in the parameter **support-STRT** (sustain enter) in the **BURNER** menu) provides a measured amount of fuel into the combustion chamber. After the feeder tray shuts down, the blower resumes working to pre-heat the fuel supplied. The period of time required by the blower to pre-heat the fuel is represented by the value set in the parameter **sup.BlowerAddit**(run blower) in the **BURNER** menu. The time the burner has to remain idle starts at the beginning of the cycle described and ends on its completion.

12.3. Anti-block (applies only where pelleted feedstock is used)

When burning pelleted fuel, this parameter specifies the time the feeder tray starts working after the boiler reaches its target temperature. By default the tray is activated at intervals of 20 minutes. The purpose of this procedure is to deliver small measures of fuel into the combustion chamber to maintain a minimum level of heat to facilitate re-ignition when the next burner cycle starts.

12.4. Power test mode

When the user or a service engineer requires to adjust the parameters of boiler operation responsible for quality of the combustion process, the burner needs to be maintained at a constant power setting while the adjustments are made and tested. This is not possible to achieve during normal operating mode because FuzzyLogic continually modulates burner power and tests combustion efficiency accordingly. If in the **OPTIONS** menu the parameter **test mode** is set to **YES**, for a period of 45 minutes burner power is maintained at a constant level equal to the value set in the parameter **test mode power** in the **BURNER** menu. It will then be possible to edit the parameters associated with the levels of oxygen selected for the burner and measure their effectiveness.

12.5. Supply/feeder at 100%

This parameter determines the period of time the feeder tray operates when the boiler is at 100% power. The time the feeder tray operates at lower power levels is calculated by FuzzyLogic. Since the optimum efficiency of the combustion process depends wholly on the value of this parameter, such value should be carefully selected as it will vary according to the type of fuel used (pellets, pea coal, etc.) and its quality. This parameter can be determined by trial and error, mainly by observing the behavior of the boiler (whether there is too much or too little fuel, appearance of the flame, etc.) and by noting the oxygen content in exhaust gas emissions. It is also advisable to read the documentation provided by the manufacturer of the fuel feed mechanism and in particular to refer to the table of values provided for this parameter relative to the type of worm gear used.

12.6. Initial supply/feeder

This parameter defines the period of time the feeder tray operates when supplying an initial measure of fuel at the start of a firing cycle. Note that the amount of fuel supplied should be sufficient to ensure sustained ignition. Depending on the performance of the feeder mechanism which will vary with type and manufacture, a sufficiency of fuel should be provided in a feeder runtime of 20 – 60 seconds

12.7. Ignition

This parameter sets the working time of the igniter, without blower activation, to preheat the fuel.

WARNING!

Where the power of the igniter element is rated at 600W or above, the value of this parameter should be set to 0 (zero) in order to avoid possible burnout of the igniter element and/or its power cables.

12.8. Igniter + blower

This parameter sets the working time of the igniter + blower when firing fuel in the burner. The value assigned to this parameter should be sufficient to ignite the fuel in the combustion chamber and produce flame.

12.9. Fire testing

This parameter sets the working time of the burner when the feeder tray and blower are operating in normal mode. The system checks whether the burner is able to maintain a stable flame. If the system detects that a stable flame can be sustained, it enters into normal mode bringing the firing sequence to an end.

12.10. Starting Power

This parameter specifies burner power. At the beginning of a normal mode operating cycle, the burner power value that has been set provides the basis for setting other operating parameters (feeder, blower volume, etc.). It also represents the minimum power the burner may have when it slows down before reaching target boiler temperature.

12.11. Burning

The value set in this parameter determines the duration of the combustion process in burning off residual fuel remaining in the combustion chamber when the boiler reaches its target temperature. In other operating modes, the same value determines burner timeout (the period it remains idle between burning cycles). In both instances the blower is then activated to assist in burning off residual fuel.

Where wood comprises the selected fuel, the boiler operates with the feeder mechanism disconnected and the system does not monitor the kindling process. Preparation of the boiler to operate with wood feedstock (depending on its construction) is based on mounting metal shelf angles on the feeder tray inside the combustion chamber to support an iron grating. Placement of the fuel and its ignition is achieved manually.

WARNING!

If wood feedstock is used, the exhaust gas sensor must first be removed from the flue. Leaving it in place could result in it being irreparably damaged.

13. LAMBDA (O2)

Measurements from the oxygen sensor are nominally available within 90 seconds after turning the system on during which period the sensor is in the process of warming up. This is a necessary procedure which provides a reliable and accurate representation of measurement results. The lambda probe is positioned in

the flue and measure combustion parameters by analyzing flue gas emissions. Too low an oxygen level in the exhaust gas from the boiler results in an increase in blower power to a value calculated by FuzzyLogic. This is a unique and constantly active corrective function of the system, which dynamically adjusts blower power in order to maintain an absolute optimum level of oxygen in the combustion process. While being categorized as an accessory, the lambda probe is nevertheless considered a critical component and its inclusion in the system is highly recommended as it can increase combustion efficiency by up to 96%.

WARNING!

When cleaning the flue outlet the sensor should be removed from its sleeve. Failure to do this could result in the sensor being irreparably damaged.

14. BLOWER/FAN

In the sub-menu **02** (FAN/O2) a value can be set to determine the optimum oxygen content in the exhaust gas at which the boiler achieves the highest level of fuel efficiency. Settings are provided for both **Pellet** (pelleted fuel) and **ecoCoal** (pea coal) which are held in separate libraries in the controller's memory. Concurrent with setting optimum oxygen content, blower parameters are also set. This is the strength and volume of air provided by the blower for the selected burner power. NOTE: Intermediate burner powers not listed in the menu are calculated by FuzzyLogic.

The parameter **inflammation** (ignition blower power), which governs the blower when it works in conjunction with the igniter during the ignition stage (igniter + blower), can be edited as too can the parameter **support power** which defines the required strength of the blower in pre-heating pea coal.

In this sub-menu it is also possible to observe the correction value which the system applies to the blower in order to maintain optimum oxygen content in the exhaust gas at the level selected by the user. Such correction value becomes available after the lambda probe has warmed up, typically around 1.5 minutes after initial startup.

15. CLOCK

WARNING!

The power system of the clock will run stable after initially charging its battery - approximately 24-hours. If the program hangs up when it is running, turn off the power supply, wait for a few seconds and then turn it back on again, this will reset the driver.

In the CLOCK sub-menu the current day and time of day can be edited. There are also parameters for the circulation pump, additional pump (where fitted) and burner. Setting the value for each of these component parameters to ON, activates the pumps and burner to a preset schedule.

The steps for editing the schedule for each of these components is identical and the changes introduced are performed according to an algorithm. First select the appropriate menu (**CIRKUL** – circulation pump, **P3** – additional pump, or **BURNER**) and then proceed as follows using the +/- keys to navigate through the sub-menu headings:

1. Using the +/- keys, enter the day of the week and then press **ENTER** to confirm the selection.
2. Select the **EDIT** function and then press **ENTER** to confirm the selection.
3. Using the +/- keys, enter the program start time and then press **ENTER** to confirm the selection.
4. Select the run status of the component after the programmed start time (**ON** it will be turned on, **OFF** it will be turned off), then press **ENTER** to confirm the selection.

5. Using the +/- keys, enter the end time and then press ENTER to confirm the selection and return to step 4 (with start time hour equal to that entered in step 5)
6. Press **ESCAPE** twice to exit or once to return to step 3 (start time hour edit)

While editing the schedule the changes made are displayed on the axis line at the bottom of the operator panel LCD display. Should it be necessary for the item to remain switched on, say from 1 to 13, all points on the timeline during this period require to be switched to on. After setting the end time for an activity (e.g. startup) and selecting ENTER to confirm the selection, proceed to set the time from step 3, where the value of this parameter will be automatically set to the time of the previous activity, press the ESCAPE key to finish editing.

Once the work schedule for the selected components is complete it can be copied to other days of the week where the same work schedule is to apply. To do this, first select the day of the week containing the work schedule to be copied and then select the **COPY** option. Using the +/- keys, select the day or days that the schedule is to be copied to and then press the **ENTER** key next to each item to be included in the schedule. After the last item has been entered, complete the procedure by pressing the **ENTER** key to save the changes.

16. OPTIONS

16.1. Additional pump

If an additional pump is installed and connected to the controller, say for running an under-floor heating circuit or separate heating zone, the value of this parameter should be set to **YES**. Only if this has been done will pump P3 work according to the time schedule (**CLOCK** menu, sub-menu P3) or the startup temperature for switching the pump on (**boiler.min.temp**/minimum boiler temperature) and the shutdown temperature for turning it off (**pump.min.temp**/minimum pump temperature).

16.2. Backup boiler

If the output for switching on the circulation pump is not being used by the driver, the terminals for this output can be used (if required) for connecting a backup boiler. If the value of the parameter **boiler-reserve** is set to YES, the parameter **circulation pump** in the **CLOCK** menu is automatically set to **OFF**. This output is then switched on at the same time that the message **LIGHTING FAILED*** appears on the operator panel LCD display.

16.3. Restoring factory default settings

If changes to the system's operating parameters adversely affect boiler performance, the controller can be restored to its factory default settings. To restore the factory default settings, first turn off the boiler (status OFF). Access **reserParam(OFF)** (factory settings) in the **OPTIONS** sub-menu by pressing the + Key. Select and then press **ENTER** to confirm the selection. **WARNING:** If the boiler is not turned off prior to restoring the default settings, errors can arise when they are loaded that may subsequently impair functionality of the controller.

16.4. Lambda sensor

To register connectivity of the lambda probe the value in the parameter **sonda lambda** (lambda probe) should be set to **YES**. If the value is set to **NO**, the FuzzyLogic element of the lambda probe will be turned off and the combustion process will not be monitored. This will lead to the deterioration of other

parameters dependent on lambda monitoring which in turn will result in a reduction of boiler efficiency and an increase in fuel consumption.

16.4.1. Język menu (Language menu)

The language menu is used to change the operating language of the controller. To change the language, access the **language** and using the **+/-** keys select the language preferred and then press **ENTER** to confirm the selection.

17. TESTING CONTROLLER OUTPUTS

When the controller status is OFF, it is possible to test its individual components (submenu TEST). This is accomplished by pressing ENTER to change the parameter to ON (enabled). Pressing ENTER again will return the parameter to OFF (disabled). Pressing ESC while in TEST submenu will set all components to OFF and exit this submenu.

18. TROUBLESHOOTING

During normal operation of the boiler situations may arise that will serve to either shut the system down, impair its functionality or modify its mode of operation. Some typical symptoms are described below together with their probable cause and remedy.

FAILURES LEADING TO SYSTEM SHUTDOWN

- **Symptom:** Overheating of the boiler, where the temperature indicated by the boiler sensor exceeds the permissible boiler temperature.

Probable cause: Boiler temperature sensor failure, associated with either a missing or damaged sensor. Will shut down the system completely until the defect is remedied.

Remedy: Inspect the sensor and replace if missing or damaged. If the sensor is not damaged trace its wiring back to source and check all connections. If the wiring is damaged replace as necessary. If connections are damaged or insecure replace or make good as required.

- **Symptom:** Overheating of the feeder tray, where the tray temperature exceeds the safe temperature limit.

Probable cause: Feeder sensor failure, associated with a missing or damaged feeder sensor. Will shut down the system completely until the defect is remedied.

Remedy: Inspect the sensor and replace if missing or damaged. If the sensor is not damaged trace its wiring back to source and check all connections. If the wiring is damaged replace as necessary. If connections are damaged or insecure replace or make good as required.

- **Symptom:** No flue gas temperature recorded or recorded temperature erratic.

Probable cause: Flue gas temperature sensor failure, associated with a missing or damaged sensor. Will shut down the controller completely until the problem is remedied.

Remedy: Inspect the sensor and replace if missing or damaged. If the sensor is not damaged trace its wiring back to source and check all connections. If the wiring is damaged replace as necessary. If connections are damaged or insecure replace or make good as required.

- **Symptom:** After three repeated unsuccessful firing attempts, the system determines that there is a lack of fuel and shuts down. A message to this effect is displayed.

Probable cause: No fuel in the feed hopper. Feeder mechanism blocked or malfunctioning.

Remedy: Check feed hopper and if empty replenish with fuel. If lack of fuel is not the problem check for blockage or malfunction in the feeder mechanism and clear or repair as necessary.

WARNING!

The inspection, testing and replacement of defective sensors, the inspection and correction of electrical wiring and terminal connector defects, and the inspection and correction of feeder mechanism malfunctions, essentially requires to be carried out by a qualified service engineer. Under no circumstances should such work be attempted by a person or persons not qualified to do so.

OTHER FAILURES AND/OR PRECAUTIONARY MEASURES

- The system monitors the heating element in the HC and HW circuits to prevent overheating. In this context, prevention means for example - shutting down the appropriate pump(s).
- When the exhaust gas temperature rises above 220°C, a message is displayed indicating the need to clean the boiler. This does not shut down the system but the boiler combustion chamber and flue should be thoroughly cleaned at the very earliest opportunity.
- If the operating mode WEATHER is to be used, it is required to connect an external temperature sensor, without which this mode will not function.
- The controller provides a frost protection function. In cold weather, if the temperature of the central heating system falls below 8°C the HC heating pump will be started together with the motorized valve (where fitted).

WARRANTY

PIONIER ELEKTRYK

FL 310LG

WARRANTY CONDITIONS

1. This warranty is valid for a period of 24 months from date of purchase.
2. Defects discovered within the warranty period will be corrected within 21 days from the date the unit is taken in for repair.
3. In the event of third party intervention in the controller the manufacturer has the right to void the warranty and the cost of becomes the responsibility of the customer.
4. In the absence of a Warranty Card, or uncompleted Warranty Card, the user will be required to pay for the repair.
5. Repairs and alterations can only be made by the manufacturer.
6. The warranty is only valid with proof of purchase.
7. A WARRANTY CARD WHICH IS INCOMPLETE IS NOT VALID

I certify that I have read and agree with the terms of the warranty.

/_____/

Signature of purchaser

/_____/

Product identity

/_____/

Serial number

/_____/

Date of purchase

/_____/

Stamp and signature of vendor

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