APPENDIX 2

CONTROL PANEL

The view of control panel used in automatic feeding boilers, and functions of buttons and indicators are given in Figure-A1 and Table-A1 respectively.
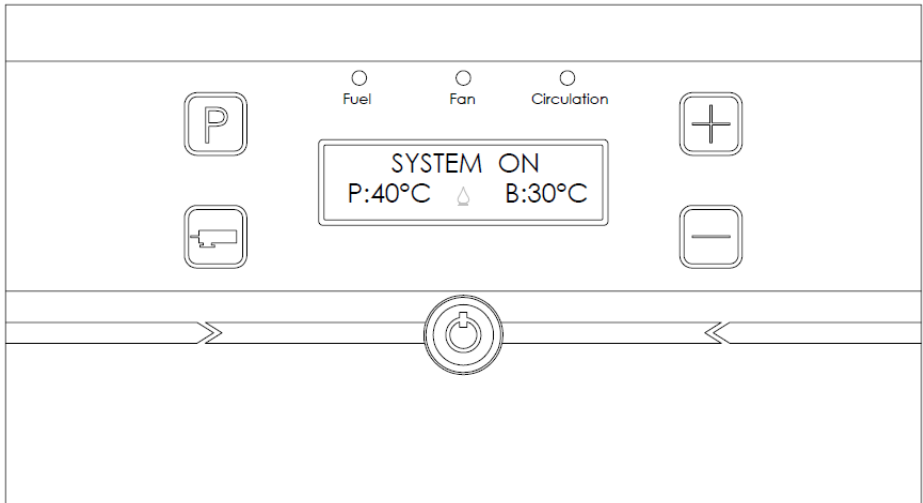

Figure-A1. *The view of control panel.*

Device Screen: The screen on the control panel (Figure-A1) is shown in Figure-A2. Values entered into the device and operating information are displayed on this screen. Here:

Figure-A2. *Control panel screen.*

(SYSTEM) ON - the boiler is on,
P: 40°C - program temperature (desired temperature),
B: 30°C - the current temperature of the boiler
00:00:00 - indicates the time.

Table-A1. *The function of buttons and indicators on the control panel.*
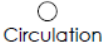
Process	Buttons	Instructions
Turn on/off	Reset	Switching the device on and off is done with this button
+ / - Buttons	(+) (−)	It is used to adjust the entered value
Program Settings	(P)	Allows switching between programs
Manual fuel loading: Manual Feed/ Clock Setting		Allows manual fuel feeding, and to switch between hour and minute settings on the clock
Fuel feeding	○ Fuel	It is on while fuel enters the boiler
Fan on	○ Fan	The light is automatically on when the fan is running
Pump on	○ Circulation	It is on when the circulation pump is running

The commands required for data entry to the control panel are explained in Table-A2.

Table-A2. Data entries to the control panel.

Buttons	Instructions
P	Followings can be activated to set on the screen by pressing P button; - programed temperature - fuel feeding time (enter seconds by "**+ / -**" keys) - fuel stand by time (enter seconds by "**+ / -**" keys) - fan control (auto / off) - fan speed (1-4 speeds) - fuel control (auto / off) - circulation control (auto / on) - program time- timer (on / off) - boiler start and end time For example: **To adjust the program temperature;** Press "P". While P:00°C is activated, adjust the boiler temperature using the "**+ / -**" buttons.
+ −	Enter the value you want using the "**+ / -**" keys.

Circulation Temperature: It enables the circulation pump to be activated automatically. The pump is activated at 30°C as default in the program. In addition, the pump stops at 26°C. Even when the system is turned off, the pump runs until the boiler temperature drops to 26°C. The control card does this process automatically.

Programming of the control panel is explained in Table-A3.

Table-A3. Programming the control panel.

| Process	Instructions	Buttons
Temperature Programmed	It is the desired operating temperature of the boiler. It is adjusted between 32-80°C. When the boiler reaches the set temperature, it goes into sleep mode. If the boiler temperature drops by 3 degrees, it starts working again.	
Fuel Feeding Time	It determines how many seconds the (speed) reducer motor will charge fuel during the heating of the boiler. It is adjusted in the range of 1-60 seconds.	
Fuel stand by Time	It determines how many minutes the reducer motor will wait during the heating of the boiler. It can be adjusted between 10 seconds and 10 minutes.	
Fan control	The fan motor is set as automatic or Off.	
Fan Speed Setting	The fan motor has a working speed of 1-4. When the fan is activated automatically, first it runs for 5 seconds at maximum speed and then drops to the set speed.	
Fuel control	The fuel motor is set as automatic or Off.	
Circulation control	The circulation pump is set as automatic or On.	
Program Time	The program clock can be set as On or Off. If it is selected as On, when the "P" button is pressed, it moves to the next menu. It returns to the main screen if selected as Off.	⊡P
Programming On and Off	When the program clock P1 is selected by "P" button, it switches to this menu. Boiler On and Off times should be set here. This process can be adjusted between 1&4 times for a 24-hour period according to your needs. The boiler is considered on as default and first of all, the process starts by setting the off time. For this, activate the value to be adjusted by "Manual Fuel Loading" button. It becomes active if the lower line flashes. Enter the desired value using "+ / -" buttons. Then press "P" key to confirm set values. "On" or "Off" selection is made using the using "+" and "-" keys for the program clock-2. If "On" is selected, P2 is set in the same way as "Off" and "On". In this way, optional adjustment can be made up to 4 steps. Finally, the real time clock is set to activate the program.	⊡ ⊞ ⊟ ⊡P
Setting a Sample Time	Off P1: 10:00 On P1: 14:00 Off P2: 15:00 On P2: 17:00	Off P3: 23:00 On P3: 02:30 Off P4: 03:30 On P4: 05:00

The use of the boiler and the steps of first start-up are given in Table A4.

Table-A4. *The use of the boiler and the steps of first start-up.*

No	Instructions	
1	Check the pressure indicator whether there is enough water in the boiler.	
2	Check that the flow / return valves of the boiler are turned on.	
3	Turn on the boiler by pressing the On/Off button on the control panel.	Reset
4	(if necessary) enter the desired program temperature (e.g. P: 55°C). Program temperature is not recommended below 50°C to avoid the risk of condensation. Also, adjust the other data as specified in Table-A3.	P
5	Fuel is loaded manually into the furnace by pressing "Manual Fuel Loading" button. Load the fuel until it reaches 5-6 cm height.	
6	Turn the fan and the fuel controls "OFF".	
7	Put pieces of wood and flammable substances into furnace and burn them.	
8	When the substances start to ignite, set the fan control to "AUTO" and the fan speed to "1" so that oxygen goes into the boiler.	
9	When the coal starts to ignite, change the fuel control setting to "AUTO" and fan speed to normal setting.	
10	When the process steps are completed, the boiler is activated according to your settings.	

Using the service menu:
While the boiler is on stand by, additional fuel feeding and waiting times can be adjusted using this menu. To do this,
- press the "**+**" and "**-**" keys simultaneously for 10 seconds while the control card is on. When "service menu" appears on the screen, the menu is activated.
- Press "P" button to activate fuel feeding time and insert the desired setting time using the "+ / -" keys.
- Press again "P" button to activate fuel stand by time and insert the desired value using the "+ / -" keys.
- Press "P" button one more time to set the fan motor as On or Off.

-     Press the "P" button one last time to exit the service menu.

SAFETY PRECAUTIONS
Sensor Failure: As a result of the failure of the temperature sensor for any reason, it gives the error message "caution: sensor is defective".

Abnormal Temperature: It is activated when the temperature of the system is above 90°C or below 0°C for any reason. It gives the error message "caution: temperature abnormal".

Out of Fuel Warning: After the boiler sleeps once, if the temperature drops below 30°C while in automatic mode, a warning will be given as "caution: out of fuel".

Frost Protection: When the water temperature of the system drops below 4°C, the circulation pump starts automatically. It prevents the freezing risk of the water in the system. This process occurs when the boiler is turned off (not actively working) and electrical connection of the control card is on.

Note: In order to get out of the above mentioned error messages, the fault must first be resolved. Then, by pressing any key, it is automatically reset and the system turns on.

Description of Room Thermostat: On the back of the card, the 2-input terminal written "KL3" is where the room thermostat connection will be made. That terminal serves as a contact. When a short circuit happens, the flame sign on the screen of the card shows "-" sign and the boiler sleeps. When it turns to open circuit again, the flame sign appears and the boiler starts to operate according to the measured room temperature. Commercially available thermostats can be connected to measure the room temperature. Electricity must not be supplied to that terminal, otherwise card circuit is broken.
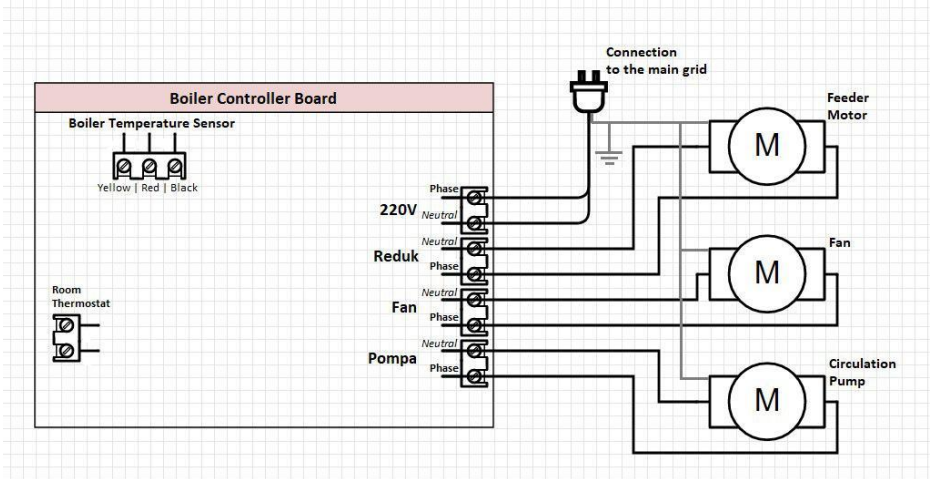
ELECTRICAL CONNECTION OF THE CARD

Figure-A3. *Electrical connection of the card.*