TERMODİNAMİK®

HEATING SYSTEMS

TBK/S SERIES SOLID FUEL HOT WATER BOILER WITH AUTOMATIC LOADING

INSTALLATION AND USAGE MANUAL

(29 kW - 116 kW)

www.termodinamik.com.tr

TD Group
TERMODİNAMİK ŞİRKETLER GRUBU

TERMODİNAMİK
HEATING SYSTEMS

FOREWORD

Dear Customer;

First of all, thank you for choosing our product. We hope you will get complete satisfaction from TBK/S Solid Fuel Boiler.
We would like you to use your device with maximum efficiency, therefore please read this instruction book carefully before you start using the product and save it to refer to in the future.
This manual will help you to operate your device safely and efficiently. For this reason you should pay attention to these:

- *Please read this instruction book carefully before you install and operate the product.*
- *Follow the instructions and the rules on safe usage.*
- *The instruction book may apply to other models as well; the differences between the models are clearly described inside.*

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HEATING SYSTEMS

CONTENTS

SAFETY WARNINGS

To prevent accidents and financial loss, please read carefully given instructions in this manual.

DANGER!
This symbol warns you against failure risks.

NOTE!
This symbol warns you against material damage and environment pollution.

In terms of safety never install boilers indoor places used for humans to live.

In case of electric shortage, never add cold water to a hot boiler. In such cases, the best measure is to remove the burning coal from inside of the boiler to out, than to close all doors allowing the air inside the boiler.

Smoke pipes should be airtight and shall not be passes through living areas. The boiler, if possible, be installed in the boiler room and should have adequate ventilation openings.

If the boiler is installed in severe cold climates, insulate expansion tank as well as expansion tank inlet and outlet pipes.

"Termodinamik" brand boilers are designed to heat the hot water up to maximum 90°C. Heating the water to temperatures exceeding this limit should not be allowed.

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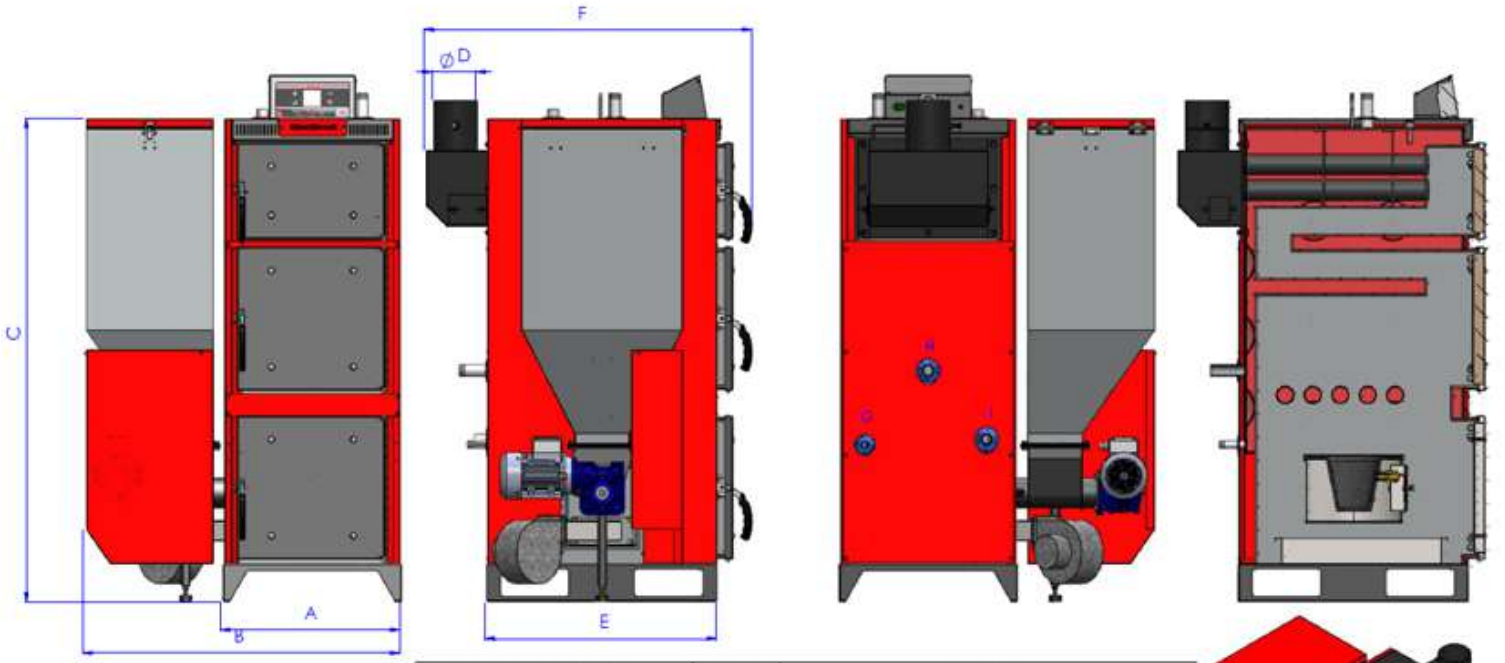
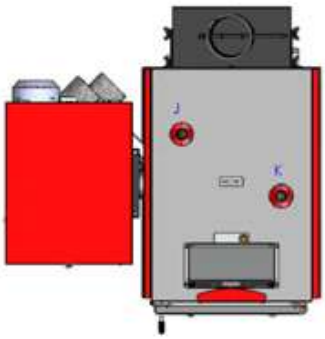
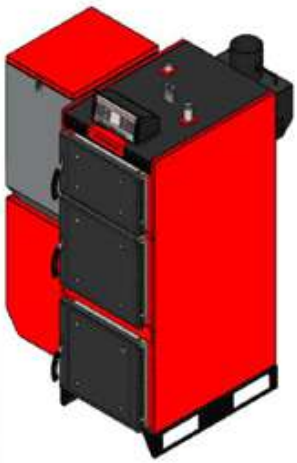
TBK/S 25-100 TECHNICAL SPECIFICATIONS TABLE







PARAMETERS	UNIT	TBK/S				
Rated heat power (coal)	Kw	29	46	70	93	116
	kCal / h	25000	40000	60000	80000	100000
Fuel capacity	Lt.	130		260		
	kg.	100		200		
Water volume	Lt.	74	87	182	202	235
Operating pressure	Bar	3				
Test pressure	Bar	4,5				
A	mm	520	520	640	640	640
B	mm	920	920	1140	1140	1140
C	mm	1400	1400	1575	1575	1575
D	mm	Ø127		Ø160		
E	mm	570	670	770	870	970
F	mm	850	950	1140	1240	1340
G (Filling - Discharging)	R	½	½	½	½	½
H (Radiator return)	R	1	1	1¼	1½	1½
I (Expropriation return)	R	¾	1	1	1¼	1¼
J (Expiry departure)	R	¾	1	1	1¼	1¼
K (Radiator going)	R	1	1	1	1½	1½
Electrical connection	V/Hz	230/50				

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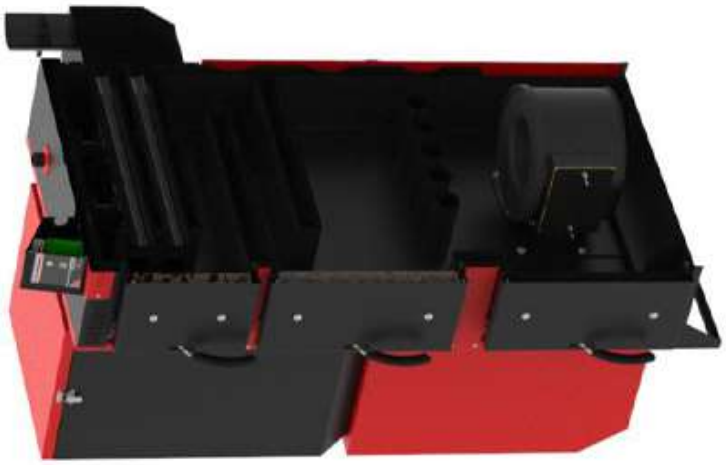
	kg.	100		200		
Water volume	Lt.	74	87	182	202	235
Operating pressure	Bar	3				
Test pressure	Bar	4,5				
Chimney diameter	mm	Ø127		Ø160		
Electrical connection	V/Hz	230/50				



FUEL FEEDING AND STANDBY TIMES

PRISMATIC		25.000 kcal/h	40.000 kcal/h	60.000 kcal/h	80.000 kcal/h	100.000 kcal/h
7.000 kcal/kg Fuel	Standby (s)	170	116	123	123	125
	Feeding (s)	2	2	3	4	5
5.000 kcal/kg Fuel	Standby (s)	125	123	116	108	105
	Feeding (s)	2	3	4	5	6
3.500 kcal/kg Fuel	Standby (s)	87	85	80	73	72
	Feeding (s)	2	3	4	5	6

We reserve the right to modify dimensions and views.

WARNING!

The given values are calculated theoretical times considering maximum heat load, geometry of the fuel storage and redactor rotation speed and may differ according to the climatic conditions of the region where the boiler will be used, quality of the fuel to be utilized, installation, chimney specifications and comfort requirements of the user. In practice, the optimal values should be determined by the user. Incorrect applications will lead increased fuel consumption. In order to avoid such incorrect applications make sure to ask from our authorized services to provide and recommend detailed information on standby and feeding times when commissioning the boiler.

IMPORTANT POINTS FOR INSTALLATION

Termodinamik brand of solid fuel boiler should be installed by observing the points mentioned in this manual in order to ensure they are commissioned by "TERMODİNAMİK AUTHORIZED SERVICES" and warranty period is started.

- Make sure the boiler is installed level. If the boiler is installed in boiler room it should be mounted on a concrete pedestal should be avoided to suck any dust from the floor.
- Adequate ventilation should be provided in the boiler room or in the room where the boiler is installed
- Open or closed expansion tank can be used with the installation of TBK/S series boilers (open expansion tank is recommended). At TBK/S boilers the pressure of the closed expension tank must be checked periodically every two months by the user or installer. The pressure of the closed expension tank should be calculated based on height of the building. (Each 1 bar will serve 10 meter height).Optimal expansion tank volumes are given in the Table page 18.
- When mounting the boiler make sure to leave enough space around the boiler for the service to facilitate intervening when required.
- In extreme cold climate conditions, expansion tank flow and return pipes should be insulated.
- The pump should be installed in such way to avoid boiler and expansion tank flow and return pipes should not create an air pocket. On points where there is possibility for air to be accumulated, air tubes or vent systems shall be provided to purge the air (Figure 1).
- On boilers operating with 3 bar working pressure 3-bar safety valves should be used. (For cylindrical boilers (25-100) and prismatic (125 and 500) boilers operating with 3-bar).
- On boilers operating with 5,6,7,8 bar working pressure 5,6,7,8-bar safety valves should be used. (For cylindrical boilers operating with 5,6,7,8-bar).
- Expansion tank flow and return pipes should be installed with continuous upward inclination from the boiler to the tank without any downward bending (Figure 2).
- Never a valve, filter, non-return valve or any other armature should be installed on the pipes between the boiler and the expansion tank.

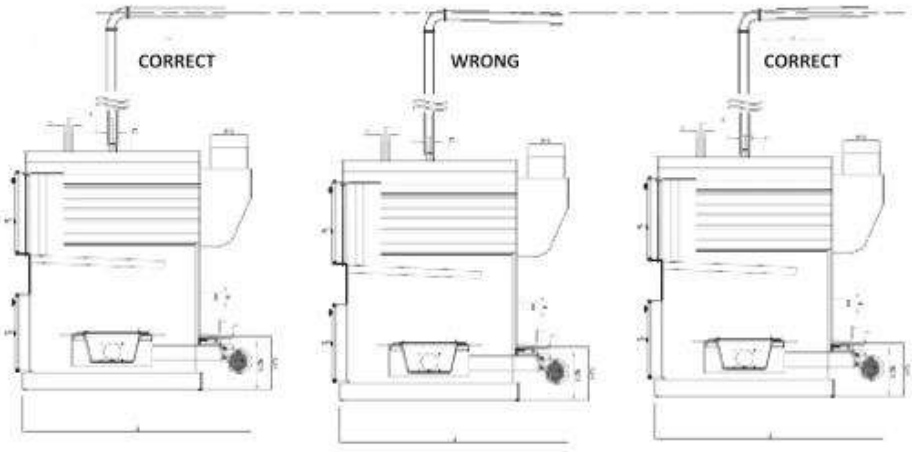
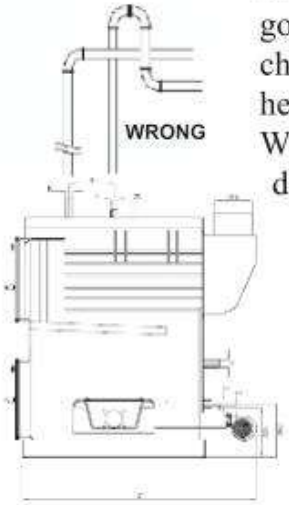


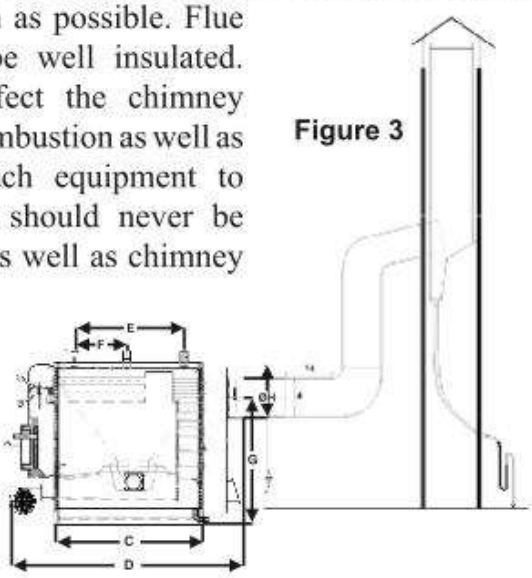
Figure 1

Figure 2



- Chimney is one of the most important parts of the system. Maintaining a good combustion cannot be possible without an adequate chimney. As chimney diameters vary according to the boiler output capacity; also the heights of chimneys should be determined according to the boiler capacity. When connecting the boiler flue to the chimney, care should be taken not to decrease the flue outlet diameter of the boiler along the flue connection as well as to avoid bends as much as possible. Flue pipes made of steel should be well insulated. Otherwise, they adversely effect the chimney draught and cause inefficient combustion as well as forming condensation. No such equipment to enforce the chimney draught should never be installed inside the flue pipes as well as chimney outlet (Figure 3).

Figure 3



- After the mounting the boiler and installation the system should be filled and drained twice in order to flush the system to remove any welding chips and sealing materials. While flushing the installation make sure to close boiler inlet and outlet valves. Figure 3
- In order to reduce heat losses to minimum al pipes crossing through outdoor spaces should be well insulated.
- Treated water should be used to improve operating conditions of the boiler.

! To avoid electrical shocks, ensure to disconnect the appliance from the electrical mains during repair and maintenance and take measure nt to be connected without your permission (Authorized service).

! To avoid burning risks start repair and maintenance works after having allowed the boiler to cool (Authorized service).

! Care should be taken not to pass chimney pipes through living spaces.

! Do not install an aluminium folding pipe between boiler's and building's flue.

! Do not install any apparatus such as windrose/weathercock at outlet of chimney.

! Open or closed expansion tank can be used for TBK/S but open expansion tank is recommended.

! Hydrometer or manometer must be installed to an easyly visible location.

! The flue pipe (chimney) mustn't be mounted with level which pevent the draught of it.

! End of the must be 40 cm higher than tip of the roof.

! The room temperature requested by the user, is related with isolating of the building, quality of fuel and the way system is installed. Therefore in unsuitableness of any of these conditions manufacturer can not be held as responsible.

BOILER ROOMS FOR BIG BOILERS

- In order to protect boilers from the wetness from the floor as well as flushing waters for the surrounding, boilers should be mounted on a concrete pedestal with 10-15 cm height from the floor. Fan of the boiler mounted on such pedestal should be avoided to suck dust from the floor.
- A relatively big size floor drain with strainer should be provided to collect and remove surround water.
- There should be two doors in the boiler room, one of which opening to the outdoor space. Both doors should be made of fireproof or fire resistance material and these doors should open outward from the boiler room. Doors should not open either directly to the stairwell, but to a small entrance room and the doors of that room should be airtight and have a sill with minimum 10 cm height.
- Lightening of the boiler room, if provided naturally (through windows), care should be taken not to position the lightening openings under the other windows of the building. If lamb is used to light the boiler room, a lightening system not dazzling but providing an optimal lightening should be installed.
- Main electric circuit breaker should be installed near to the boiler room entrance and should be a sealed type.
- A fire extinguisher should be provided in the boiler room.
- Installing units like ventilators, air handling units serving to the other floors of the building is not recommended. Such units may adversely effect boiler combustion air supply.
- In order to reduce the noise level of the boiler room, the ceiling should be covered with noise insulating material. Such insulator should be made of fireproof material.

CHIMNEYS

- Fire proof metarial must be used for flue pipe and chimney should have enough resistance to restrain the fire outside the chimney into the other parts of the building through the chimney for certain time.
- The duty of the chimney is to evacuate the flue gases outside without harming the environment and to provide necessary draught to ensure circulating of hot gasses inside boiler at a required speed.
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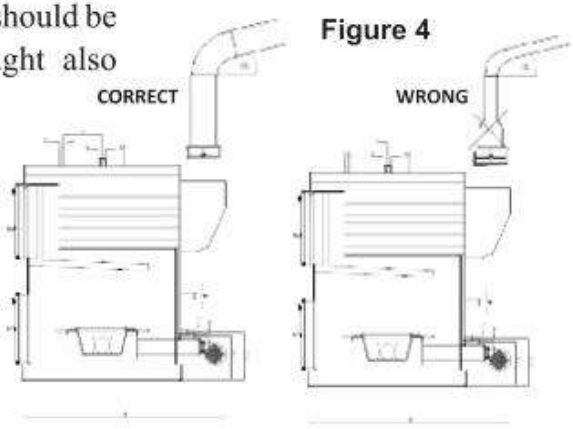
- The duty of the chimney is to evacuate the flue gases outside without harming the environment and to provide necessary draught to ensure circulating of hot gasses inside boiler at a required speed.
- Chimney material should be fireproof and should have enough resistance to restrain the fire outside the chimney into the other parts of the building through the chimney for certain time.
- Smooth surfaces should be used as far as possible in order to reduce friction on the inside surfaces of the chimney.
- Gas tightness of the chimney must be ensured.

Chimneys should be well insulated and heat losses should be reduced. When the chimney cools down the draught also decreases and in the cooled chimney the formed acids combined with the effect of condensation can lead corrosion on the inner surfaces of the chimney or down inside the boiler, therefore chimneys should always be insulated.

Figure 4



Positions of Chimneys

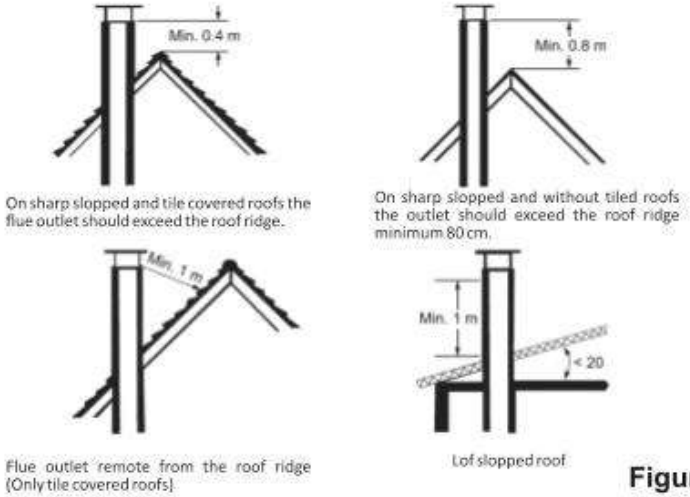
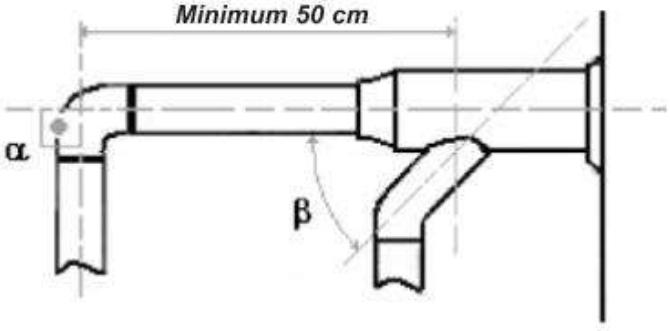


Figure 5

The distances between the roof and the chimney vary depending if the roof is covered or not with tile as well as to the form of the slope. Below Figure 5 shows the positions of the chimneys according to various types of roofs. (Figure 5)

COMMON CHIMNEY



Connecting two solid fuel boilers to the same chimney is not recommended. Where this is not achievable and if calculations based to chimney cross section and height also allow using of other solid fuel boilers, then it is possible to connect multiple boilers into a common flue system. In such cases the configuration indicated in the figure should be considered.

Another point to be observed is that, the angle of the flue connection with horizontal axis of the second boiler to be connected should be less than the first one. The second boiler's flue connection to main flue connection should be in "swept connection" as shown in the picture.

Keep easily flammable materials away from boiler flue connections and hot areas, which may occur around the boiler.

For installation of the boiler warning points indicated in the user manual must be taken into consideration. The supplier will not take any responsibility for wrong installation of the boiler and chimney.

FUEL CHARACTERISTICS

Coal Storage

- Do not store coals in open areas and under direct sunshine. Coals subject to direct sunshine go under chemical reactions leading to be crumbled and even start burning.
- Try to store the coal in a shed as far as possible. Care should be taken to keep storage height less than 1 meter. If you store the loose coal in outdoor, store it in piles and if the temperature of piles tends to increase ventilate by turning them upside down.

When purchasing coal:

- Try to buy coals with low sulfur and humid content. Requirements of domestic and import coals are given below tables.
- First buy a small amount of coal that you intend to buy and test it. Pay attention that the coal has suitable size to pass through the mesh on the bunker.
- Do not buy wet or damp coals.

Characteristics and limits of imported hard coal and lignite coal used for heating

Characteristics	Limits
Total Sulfur (dry based)	Maximum % 1.0 (tolerance %+0.1)
Lower Calorific Value (dry based)	Minimum 6400 Kcal/kg (tolerance -200)
Volatile Material (dry based)	% 12-33 (tolerance +2)
Total Humidity (in original form)	Maximum % 13
Ash (dry based)	Maximum % 16 (tolerance +2)
Dimension*(sold)	18-150 mm(Maximum tolerance ±%10)

** For mechanical feed boiler combustion systems, the coal size can be maximum 10-18 mm.*

Characteristics of domestic coals to be used in cities and towns where limit values are exceeded

Characteristics of Domestic Coals	Limits	Cities and Towns to be Used
Total Sulfur (dry based)	En çok % 2	Cities and towns (II. Group) Where the limit values are not exceeded in accordance with Article 28th of this regulation.
Lower Calorific Value	Minimum 4800 Kcal/kg (-200 tolerance)	
Total Humidity (in orjinal form)	Maximum % 25	
Ash (dry based)	Maximum % 25	
Dimension*(sold)	18-150 mm(maximum tolerance % 10 for under 18 mm and over 150 mm)	

** For mechanical feed boiler combustion systems the coal size can be maximum 10-18 mm.*

Characteristics of domestic coals to be used in cities and towns where limit values are not exceeded

Characteristics of Domestic Coals	Limits	Cities and Towns to Be Used
Total Sulfur (dry based)**	Maximum % 2.3	Cities and towns (II. Group) where the limit values are not exceeded in accordance with Article 28th of this regulation.
Lower calorific value (dry based)**	Minimum 4200 Kcal/kg (tolerance -200)	
Total Humidity (on orjiginal form)	Maximum %30	
Ash (dry based)	Maximum % 30	
Dimension*(sold)	18-150 mm(maximum tolerance % 10 for under 18 mm and over 150 mm)	

** For mechanical feed boiler combustion systems the coal size can be maximum 10-18 mm.*
** For infeed burning systems the coal size can be maximum 10-18 mm.*
***When the domestic coals with lower calorific values (dry based) of minimum 5000 kcal/kg (-200 tolerance) and combustible sulfur ratio (dry based) maximum one point five percent (1,5%) and other characteristic confirm the specifications given in this table are burnt in current stoves and boilers and if the discharged sulfur dioxide concentration from the chimney is certified by an accredited or Ministry approved laboratory that it has not exceeded the equivalent sulfur dioxide concentration discharged from the chimney of those coals bearing the characteristics determined in this table are burnt in current stoves and boilers, such coals can be utilized for heating purposes in cities and towns (II. Group) where the limit values are not exceeded in accordance with Article 28th of this regulation.*

Characteristics of domestic coals to be used in districts and villages

Characteristics of Domestics Coals	Limits
Total Sulfur (dry based)	Maximum % 2,5
Lower Calorific Value (dry based)	Minimum 3400 Kcal/kg (tolerance -200)
Dimension*(sold)	18-150 mm(maximum tolerance % 10 for under 18 mm and over 150 mm)

** For mechanical feed boiler combustion systems the coal size can be maximum 10-18 mm.*

Above values are taken from the official web site of the Ministry of Environment and Forest.
For Regulation: *http://www2.cevreorman.gov.tr/yasa/y/070209.doc*

In solid fuel boilers never open feeding door when the fan is operating.

TBK/S automatic feeding boilers can be equipped either open or closed expansion tank.

REQUIRED WATER HARDNESS

In order to prevent calcification of water inside of the boiler and pipes, not so hard water should be used. (The water used in system must be over FS 25 which is international standarts for water hardness.)

Parameter	Unit	Boiler feed water	Boiler filling water
Appearance	-	Clean, clear, free of solids and stable foam	
Conductivity at 25°C	µS/cm	< 1500	
dpH value at 25°C	-	> 7.0	from 9.0 to 11.5[a]
Total hardness (Ca+Mg)	mmol/l	< 0.05	
Iron content	mg/l	< 0.2	
Combined alkaline value	mmol/l	-	< 5
Fuel oil/oil content	mg/l	< 1	-
Organic particles	-	See the note below[b]	

TS EN 12953-10 Boilers: *Characteristics of boiler water and boiler feed water as per "**Requirements for feed water and boiler water quality**"*

a. *If components made of materials other than steel (copper pipe, aluminum radiator etc.) exist in heating system they may require lower pH values. However, in a heating system priority is assigned to the boiler protection and the above values should be observed.*

b. *Organic materials are typically consisted of various compounds. Therefore it is difficult to predetermine the effects of such compounds in total or individual components thereof in the boiler water. Organic compounds separate to their components and constitute carbonic acid or other acidic components thus may lead corrosion, wear and puncture. This also can lead accumulation of scale, which should normally exist in very minor amounts, and foaming.*

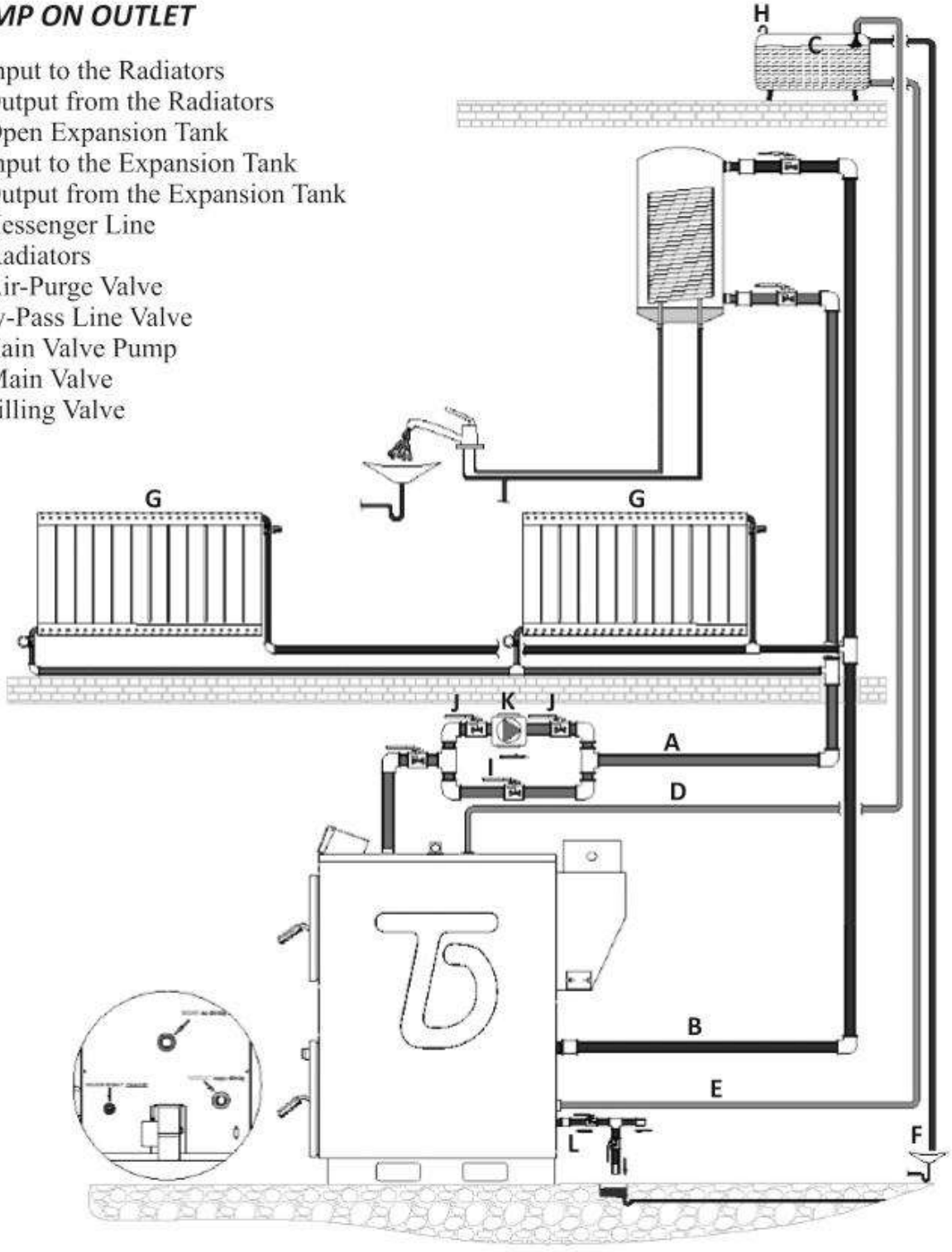
- Please consider that waters with high hardness levels will cause calcification. Malfunctions and decreased performance due to calcification,
- Problems resulting from the use of appliance in different areas not suitable for technical properties (industrial use, etc.),
- Problems caused by using water other than tap water (artesian water, waste water, etc.),

are not covered by Warranty.

TBK/S 25-100 INSTALLATION CHART

PUMP ON OUTLET

A. Input to the Radiators
B. Output from the Radiators
C. Open Expansion Tank
D. Input to the Expansion Tank
E. Output from the Expansion Tank
F. Messenger Line
G. Radiators
H. Air-Purge Valve
I. By-Pass Line Valve
J. Main Valve Pump
K. Main Valve
L. Filling Valve



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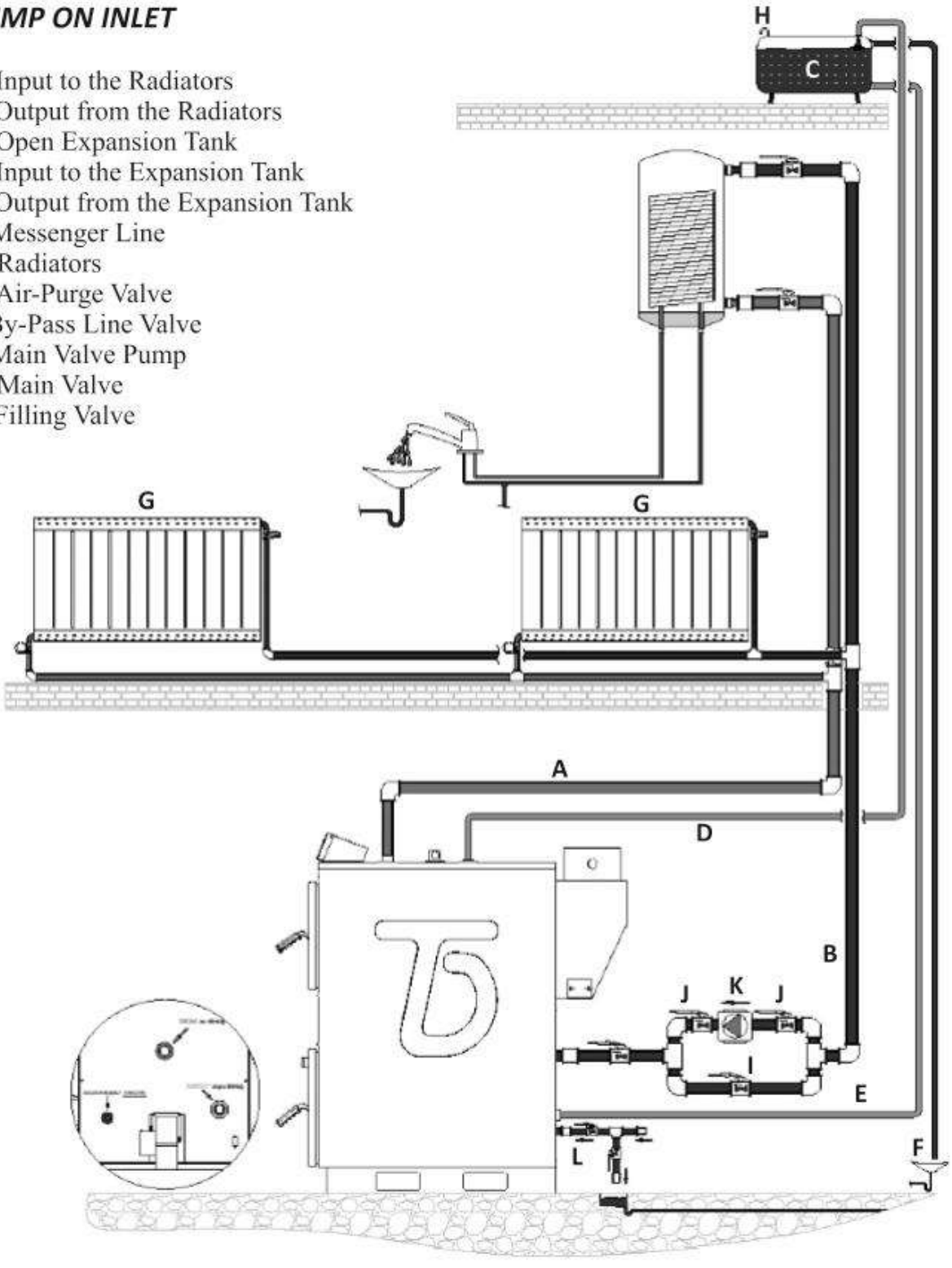
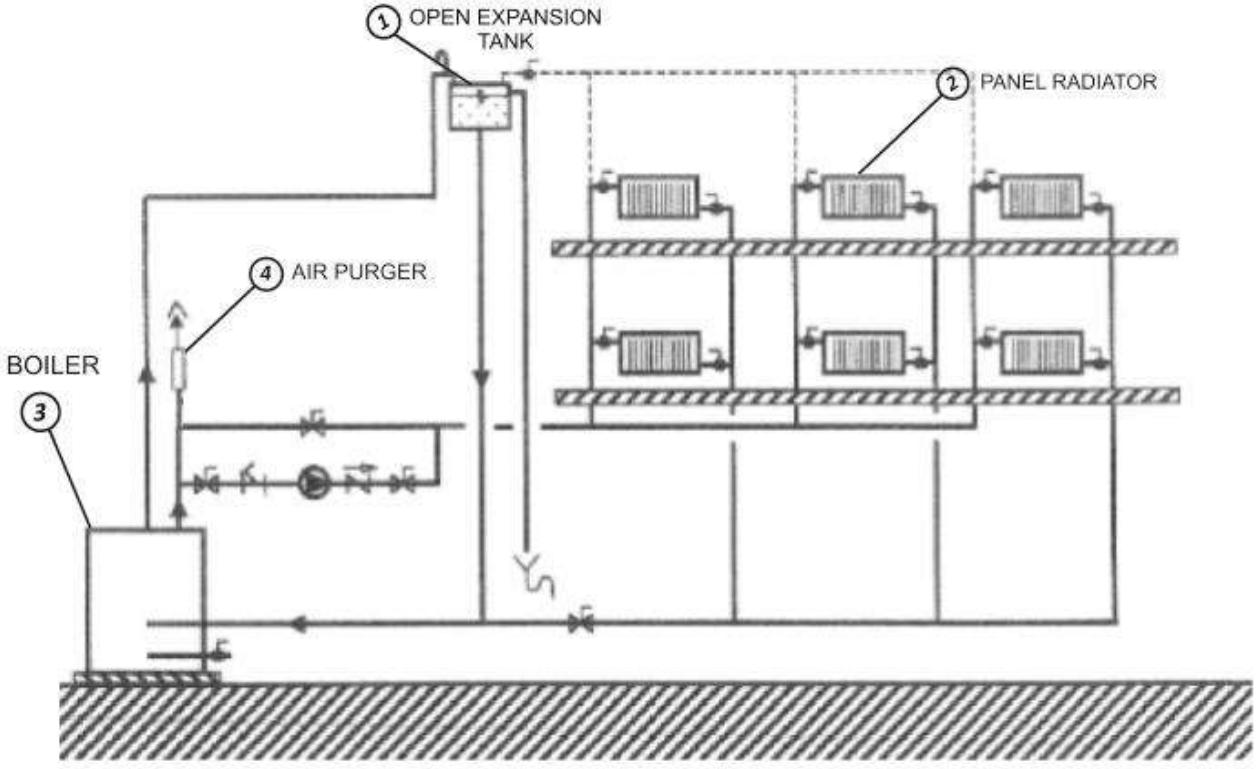


EXPANSION TANK CAPACITIES SUITABLE FOR BOILER CAPACITY

Boiler Capacity (Kcal/h)	If Using Sectional Cast Iron Boiler	If Using Panel Radiator
25.000	65 lt	42 lt
40.000	100 lt	67 lt
60.000	150 lt	100 lt
80.000	200 lt	135 lt
100.000	250 lt	167 lt

The above given values are for nominal conditions. Net assessment and measurement should be made by the installer considering the location and the conditions, which the boiler will be operated in.

MULTI-STOREY BUILDING HEATING INSTALLATION SCHEME



TBK / S AUTOMATIC IGNITION

Manual for burning pellets and coal in automatic firing boiler:
Fill the bunker with fuel. (Make sure that the pellets you will use are not damp, this will prevent the pellet from igniting and may cause the reducer to jam.)

1. Turn on the power of the panel.
2. With the manual loading option, load pellets or coal into the furnace up to the mouth level.

3. To realize the burning mode with factory settings.

*To change the panel language, go to settings - language - select the desired language - enter the password - 15 - press OK.

4. If there is no burning in the factory settings: you can realize the burning by changing the values shown in the images.

5.
1. Average burning time is about 7-8 minutes for coal and 2 minutes for pellets.
2. This time will change according to the type of fuel and humidity. It will decrease or increase. (These features determine the feeding and waiting time.)
3. This period should be determined by observing several times during fuel change and first use. Set the first fuel feeding times in the parameter settings.

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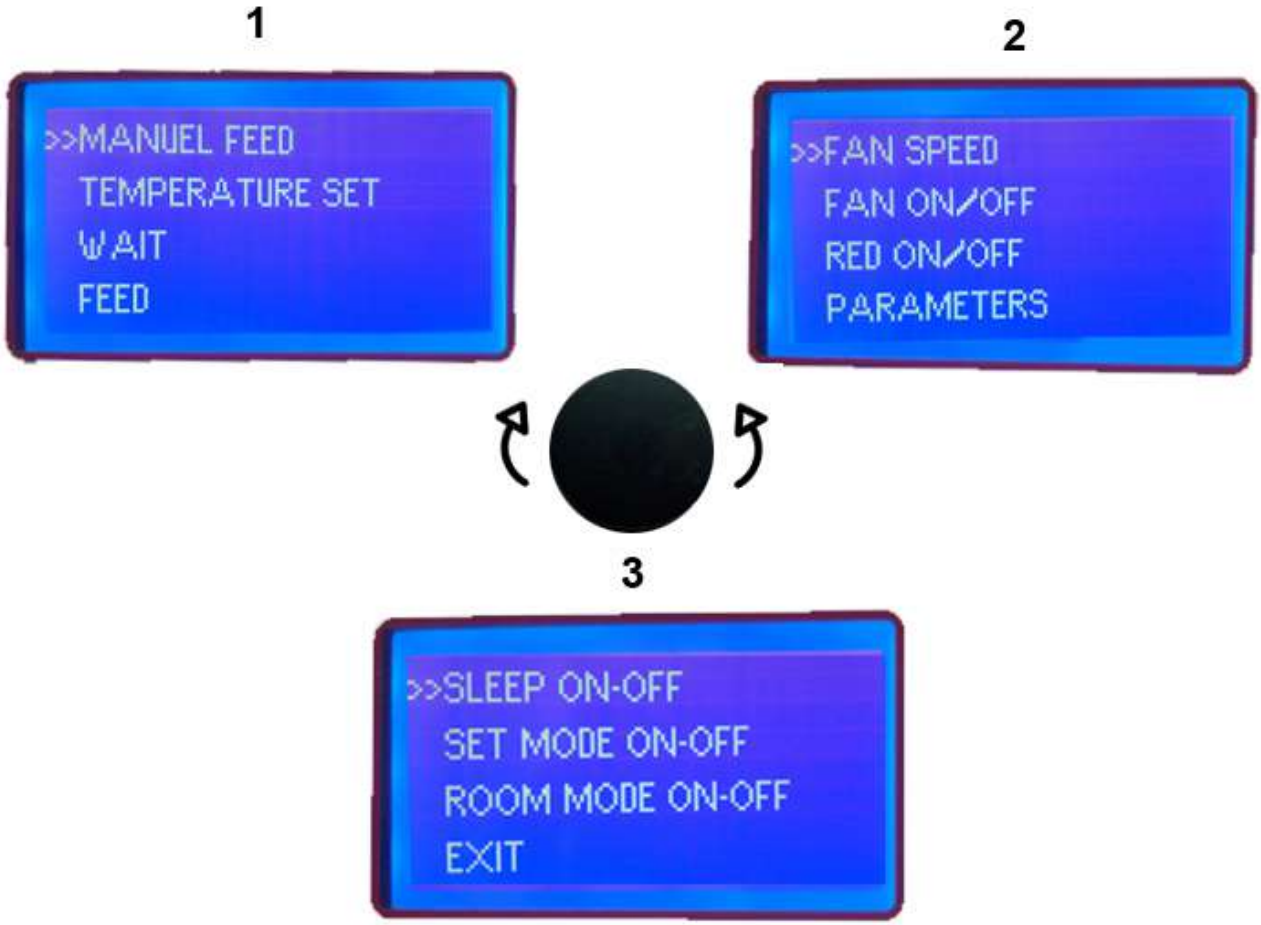
HEATING SYSTEMS

TBK / S DIGITAL CONTROL PANEL

MENU OPTIONS



FUNCTIONS

Feeding Time Setting: Charcoal feeding time is set with this option.

Waiting Time Setting: The time between two coal feeding times is set with this option.

Manual Feed: As long as this option is pressed, fuel is loaded into the boiler.

Fan Enabled: The boiler's fan is activated and deactivated with this option.

Reducer ON / OFF: Boiler reducer is activated and deactivated with one option.

INDICATOR and DISPLAYS

DEVICE DISPLAY

Set values and operating information about the device are displayed on this screen.

FAN INDICATOR

Indicates the fan speed. The speed increases in 12 steps from left to right.

SET VALUE INPUT

When the Encoder is pressed for 3 seconds, the menu is entered and you can select the setting you want to change the settings and apply the value you want by turning it left or right.

STARTING THE BOILER

To run the boiler after entering the set values; Press MANUALLY FEED, fill fuel. After the fuel is loaded, turn the fan on by pressing FAN ON.

Press REDUCER ON / OFF to switch on the gearbox.

ERROR CODES and SOLUTIONS

HIGH TEMPERATURE: If the boiler temperature rises above 95 degrees, this error occurs and the device stops operating. This error can be caused by a malfunction in the temperature sensor. There may be a problem with the pump motor.

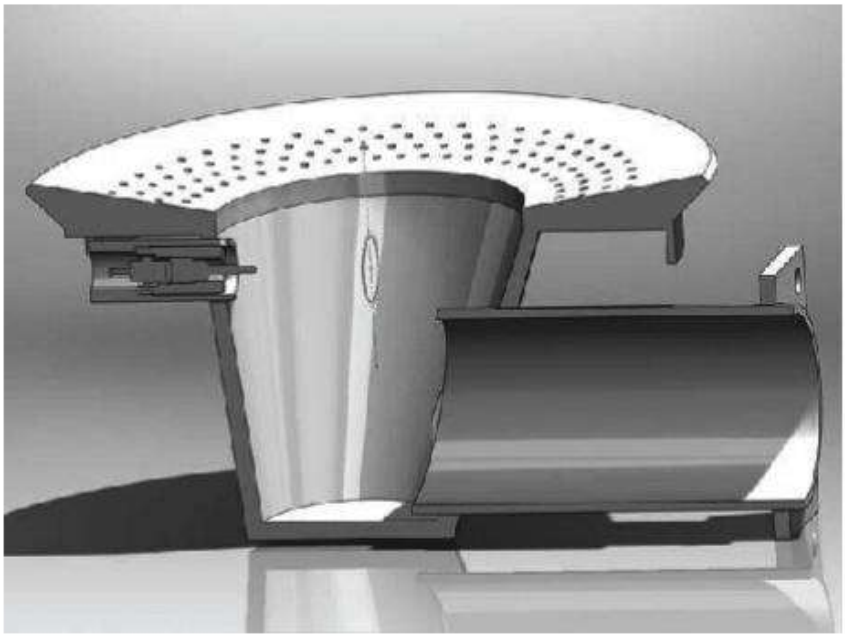
PROBE ERROR: In case the boiler temperature sensor fails, this error occurs and the device stops operating. This error can be caused by a malfunction in the temperature sensor.

FUEL LOW: After the boiler is warmed up and after the pump is activated, if it cools down to 28 degrees, the device generates this error and stops its operation. This error can be caused by a malfunction in the temperature sensor. The fuel may have run out, the fan may have stopped blowing.

ROOM THERMOSTAT: When the room thermostat is activated, this warning will appear on the screen.

TBK / S AUTOMATIC IGNITION

The system called "Automatic Ignition", which we offer in our EKY / S boilers as an option, is designed for the fuel that is fed to catch fire more quickly and more easily, thus accelerating the initial start-up of your boiler.



ERROR HISTORY

The appliance can store last 20 errors in its memory. These data are very important for authorized services. An authorized service can obtain information regarding the problems of the appliance.
To call last errors list:

- Cut off the power to the appliance
- Push ENTER button to energize the appliance
- The display will ask a password. Enter "250" as the password and confirm with ENTER button.

Thus you can see the last occurred errors. The top error bearing order number 1 is the last error occurred. Other previously occurred errors can be recalled by up and down buttons.
The appliance after having written 20 numbers of errors in its memory shifts the list and writes the latest occurred error to the top of the list. In that case the twentieth error is erased, therefore the last 20 updated errors are kept in the memory.
To reset the error list:

- When the display shows error list push ENTER button.
- In the display appears a question: "RESET ERROR LIST", "YES NO". Select YES by up and down buttons than push ENTER button.

TOTAL OPERATING HOURS

The appliance continuously stores PUMP, FEEDING REDUCTION GEAR and FAN motors operating hours in its memory. Further if the PUMP is on and the boiler temperature is equal or over 45°, then the HEATING time is continuously written in the memory, so the total operating hors of the boiler can be learnt.
To see total operating times of the boiler:

- Cut off the power to the appliance
- Push ENTER button to energize the appliance
- The display will ask a password. Enter "245" as the password and confirm with ENTER button.

Thus you can see total operating hours by navigating with UP and DOWN buttons. In the display total operating hour counters with the order of PUMP, FEEDING REDUCTION GEAR and FAN are seen.
Any hour counter can be reset. To reset:

- When the total operating hour wished to be reset is on the display, push ENTER button.
- In the display appears a question, example:"RESET PUMP HOUR COUNTERS""YES NO". Select YES by UP and DOWN buttons than push ENTER button.

ERROR CODES AND TROUBLE SHOOTING

OVERHEAT: If the boiler temperature exceeds 95°C an error occurs and the boiler stops operation. This error may arise from a sensor failure as well or pump motor may be failed.

SENSOR ERROR: If the boiler temperature sensor fails an error occurs and the boiler stops operation. This error may arise from a sensor failure.

FUEL FINISHED: If the boiler cools after it has become hot and the pump is on and cools down to 28°C the unit produces this error and stops operating. This error may arise from a sensor failure, fuel may be finished or fan may have stooped blowing.

ROOM THERMOSTAT (ODA TERMO): When the room thermostat is activated the display will show this indication.

OVERCURRENT: When the feeding drive motor is jammed or failed motor will draw overcurrent and this error occurs. Jamming in the reduction gear motor as well as in the coal drive unit should be removed.

LIMIT THERMOSTAT ERROR, RESET LIMIT THERMOSTAT: A limit thermostat is provided at the back door of the boiler cover. This thermostat, typically set at 95°C, is activated when the boiler is over heated and stops fan and reduction gear motor and also turns the pump motor on.

This condition is called as "Limit thermostat tripped" in the displays appears LIMIT THERMOSTAT ERROR, RESET LIMIT THERMOSTAT (LİMİT TERMOSTAT HATASI, RESET LiMİT TERMOSTAT)" error. warning.

Limit thermostat error is removed only after the boiler is cooled. When the temperature drops below 95°C (+/- 10°) limit thermostat is relieved however its contacts remain still. In order to have the contacts shifted: open the limit thermostat cover by turning and push the red button, which you will see after you have opened the cover. This action resets the limit thermostat.

The boiler is reset by turning off and on through ON/OFF button, the error is then removed from the display.

RESETTING TO FACTORY SETTINGS

To reset the boiler to factory settings:

- Energize the boiler by pressing ENTER button.
- The display will request a password. Enter "30" as the password, confirm with ENTER.
- The unit will ask confirmation as "YES NO". Select YES by UP/DOWN buttons and confirm with ENTER.
- The boiler is now reset to factory settings.

TERMODİNAMİK
HEATING SYSTEMS

SOLID FUEL CONTROL PANEL WITH FEEDER

Read the manual carefully before using the device! Failure to comply with the warnings in the user manual, has undertaken responsibility for loss and accidents that may occur by persons. In this case, the device is out of warranty for malfunctions.

* 220x120 plastic case
* NTC sensor
* Panel

TECHNICIAL SPECIFICATIONS

Sensor type	Temperature range	Accuracy
NTC	-20...110 °C	± % 2 (full scale) ± 1 dijit

ENVIRONMENTAL CONDITIONS

Working / Storage temperature	0...50 °C / -25...+70 °C
Maximum relative humidity	Up to 30 ° C 80% - 50% after 30 ° C decreasing linearly down to 50 ° C

ELECTRICAL SPECIFICATIONS

Supply voltage	230 Vac + %10 - %20 50/60 Hz
Power consumption	Max. 6VA
Connection	With terminal connectors
Data retention	EEPROM Min. 10 years

OUTPUTS

Relay current	Relay 250 Vac 30A, Reducer output protected by 9A current limitation, (Factory setting)
Relay life	Mechanical 10.000.000 opening and closing, under load 100.000 opening and closing

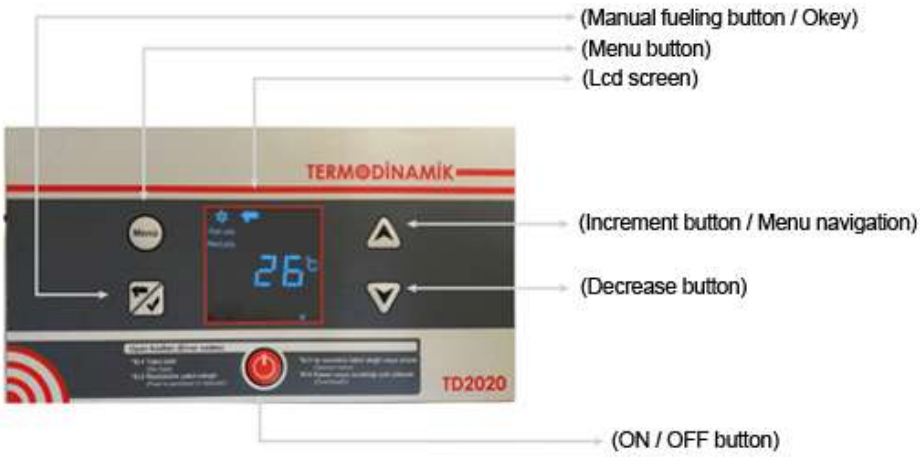
CONTROL

Control format	Single set value
Control method	ON - OFF
A / D	8 Bit

BOX

Box shape	It is fixed to the board with screws
Weight	495 gr
Box material	Self-extinguishing plastics are used.

(Solvent, Thinner, Gasoline, Acid) etc. The device should not be wiped with abrasive cleaning agents that contain it.



Manual fueling button Okey	When the fuel delivery button is pressed, it gives fuel to the boiler manually, at the same time it acts as the OK button when it is in the menu.
Menu button	It is entered into the menu and the value is changed.
ON / OFF button	The circuit is ON or OFF.
Increase button	It is used to increase the desired value. At the same time, when the menu is entered, it is possible to switch between the menus.
Decrease button	It is used to decrease the desired value.
LCD screen	It shows the measured temperature in normal operating condition. In the setting state, the value to be adjusted is displayed on the screen.

* When the (ER1) warning code is seen in the system, it means Fuel is over.
* When the (ER2) warning code is seen in the system, fuel is stuck in the reducer.
* When the (ER3) warning code is seen in the system, the temperature sensor is not connected or is defective.
* When the (ER4) warning code is seen in the system, the boiler water temperature is too high.

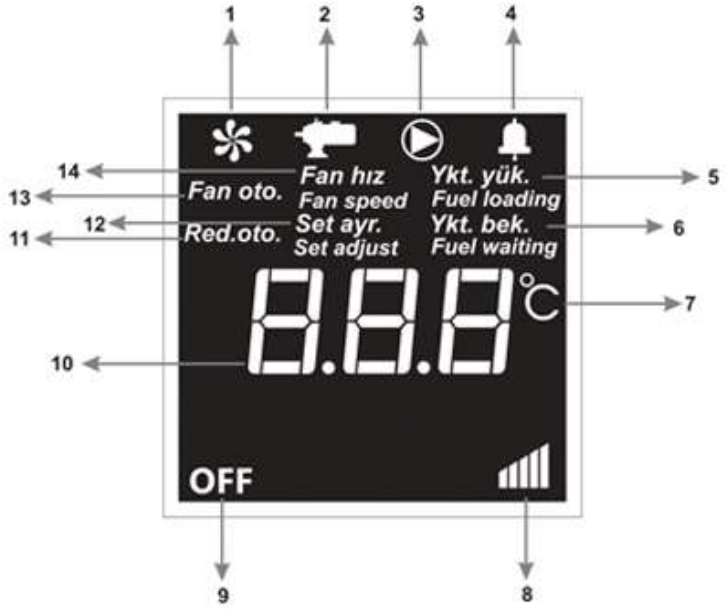
WORKING PRINCIPLE

* Solid fuel boiler control card.

MENU SETTİNGS

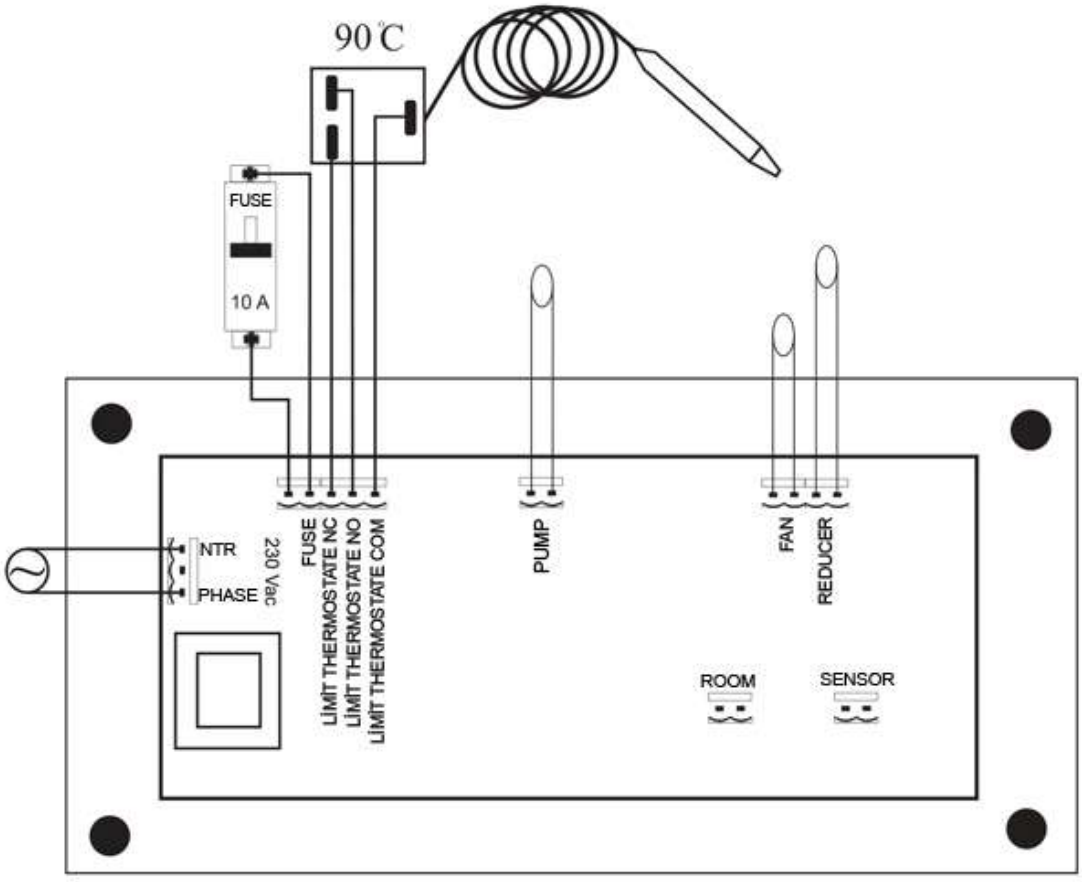
Press the menu key and switch between the desired menus with the Up - Down keys.

When we come to the desired menu, press the Menu button again for the value we want to set and the value starts to flash, the desired value is set with the Up - Down keys, and the menu is exit by pressing the OK button.



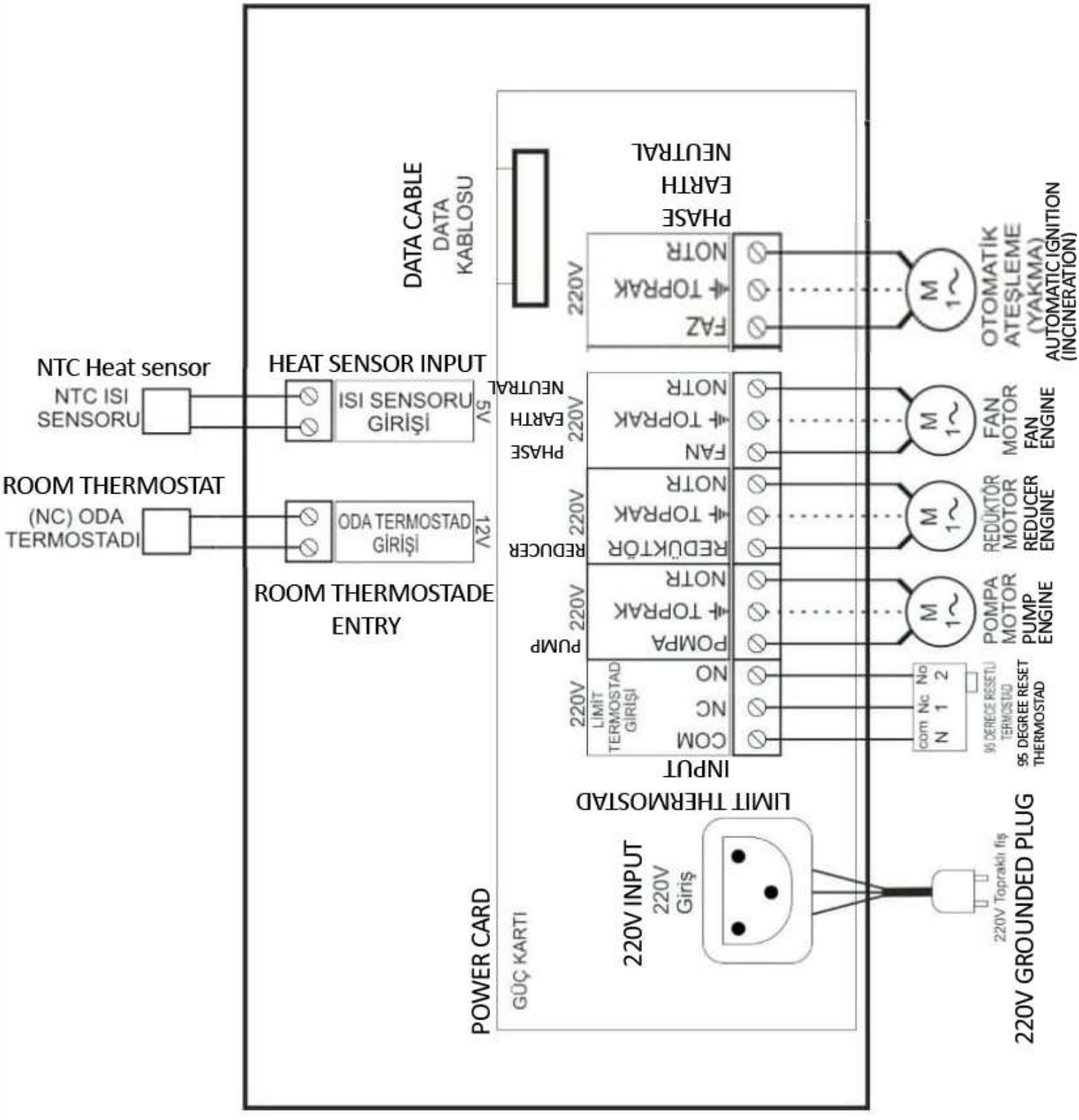
1	Indicates that the fan is running
2	Reducer shows fuel delivery
3	Indicates that the pump is running
4	Indicated as a warning symbol when there is a fault in the circuit
5	Indicates that it is in the fuel loading menu
6	Indicates that the fuel is in the standby menu
7	Degree symbol
8	Indicates at which stage the fan speed setting is
9	Indicates that the system is turned off
10	It shows the temperature of the circuit and shows the value to be adjusted when entering the menu.
11	Indicates that the gearbox is in automatic operation
12	Indicates that it is in the set setting menu
13	Indicates that the fan is in automatic operation
14	Indicates that it is in the fan speed setting menu


220 mm
120 mm
TERMODİNAMİK
Menü
26°C
TD2020


90°C
FUSE
10 A
NTR
PHASE
230 Vac
FUSE
LİMİT THERMOSTATE NC
LİMİT THERMOSTATE NO
LİMİT THERMOSTATE COM
PUMP
FAN
REDUCER
ROOM
SENSOR

TERMODİNAMİK
HEATING SYSTEMS

TBK / S DIGITAL CONTROL PANEL AUTOMATIC IGNITION ELECTRIC WIRING SCHEME



OPERATING THE BOILER

1. Put chimney damper to fully open position before lighting up the boiler.
2. Before starting the boiler ensure that the hydraulic system is filled and air is vented. Filling up the boiler should be carried on slowly to avoid any air to be accumulated in the system.
3. Systems with open expansion tank should be filled until water comes from the overflow pipe.
4. After filling the system up air should be removed from the system and the system should be checked for leaks.
5. Systems with open expansion tank the lowest pressure limit on the hydrometer should be marked and the user should be informed regarding the importance of this mark.
6. Information referring to the boiler adjustments, operation, controls and procedures to be carried on in case of emergency situations should be given to the user.
7. Circulation pumps should be checked for operation. The circulating pump shall not start automatically until the boiler temperature is reached to 37°C. This parameter is factory set like this to heat the boiler as soon as possible thus to avoid forming condensate during the first start and consequent damages the boiler.
8. Boiler water temperature can drop when the pump is restarted. You can observe starting of the pump and the fan from the red lights (LEDS) on the digital indicator.
9. After the boiler has started to burn normally and the system has started to operate, in systems equipped with automatic loading the feeding gear continues to feed in adjusted periods and the fan stays until the system water temperature has reached to the set value. If during this period you turn the boiler temperature adjusting knob on the mechanical control panel (or push temperature adjustment button on the digital panel), the digital display indicating the boiler temperature will show the temperature you wish to set at that moment.
10. Never open the feeding door during the fan operates.
11. Remember that, the quality of the coal you will use shall have direct influence on the on quality, ash amount produced after the combustion, cleaning periods and operation costs. Therefore before purchasing a large amount of coal, it is a good practice to buy a sample amount and test the results in the boiler.
12. Do not use coke having high calorific value in the boiler.
13. The water to be used in the boiler should have required hardness values for the boiler to serve long years in good condition.
14. Never operate the boiler without water. Check water level frequently.
15. When the boiler is do not touch hot points with bare hands. Use protecting gears.
16. Never open the doors of the smoke box.
17. Never place anything to obscure the explosion cover at the back of the boiler. The cover should be easily moved.
18. Always carry on regular cleaning of the boiler. Cleaning ensures your boiler to give better performance and good combustion.
19. If you notice any abnormal condition on the boiler, take necessary measurements and inform your authorized service immediately.

When converting fuels, ensure to contact with Termodinamik Company and obtain information referring to the conversion requirements of the boiler.

- Boiler must be operated according to the operation instructions.
- Failure to observe the instructions given in this manual as well as the usage and maintenance instructions provided with the boiler shall result the boiler go out of warranty cover and lead more fuel consumption.
- Never pump cold water to the boiler when it is hot.
- Never use thinner, gasoline or similar combustible materials to light up the boiler.
- Do not touch the metal surfaces of the boiler when the boiler operates. As they may be hot.
- Do not store imfalmmable, combustible or volative chemical materials in the room where the boiler operates.
- Do not open boiler doors when the boiler operates.
- The operation temperature of the boiler must be always over 45 °C.
- Inside of the boiler any petrolium metarials (such as styrofoam, nylon, cloth etc...) which will cause pitch, should not be burned.
- Fire proof metarial must be used for flue pipe and chimney should have enough resistance to restrain the fire outside the chimney into the other parts of the building through the chimney for certain time.
- Gas tightness of the chimney must be ensured.
- Smooth surfaces should be used as far as possible in order to reduce friction on the inside surfaces of the chimney.

POWER CUTS

In case of a power cut, as the circulating pump does not operate, a temperature increase occurs in the boiler water. This increase can rise up to boiling point in boilers having very high chimney draught. Therefore in case of a power cut, the procedure to be carried on in order is as follows:

- Bring flue damper to fully closed position,
- Tighten the knurled screw in front of the fan to avoid the air that can be passed through fan blades,
- If there is a by-pass valve in your system, open the related valve to the system,
- Never open boiler doors,
- Never drain the boiler water.

After the power cut is relieved do not forget to bring the settings to previous ones.

If possible, use an uninterrupted power supply (UPS) for the circulating pump in order to keep the pump running in a power cut.

CLEANING AND MAINTENANCE

- Check the boiler water level before each light up,
- The boiler should be lit in accordance with lighting instruction, the flame in the combustion chamber should be controlled and a complete combustion should be accomplished.
- Clean, at least weekly, smoke pipes, the chromium sheet metals (turbulators)inside the smoke pipes, and the smoke box that connects the boiler to the chimney.
- Clean the chimney at least three times in a heating season,
- Pay attention to carry on air openings above the combustion chamber as well as air box beneath the combustion chamber minimum one in a heating season.
- Cleaning of the accumulated ashes in the combustion chamber should be carried on daily. This action may be required twice depending to the quality (ash ratio) of the coals used.
- Pay attention to avoid collection of dust, burned coal on electric components and the fan of the boiler.
- Do not carry on cleaning when the boiler operates.
- Before heating season (winter) ensure to have you boiler cleaned and controlled (for a fee) by a TERMODİNAMİK authorized service.
- Boiler must be cleaned at least once a week by user. Otherwise pitch inside of the boiler and blockage at pipes will occur.
- The pressure of the closed expansion tank must be checked peridiocally every two monthes by the user or service. The pressure of the closed expansion tank should be calculated based on height of the building (Each 1 bar will serve 10 meter height.)

FAILURES AND SOLUTIONS

PROBLEM	POSSIBLE CAUSE	SOLUTION
Fire goes out while the burner operates.	- Insufficient supply air, - Fuel is wet or very dusty	- Check the chimney damper and fan damper. - Renew your fuel.
Boiler temperature increase higher over the set point.	- Sensor failure, the sensor may indicate more than actual value. - Temperature detecting sensor cable may be disconnected from its holder on the boiler.	- Call the service - Slightly remove the top cover and connect the cable into its place.
Figures seen on the control panel continuously change	Electronic card can be failed.	Call the service, to avoid repetition the problem prevent coal dusts enter inside the control panel.
High fuel consumption but less heat	- Low quality fuel, - Too much fuel is fed inside the boiler. - No chimney draught, or too much draught.	- Change the fuel. - Do not load new fuel until the fuel in the boiler turns red. - Check the flue damper and the position of the chimney as well as the wind conditions.
Collection of tar and pitch in the boiler.	- Boiler operates at very low temperatures or capacity very low. - Petroleum products (pvc, coal sacks etc.) or waste may be burnt in the boiler. - Low chimney draught.	- Set boiler temperature around 70°C - Never burn petroleum products in the boiler. - Check the chimney and correct as necessary.
Big clinkers, unburned fuels	- Fan supplies more air than necessary - Very high chimney draught	- Adjust fan speed via fan speed control knob. - Bring the flue damper to half position. Increase standby time.
Expansion tank is heated nearly boiler temperature	-Expansion tank can be subjected to the pump. -Pump capacity is too high	Call the service.

PRODUCER INFORMATION

PRODUCER

TITLE	:	**TERMODİNAMİK MAK. SAN. TİC. A.Ş.**
ADRESS	:	Atatürk Mah. 80 Sk. No:10 Ulucak-Kemalpaşa-İZMİR
PHONE	:	(232) 877 12 12
FAX	:	(232) 877 08 67

COMPANY EXECUTIVE

SIGN - SEAL :

PRODUCT

TYPE OF PRODUCT	:	KALORİFER KAZANI
MARK	:	TERMODİNAMİK
MODEL	:	**TBK/S**

BANDEROLE AND SERIAL NUMBER:

DATE AND PLACE OF DELIVERY :

SELLER COMPANY

TITLE :

ADRESS :

PHONE AND FAX :

INVOICE DATE AND NUMBER :

DATE - SIGN - SEAL :

TERMODİNAMİK®

HEATING SYSTEMS

TERMODİNAMİK MAKİNA SANAYİ TİC.A.Ş.

Kemalpaşa OSB Mah. 80 Sok. No:10 Ulucak - Kemalpaşa / İZMİR

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