Solid fuel boiler TKK3 with wood pellet burner TERMEC 70-90 KW
OPERATING INSTRUCTIONS with safety features

Prhovacka bb 22310 Šimanovci, Srbija
Tel/Fax. +381 22 480404 +381 63 259422
office@termomont.rs www.termomont.rs

June 3, 2011
## Contents

1 Konstrukcija i karakteristike kotla .......................... 2
  1.1 Dimenzije .................................................. 3
  1.2 Technical data chart EN 303-5 .......................... 3
  1.3 On Product .................................................. 3

2 How It Works .................................................. 3

3 Recommendations for boiler shipment and storage ............. 5
  3.1 Delivery form ............................................. 5
  3.2 What’s in the box .......................................... 5

4 Boiler installation ............................................... 5
  4.1 Boiler placement ........................................... 5
  4.2 Chimney .................................................... 5

5 Connecting the boiler with a central heating system .......... 7
  5.1 Closed system .............................................. 7
  5.2 Closed system combined heating with solar panels ...... 9
  5.3 Open system ............................................... 10

6 Boiler in function ................................................ 11
  6.1 First operation ............................................ 11
  6.2 Burner in operation ...................................... 11
  6.3 Maintenance and cleaning .................................. 13

7 Safety features .................................................. 13
  7.1 Thermal safety in case of overheat (closed systems) .... 13

A Declaration Of Conformity .................................... 15
1 Konstrukcija i karakteristike kotla

1.1 Dimenzije

<table>
<thead>
<tr>
<th>Type</th>
<th>Weight (kg)</th>
<th>Weight w/ tank</th>
<th>B without tank (mm)</th>
<th>B with tank (mm)</th>
<th>L without tank (mm)</th>
<th>L with tank (mm)</th>
<th>H (mm)</th>
<th>A (mm)</th>
<th>E (Φ)</th>
<th>F (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TKK3</td>
<td>70</td>
<td>395</td>
<td>506</td>
<td>730</td>
<td>1450</td>
<td>1270</td>
<td>1525</td>
<td>1300</td>
<td>990</td>
<td>180</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>510</td>
<td>621</td>
<td>750</td>
<td>1470</td>
<td>1270</td>
<td>1525</td>
<td>1300</td>
<td>990</td>
<td>220</td>
</tr>
</tbody>
</table>

1.2 Technical data chart EN 303-5

<table>
<thead>
<tr>
<th></th>
<th>TKK3</th>
<th>TKK3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal power TKK3 PELLET (KW)</td>
<td>70</td>
<td>90</td>
</tr>
<tr>
<td>Power range (KW)</td>
<td>70-90</td>
<td>90-100</td>
</tr>
<tr>
<td>Necessary draught (mbar)</td>
<td>0,27</td>
<td>0,28</td>
</tr>
<tr>
<td>Water content (l)</td>
<td>155</td>
<td>178</td>
</tr>
<tr>
<td>Output gas temperature at nominal power (°C)</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Chamber Volume (dm³)</td>
<td>0,2</td>
<td>0,23</td>
</tr>
<tr>
<td>Mass flow at nominal power (kg/s)</td>
<td>0,08</td>
<td>0,1</td>
</tr>
<tr>
<td>Network (V/Hz)</td>
<td>230/50</td>
<td>230/50</td>
</tr>
<tr>
<td>IP protection level</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Fuel consumption (kg/h)</td>
<td>13</td>
<td>15</td>
</tr>
<tr>
<td>Temp. regulation range (solid fuel) (°C)</td>
<td>60-90</td>
<td>60-90</td>
</tr>
<tr>
<td>Minimum temp. return line (solid fuel) (°C)</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Efficiency</td>
<td>90%</td>
<td>90%</td>
</tr>
<tr>
<td>Boiler class</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

1.3 On Product

- Prescribed fuel declaration for this boiler is wood pellet only with caloric value > 17.5 MJ/kg, diameter 6 mm, length 35 mm, maximum moisture content 8%;
- Three-pass solid fuel boiler TKK3 PELLET is fully compatible with TERMEC burner for wood pellet combustion (efficiency level 91%) and it fulfills the requirements of the European norm EN 303/5.
- Following the norm demands, wall thickness of boiler plates in contact with water is 5 mm.
- Boiler comes together with stock for pellets with capacity for round 200 kg of pellets, which can be freely positioned near the boiler.
- Boiler is equipped with a thermometer, removable ash-tray and cleaning kit and also with a thermostat to prevent condensation (caused by low temperature of the return pipe).
- Upper door of the boiler is covered by fire-proof glass with a small opening for secondary air.
- Pressure test is done at 6 bar pressure. Working pressure is 2.5 bar.
- The burner warranty is 2 years, while the warranty against leakage is 5 years (if following the guidelines given in the operation manual).

2 How It Works

Wood pellet burner TERMEC is an integral part of the TKU3 PELLET set and is designated for optimum and complete combustion of wood pellets. The burner itself consists of burner body and feeding auger which connects the pellet storage with the burner body. Burner body is to be mounted on the lower door of the boiler with a help of a specially designed flange adapter (part of the set). Burner function is fully automatic and it can be programmed seven days a week. Automatic control algorithm is based on two input parameters: Water temperature inside the boiler and flue gas temperature.
Unlike other similar products available on the market, TERMEC has an additional screw-transporter inside the burner body which mechanically feeds the pellets into the flame tube, where pellets are blown into the boiler chamber by a fan. The additional transporter is an essential safety feature which protects burner from eventual reverse flame from the boiler. Secondary screw is synchronized with the outer feeding auger - with every cycle of the external motor the inner motor will turn as well; only delayed for several seconds.

The flame tube is made of stainless steel (wall thickness 5 mm), it is resistant against deformation at high temperature. Inside the flame tube there is a multi-functional piece called the burner grid or ash-tray (not to be confused with a boiler ash-tray). It is also made of high resistance stainless steel and its main feature is to prevent sedimentation of non-combustible particles. The piece has such a form to redirect the air stream of the fan from lower side in order to blow out the particles toward the heating chamber of the boiler. If however, the low quality pellet is used, which is not pure wood but contains inorganic particles such as soil or sand, the formation of silicate layers is inevitable. This formation can be removed only by frequent cleaning of the tray and on the other hand it will cause the corrosion of the material and negatively affect the combustion process. For that reason we strongly recommend to use high quality CERTIFIED wood pellets with our pellet set. No warranty is taken if the pellet does not fulfill the following requirements: caloric value > 17.5 MJ/kg, pellet diameter 6 mm, average length 35 mm, maximum moisture content 8%.

Combustion process can be divided in 5 phases: ignition, flame stabilization, main working cycle, modulation and turning off. When burner has reached desired temperature set by user, it will continue working in the modulation cycle - which means minimum power consumption.

TERMEC burner has a transformer and its motors and electronic parts use 24 V direct current. Stable operation, lower power consumption and a lower risk against potential damage come as a result. In case of a black-out, the burner will stop itself and than continue according to the program before the interruption occurred.

For detailed explanation on burner function please refer to burner manual.

The user can always switch to the conventional wood or coal fuel. Before that, pellet burner must be removed from the boiler and the burner opening must be closed with a cap (part of the set). It is necessary to obtain and mount a draught regulator in order to operate the boiler in this case (not included in the set). It is not possible to fire woodlogs and pellet at the same time.
3 Recommendations for boiler shipment and storage

3.1 Delivery form
The boiler comes in three parts, boiler chamber, pellet storage and the boiler housing packed separately. Chamber is wrapped with plastic sheet, and upper door containing fireproof glass should have a small styrofoam protection sheet. The whole set is transported on wood pallet.
The boiler must always stand in its vertical position. The rotation of the boiler during the shipment or installation represents a serious risk and can lead to damaging the boiler. It is forbidden to stack boilers vertically one on to other.
The boiler can be stored only in closed rooms with no atmospheric influence. The humidity in the storing room also must not exceed the critical value of 80%, so as not to create any condensate. The temperature of the storing room must be in the range of +/- 40 °C.

3.2 What’s in the box
The following parts are supplied together with the boiler:

- Wood pellet burner TERMEC with feeding auger, regulation panel and connecting tube
- Special flange to mount burner body on boiler lower door opening
- Cap to close boiler opening in case of using conventional solid fuel
- Two pieces of boiler ash-tray
- Cleaning kit
- Warranty note for both boiler and burner (separately)

4 Boiler installation

4.1 Boiler placement
The boiler room should have air-conditioning. The boiler should be mounted in the boiler room permitting access to all its parts as shown below:

4.2 Chimney
Boiler connection to the chimney is shown in the figure:
Proper dimensioning of the chimney is a very important premise for optimum boiler performance. The purpose of the chimney is to take out the products of combustion but also to secure necessary air draught in the boiler. The graph shows how to choose the necessary height for the chimney as a function of chimney opening. Proper chimney insulation is very important and should be at least 50 mm thick.

Depending on the necessary draught of the boiler, the cross section and the height of the chimney are determined. Please advise technical material given by chimney producer. Minimum chimney height for wood boilers is 6 m. Round chimney made of stainless steel modules is recommended in order to keep the condensation influence low.
5 Connecting the boiler with a central heating system

5.1 Closed system

The following schemes show how to connect the boiler to the central heating installation with or without a heat accumulator tank:

Schemes for connecting both radiators and floor heating:

mixing valve 18. Safety valve

It is not necessary to install the heat accumulator. However, it is recommended. For 1 KW power of the boiler, a capacity of the heat accumulator of 25-50 l is recommended. One must also bear in mind that the power of the boiler must be enough in order to both warm up the water in the accumulator, as well as to provide direct feed to the installation in very cold periods – the chosen power of the boiler should be 1.5 higher than the power of an oil-gas boiler for the given squaring.

It is recommended that the closed central heating system is supplied with an expansion tank, the capacity of which must amount to at least one tenth of the total capacity of the system (including the water volume in the boiler). The system must also have an automatic aeration valve with the help of which air will be eliminated from the system. The use of a safety valve is obligatory (with a 2-3 bar threshold, depending on the power of the boiler) and it must be mounted near the boiler.

It is also necessary that the system has a thermometer and manometer in order to read the temperature and pressure in the system. In case of using conventional solid fuel, the temperature of the return line should not fall below 60 °C, so as to avoid leaking, i.e. condensation in the boiler, which can further lead to corrosion. The temperature of the starting line should not fall below 70 °C. It is recommended to use a four-arm mixing valve on the return line of the boiler or a regulation group such as LADDOMAT 21. It is also recommended to mount a filter catcher on the return line.

Qualified installer should be entrusted with the mounting of the heating and the initial operation. This must be a person who will take over the responsibility and guarantee the correct operation of the boiler and of the complete central heating system. In the case of an incorrectly planned system with manifesting deficiencies caused by the respective person’s incorrect installation of the system, which can again lead to an incorrect operation of the boiler, the complete liability for the material damage and potential new costs arising in relation to it is borne exclusively by the person who was entrusted with the mounting of the central heating system, and not by the boiler manufacturer, sales representative or seller.

5.2 Closed system combined heating with solar panels

The following scheme depicts a heating system connected over a hybrid solar boiler within an accumulation tank:

Termomont in its offer of solar boilers also has a ‘hybrid’ version of a heat accumulation tank and stainless steel solar boiler in one: ATS combined tank. When boiler heats up the ‘technical’ water inside
the boiler - as do the solar panels through the spirale. The drinking water is inside the inner vessel which is heaten indirectly by the technical water.

5.3 **Open system**

The following scheme shows how to connect the boiler to the open central heating system:
6 Boiler in function

6.1 First operation

When putting the boiler and burner in operation for the first time (this job can be performed by authorized and qualified person only) it is necessary to check if the factory settings are

6.2 Burner in operation

To turn the burner on perform the following steps:

1. Turn the main switch for power supply.

2. By pressing the manual feed button, it is necessary to fill the feeding auger with pellets and the burner itself. Before that make sure that there are enough pellets in the pellet storage and if not please refill it.

3. The burner is tuned on/off by pressing the corresponding button. When all the parameters are set at the time of the initial burner operation, this is all the end-user has to do.

Burner operation can be divided into several zones:
1. **Start-up / Ignition.** Burner is put into operation by pressing the corresponding button. Ignition process is controlled automatically by the preprogrammed parameters. When the burner is turned on, the electrical heater starts to heat up pellets (for 4 minutes by default setting) and after that the fan starts to blow. Ignition process lasts until the flue gas temperature reaches 70°C. The burner goes into another phase ("stabilization"). If for some reason, after 15 minutes the 70°C temperature is not reached, the burner will be turned off and the message on the display will tell that the burner ignition did not succeed.

2. **Flue gas stabilization.** After the ignition process is successfully completed, it is necessary to allow burner some time to stabilize the flame. This period is according to default setting one minute long. After that, the burner is ready to start the feeding process according to adjusted power range and start increasing the water temperature toward the desired one.

3. **(Main) working cycle.** The burner remains in this state until one of the following conditions is completed:
   - water temperature inside the boiler has reached the set value
   - flue gas temperature has reached 250°C;

   if one of the conditions is fulfilled the burner will enter the "modulation" cycle.

4. **Modulation.** Modulation means the burner operates with minimum power necessary only to retain not to increase the (reached) water temperature. According to factory presets modulation range is set between 2°C below the desired temperature (the lower threshold) and 5°C above the desired temperature (the upper threshold). For instance, if the desired temperature is set at 50°C, between 48°C and 55°C burner will feed minimum amount of pellets. If the temperature exceeds the upper threshold burner will turn off. If it goes below the lower threshold, burner will be in main working cycle (again).

5. **Turning off.** When the burner is turned off by pressing the button, no pellets are fed to the burner and the fan starts to blow out the remaining pellets through the flame tube until the flue gas temperature is below 60°C.

   Burner display should indicate the current working zone of the burner.

   For the cleaning purpose, fan blows out the particles in the flame tube every 60 minutes (by default) and this operation takes 30 seconds. If there is an electricity black-out, and there is no alternative power supply, the burner will be extinguished and after the black-out is over, it will continue its operation automatically.

   The power consumption of the burner is in the range of a light bulb, except when ignition takes place - then it can reach up to 300W. The ignition itself cannot take longer than 15 minutes. All technical parameters and values mentioned above are preset by the factory, but the authorized person can change them on the spot.

   **Important notes:**
   1. To turn on/off hold the corresponding button for 3 seconds.
   2. Main switch should be always turned on - during the heating season.
   3. Manual feed button is situated on the side of the burner and it is important that burner is filled with pellets before start.
6.3 Maintenance and cleaning

Using wood pellets as a primary fuel means very low level of ashes (less than 1%). The cleaning of the boiler can thus be performed once per week and does not take more than 5 minutes. Burner ash-tray should be however cleaned every day or two - operation which takes less than a minute.

Using pellets means also low temperature of the flue gases due to the high efficiency of combustion. This means the boiler would last much longer compared to combustion with traditional solid fuels such as wood or coal.

7 Safety features

7.1 Thermal safety in case of overheat (closed systems)

Burner has two main safety features: The internal feeding auger prevents fire passing from the boiler to the burner body. The other feature is that if the temperature of the flue gases does not drop below 250 °C the burner will be forced to work with minimum power (which means minimum quantity of pellets added every time).

For additional hydraulic protection in the closed systems it is necessary to install safety thermal valve shown on image (to be bought separately, not an integral part of the boiler).

If for some reason the temperature of the water inside the boiler should exceed 95°C this valve would release the water from the water supply system to cool down the water temperature inside the boiler.
Connection scheme for the thermal safety valve: 1. Cold water entering from the water supply system 2. Cold water entry into boiler 3. Hot water going outside the boiler 4. Hot water ending in the sewage water system 5. Thermo-valve sensor

To connect the safety valve:

- Connect the sensor of the valve (outer thread 1/2") at depicted place on the boiler, position 5 (inner thread 1/2")
- Connect the cold water entry (on valve’s input is marked with C) than connect the exit line (valve marked with: →) with the corresponding exit line on the boiler (position 21)
- Connect position 21 (on the boiler) with the input line on the valve (valve is marked with: ←)
- Connect the valve (marked with S) to the sewage system.
A Declaration Of Conformity

We, Termomon d.o.o. with legal seat on the address Prhovačka street bb, 22310 Šimanovi, Republic of Serbia, under sole responsibility declare that:

Wood pellet boilers TKK3 PELLET 70, TKK3 PELLET 90

produced 2010 and 2011, as by its construction, design and performances are in accordance with the following norms and directives prescribed by the European Union:

- 97/23 EEC "Pressure device directive"
- EN 303/5 "Norm for solid fuel boilers"

Šimanovi, June 3, 2011

Signature of the responsible person