

***ELECTRIC BOILERS FOR CENTRAL HEATING***

***TERMO-Blok***  
***TERMO-Extra***  
***TERMO-Blok PTV***

***INSTRUCTIONS FOR USE***

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INSTRUCTIONS FOR USE

We reserve the right of alternations



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## 1. Introduction

Thank you for your confidence you have shown to us by purchasing our central heating boiler. In order to use the boiler to the utmost correctly and safely, and above all economically, read thoroughly these instructions before continuing with installation.

**The appliances must be installed by a competent person, who is responsible for adhering to the existing regulations, rules and guidelines.**

### 1.1. Applicable documents

The following additional documents are provided with the appliance:

**For the owner of the system:**

Instructions for use  
Warranty card

**For the qualified technician:**

Instructions for installation  
Electrical drawing for the appliance

### 1.2. Retention of documents

Please pass on this installation manual to the owner of the system. The owner should retain the manuals so that they are available when required.

### 1.3. Introduction

TERMO-Extra and TERMO-Blok are economical central heating boilers that may be used as an independent or additional source of heat.

TERMO-Extra and TERMO-Blok boilers offer you the possibility, to reduce the power of a heater if necessary. The power may be switched on when necessary automatically with the built-in step regulator or manually with switches on the control board. In this way it is possible to adapt the boiler to the utmost to circumstances on the spot.

The boiler operates on the principle of rapid heating smaller water quantities, so that exploiting of energy is already 100%.

They are particularly suitable for heating smaller business premise, where you are short of space (small apartments, efficiency apartments, representation offices, smaller coffee-shop spaces etc.) or for heating larger spaces in early season when the main boiler is over dimensioned.

TERMO-Extra boilers are manufactured only with upper connections. Temperature operation area is from 20 °C to 90 °C.

TERMO-Extra and TERMO-Blok are designed in such a way that in apartment-contained central heating they can fit well with your furniture.

### 1.4. Heating curves

#### 1.4.1. Availability of heating curves

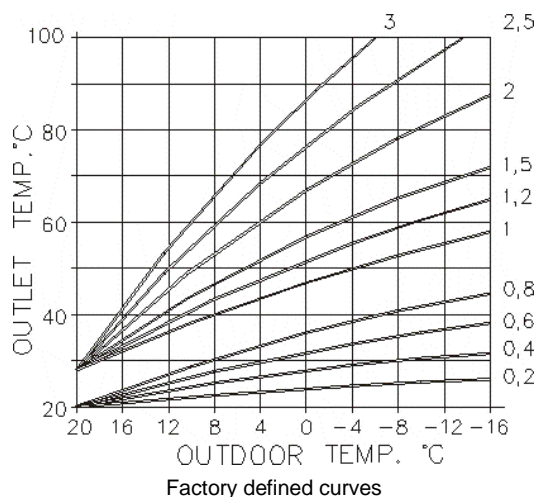
Use of heating curves, temperature compensation, is limited to Termo Extra boilers with options **C** and **W**, Termo Blok boilers with option **C** and Termo PTV boilers.

### 1.4.2. About Heating curves

The modern way of heating is based on energy savings and automatic adjustments to warm up the space.

To achieve the required temperature electric boiler with electronic control panel heats the water in the boiler automatically depending on the external temperature. There is no need to look after the minimal working temperature because electric boilers do not dew and that means that the temperature of the water in the boiler is at the same time the temperature in the heating elements (for example in radiators, convectors etc.).

To achieve the desired room temperature, the characteristic heating curve has to be chosen depending on the characteristics of the object and the heating system.



**If the heating curve is set optimally for heating your apartment or a house, corrections will not be necessary.**

### 1.4.3. Why does the characteristic heating curve have to be set?

After the first settings of the heating curve an authorized person can adjust, correct that curve if necessary.

Every heating room is built up differently. Different heating elements and heating systems can be used (radiators, under floor heating or combined heating) and every building has a different thermal insulation.

For the maximum exploitation of the heating and maximum energy savings, characteristic heating curve has to be set using the parameter on the control panel, in a way that the chosen heating curve is suitable for the heating system and for quality of the building.

### 1.4.4. Corrections of the room temperature

Based on experience, factory settings of the device are for the average insulated object and room temperature of 22°C. If factory settings are not adequate for achieving the desired room temperature, supplemental adjustments of the standard heating curves can be made.

#### *Changing the inclination*

When changing the heating curve, inclination is changing too, and that way temperature of the water in the boiler is changing when the external temperature is low (below + 5°C).

#### *Level changes - offset*

By offsetting the heating curve for the chosen value, the temperature of the water in the boiler is changing without changing the shape of the curve.

Values in the table below are used for the orientation and the user can change them any time as he/she wishes.

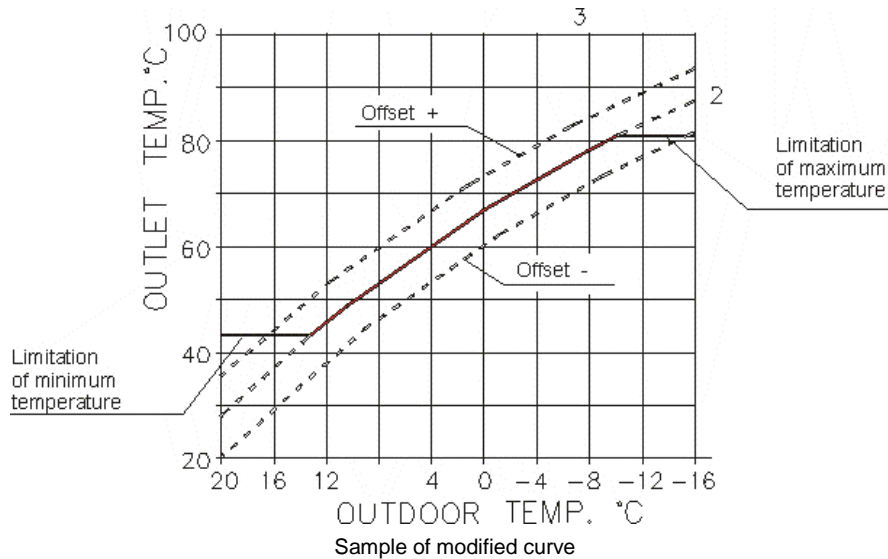
**The experience has shown the following (for the average building quality): when the temperature of the water for the heating changes from 5 to 7°C that will change the room temperature by approximately 2°C.**

**Thermal (heating) processes are slow, all corrections function after some period of time. It would be better if further corrections were made a day or two later.**

To gain experience, we suggest that you should write all corrections (in the period of searching for the right parameters) in the *protocol of the corrections*.

In the table below you can find instructions how to correct the heating curve for the radiator heating depending on the achieved room temperature.

	Inclination of the curve	Offset
<b>Factory settings</b>	<b>1,5</b>	<b>0</b>
<b>Room temperature is too low</b> if the external temperature is <b>above + 5°C</b>	Change with the first lower curve	Add with offset + 6°C
<b>Room temperature is too low</b> if the external temperature is <b>between + 5°C and - 5°C</b>	Leave the curve 1,5	Add with offset + 3°C
<b>Room temperature is too low</b> if the external temperature is <b>below - 5°C</b>	Change with the first higher curve	Leave offset 0°C
<b>Room temperature is too high</b> if the external temperature is <b>above + 5°C</b>	Change with the first higher curve	Lower with offset - 6°C
<b>Room temperature is too high</b> if the external temperature is <b>between + 5°C - 5°C</b>	Leave the curve 1,5	Lower with offset - 3°C
<b>Room temperature is too high</b> if the external temperature is <b>below - 5°C</b>	Change with the first lower curve	Leave offset 0°C



In combined heating system, radiator and under floor heating or other heating elements, temperature of the water in the boiler has to be chosen in a way to achieve the highest desired temperature. On the parts of heating where temperature of the primary flow has to be lower, one element has to be built in such as motorized three-way valve that is controlled by room thermostat, thermostat valve for limiting the temperature of the return flow or something similar.

### **1.4.5. Limiting the minimum and maximum temperature of the water in the boiler**

If the heating curves and offset are selected correctly and the room temperature is falling, *in transitional period in heating seasons* (fall, spring) minimal temperature of the water in the boiler has to be changed.

If the building cannot accumulate heat (sudden and short warming during the day) the necessary temperature of water in the boiler will be too low and will not keep up the desired room temperature.

Limitation of the maximum temperature of water in the boiler serves more as a protection. Factory setting is 90°C, and we suggest lowering it to approximately 80°C. Limitation of the maximum temperature of water in the boiler is also used in central heating and domestic water preparation system, and because of that it is not advisable to lower that temperature too much because the domestic water will warm up slowly on higher temperatures.

## **1.5. Functionality of hot domestic water**

### **1.5.1. Availability**

Termo Extra boilers with options **W**, and Termo PTV boilers enable the preparation of hot water in separate water storage with heat exchanger.

### **1.5.2. Description**

Domestic water conditioning has the preference order over central heating. At the moment of signaling the need for warming up the domestic water container by the domestic water temperature sensor, the circulation pump of central heating is switched off, and the circulation pump for domestic water conditioning is switched on.

Heaters regulate the desired water temperature in the boiler that is 25°C higher than set values of the desired domestic water temperature (independent of central heating curve).

Circulation pump for domestic water conditioning supplies the container until the desired temperature of domestic water is reached, upon which it is switched off with previously described and programmed time delay.

If the central heating is off, either floor or radiators' heating, at the moment of reaching the desired domestic water temperature, the desired water temperature in the boiler is set to minimum value of water temperature in the boiler (stand by).

At repeated requests for heating the domestic water container, the desired water temperature in the boiler is set to 25°C higher than set values of the desired domestic water temperature.

Circulation pump for domestic water conditioning is switched on as late as the water temperature in a boiler reaches the same or higher temperature than desired value of domestic water temperature.

The 5°C difference for warm water conditioning is programmed. It means that if the desired temperature of domestic water tank is 60°C, then the central heating will be switched off and domestic water conditioning switched on as late as domestic water temperature is lower than 55°C, and heating will be switched on and domestic water conditioning switched off when the temperature in domestic water tank reaches 60°C, and when the programmed time of supplemental operation of domestic water circulation pump has passed.

If the time for domestic water conditioning is longer than 30 minutes, i.e. if the desired temperature of domestic water tank is not reached within 30 minutes, the process will be automatically interrupted and switched to the heating regime, which in this case lasts at least 30 minutes.

## **1.6. Frost protection**

### **1.6.1. Availability**

Frost protection, as boiler's function, is limited to Termo Extra boilers with options **E**, **C** and **W**, Termo Blok boilers with option **C** and Termo PTV boilers. For other versions of boilers, frost protection can be provided with the usage of an appropriate room thermostat. Where frost protection is controlled by room thermostat, please consult room thermostat manuals for more details.

Following topics explain how frost protection is working when it is boiler controlled function (options C,W).

### **1.6.2. Domestic water**

If the boiler is on for supply and only warm water conditioning is on or only heating or both, the protection from freezing the water in warm water container switches on automatically when the temperature sensor of warm water container reads the value below 7°C, signaling switching on by blinking display, as well as the LED diode of the heater and warm water conditioning, regulating the warm water container temperature to 7°C.

### **1.6.3. Central heating**

If the boiler is on for supply and heating or both (heating and warm water conditioning) are off, the protection from freezing the water in the central heating system switches automatically on if the water temperature sensor in the boiler reads the value below 8°C. In this case the temperature of water in the boiler is maintained at 8°C, as long as the conditions of possible freezing do not disappear. Switching on is signaled by a blinking display as well as the LED diode of the heater and the boiler.

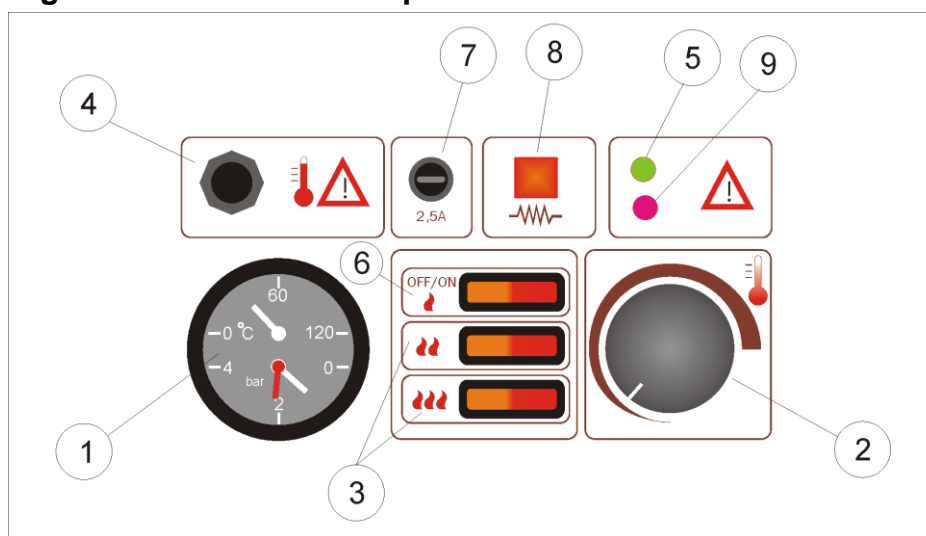
In this case, domestic water conditioning has priority.

In order for the freezing protection system of central heating to operate, the room thermostat should be in the position of freezing protection as well (otherwise, the circulation pump of central heating would not operate).



## 2. Using control panels

### 2.1. Working with standard control panel



Standard electromechanical control panel

The automatics consists of the following elements:

- 1 – Indicator of temperature /pressure in boiler
- 2 – Working thermostat
- 3 – Switch for the 2<sup>nd</sup> and 3<sup>rd</sup> operation stage
- 4 – Cutout thermostat with manual deactivation (switches off on ca 115 °C)
- 5 – Indicator of air appearance in the boiler - air-indicator (also indicates low voltage protection)
- 6 - Switch for ON/OFF and the 1<sup>st</sup> heating stage
- 7 – Fuse 2,5A protecting the pump and switches
- 8 – Indication of heater operation
- 9 - Indicates low voltage protection - under 180V

#### Putting on central heating

By switching the switch (6) ON, the central heating system is switched on and the first power stage is active. With switch (3) it is possible to control manually the second or the third power stage of boiler. Boilers with 3 stages have soft start for the second and the third stage and switches (3) have only limiting function. If the boiler is heating, the light of heater in operation (8) is on, if heaters are not working and boiler is in standby only ON/OFF light is on.

#### Adjustment of desired temperature of central heating

With the help of working thermostat (2) it is possible to select the fixed desired temperature in boiler. Working thermostat has range from 20°C to 80°C. Recommended temperature is about 60°C (12 o'clock position).

#### Air in the boiler (5), red light

If the air appears in the boiler, the signalization of air in the boiler turns on (5) and the boiler stops the operation. In this way the boiler is protected against burning through due to presence of air. To continue the operation the boiler should be vented. If the boiler is correctly vented, the operation of boiler continues automatically.

#### Voltage drop (9), red light

If the voltage in the network line drops below 180V by phase, the signalization of under voltage protection (9) turns on, the boiler automatically switches off in order to protect electronics and contactors inside the boiler. The boiler will automatically continue the operation when the network voltage reaches values above 180V.

### Cutout thermostat - turning on

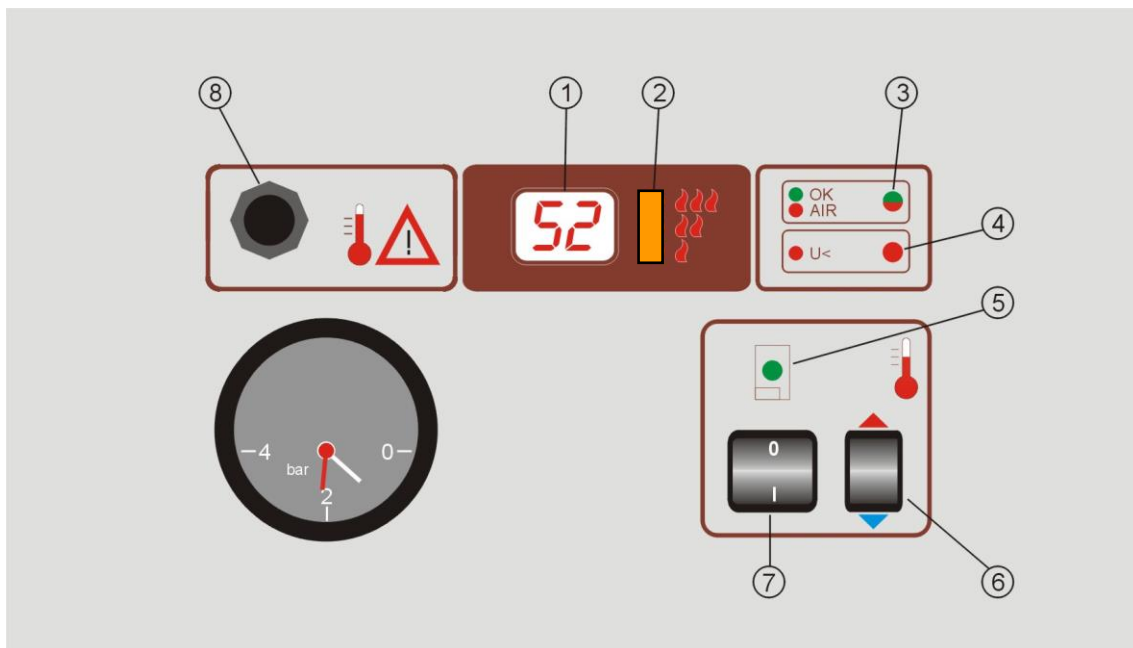
Cutout thermostat (safety thermostat) (4) protects the boiler against rapid increase of temperature above 115°C. The fuse turns the boiler off and ejects the RCCB (RCD)-switch.

For boiler to continue working it is necessary to take off the protection cover from the cutout thermostat and press the red key, upon which the RCCB (RCD)-switch should be switched on again.

#### NOTE:

**If the room thermostat is on, make sure that it is set on the required room temperature and if supply batteries are in order, otherwise the boiler will not operate.**

## 2.2. Working with electronic control panels (option E)



**Electronic control panel without external temperature compensation**

- |  |  |
|--|--|
| 1. Multipurpose – temperature indicator (temperature of boiler, adjustment of temperature) | 5. Signalization of boiler operation (green light) |
| 2. Signalization of operation degree of heaters (1, 2, 3)                                  | 6. Adjustment of temperature in boiler             |
| 3. Signalization of the presence of air in the boiler (red light)                          | 7. Switch for central heating switching on and off |
| 4. Signalization of under voltage protection (red light)                                   | 8. Thermal fuse                                    |

### Switching on of central heating

By switching the switch (7) to the position 1, the central heating system is switched on. Upon switching on the desired water temperature in boiler is displayed for 5 seconds, signalization of boiler operation is twinkling (5). After 5 seconds the real temperature in the boiler is displayed (1); if the current temperature in the boiler meets the desired one, the signalization lamp of the boiler operation (5) is switched off.

### Adjustment of desired temperature of central heating

By pressing the key for temperature adjustment (6) the desired temperature in the boiler appears, the signalization lamp of the boiler operation (5) is twinkling. By repeated pressing upwards or downwards it is possible to increase or decrease the desired sanitary water temperature. When the temperature is adjusted it is sufficient to wait for 5 seconds (signalization lamp of the boiler operation (5) does not twinkle) in order for the boiler to memorize new temperature.

### Air in the boiler (3), red light

If air appears in the boiler, the signalization of air in the boiler turns on (3) and the boiler stops the operation. In this way the boiler is protected against burning through because of appearance of air. To

continue the operation, the boiler should be vented. If the boiler is correctly vented, the operation of boiler continues automatically.

### Voltage drop (4), red light

If the voltage in the network line drops below 180V by phase, the signalization of under voltage protection (4) turns on, the boiler automatically switches off in order to protect electronics and contactors inside the boiler. The boiler will automatically continue the operation when the network voltage reaches values above 180V.

### Cutout thermostat - turning on

Cutout thermostat (safety thermostat) (8) protects the boiler against rapid increase of temperature above 115°C. The fuse turns off the boiler and ejects the RCCB (RCD)-switch.

To continue the operation it is necessary to take off the protection cover from the cutout thermostat and press the red key, after which the RCCB (RCD)-switch should be switched on again.

## 2.3. Working with electronic control panels (option C and W and Termo Blok PTV)

### 2.3.1. General

Regardless of the selected regulation curve, the maximum water temperature in the boiler is limited to 90°C for radiator heating and 50°C for floor heating.

Factory setting of the curve is 1,5 for radiator heating.

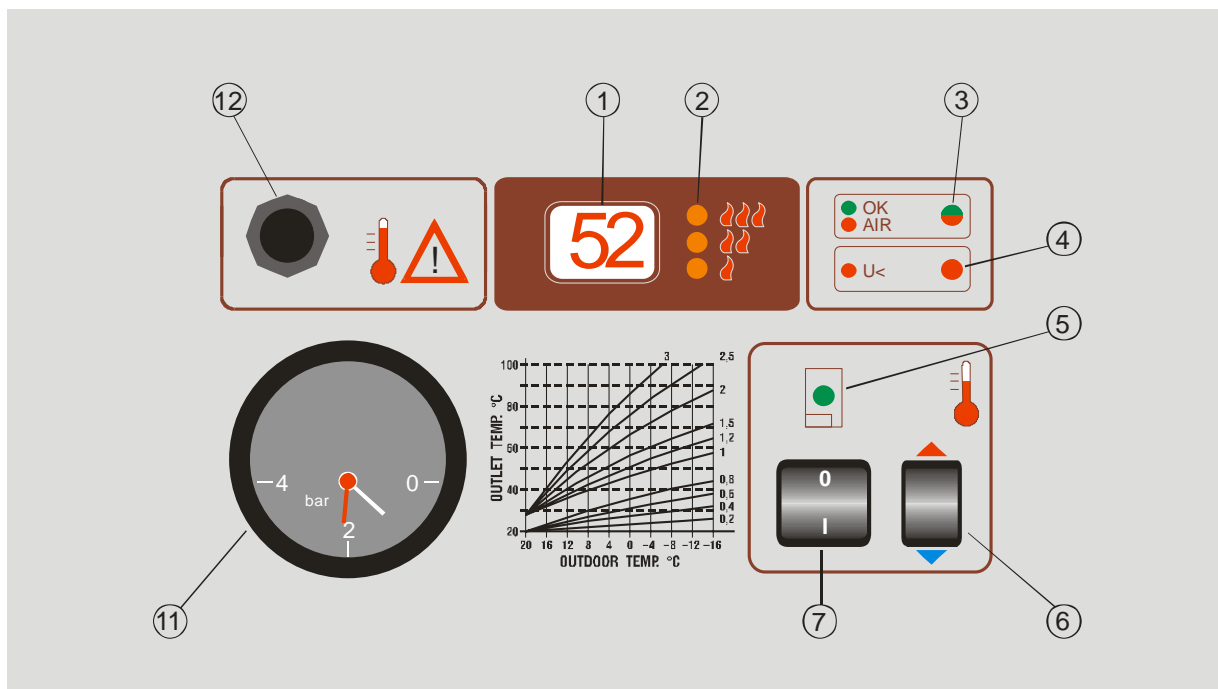
Factory setting of the curve is 0,6 for under floor heating.

Refer to chapter 1.4. for detailed description of heating curves.

Refer to chapter 1.5. for detailed description of DHW functions.

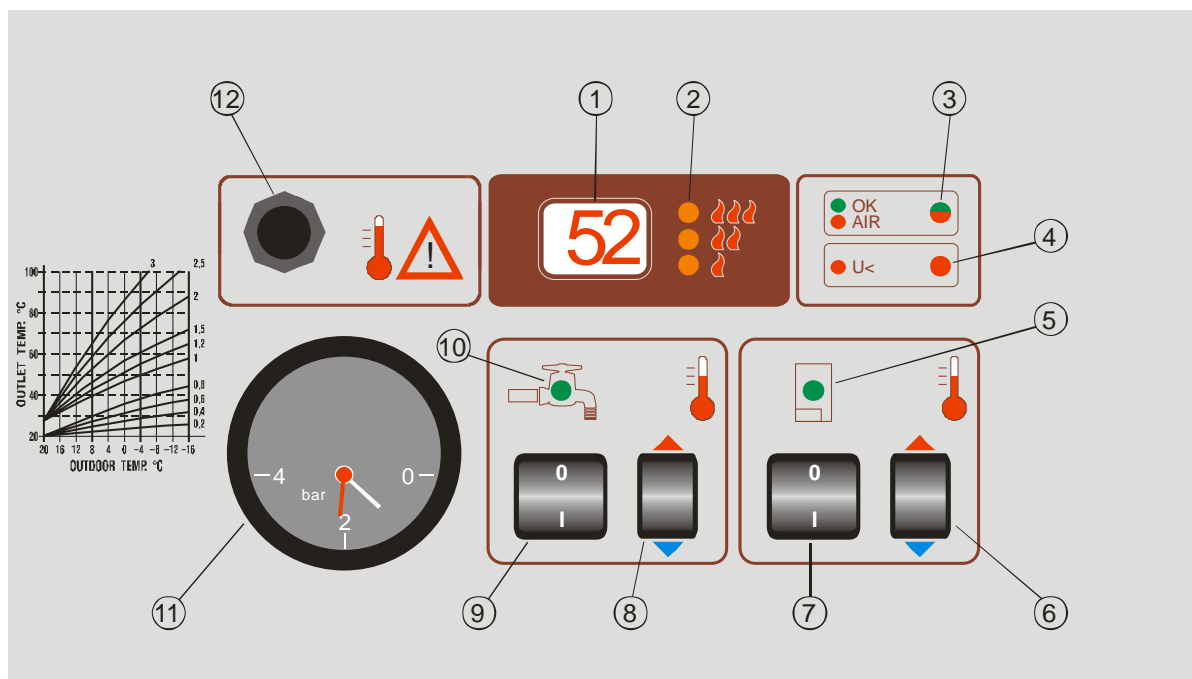
Refer to chapter 1.6. for detailed description of frost protection.

Refer to chapter 4.8 for detailed description of selecting desired set of heating curves.



Type 1 – Outdoor temperature compensation

## INSTRUCTIONS FOR USE



**Type 2 – Outdoor temperature compensation and sanitary water on Termo Extra or Termo Blok PTV**

### 1. Display

Display of temperatures values reading from KTY probes from + 99°C (above +99°C display is blinking) up to -19°C (below -19°C the display shows -). Display of desired temperature or curve during setup.

Following warning signals can be displayed:

- P1 – frost protection for sanitary water is active
- P2 – frost protection for central heating is active
- o1 or c1 – thermal sensor for boiler temperature is not connected or is short-circuited
- o2 or c2 – thermal sensor for external temperature is not connected or is short-circuited
- o3 or c3 – thermal sensor for DHW temperature is not connected or is short-circuited

### 2. Led diodes of heaters stages

The number of lighted diodes corresponds to the number of momentarily active heater operations stages.

### 3. Led diode OK/air in boiler

If there is no air in the boiler, the diode becomes green. If the air appears in the boiler, the diode becomes red and at the same time the operation of the device is stopped. After venting, the diode automatically changes the color to green and operation of the boiler is continued.

### 4. Led diode too low supply voltage

If the net voltage falls below 170 V red light appears and at the same time the operation of the device is stopped.

### 5. Led diode of central heating

It indicates the operation of circulation pump of heating, provided that the room thermostat is on.

### 6. Push button for adjustment of heating characteristics

### 7. Switch – heating on/off

### 8. Push-button for adjusting characteristics of sanitary water conditioning

### 9. Sanitary water conditioning on/off

### 10. Led diode in course of sanitary water conditioning,

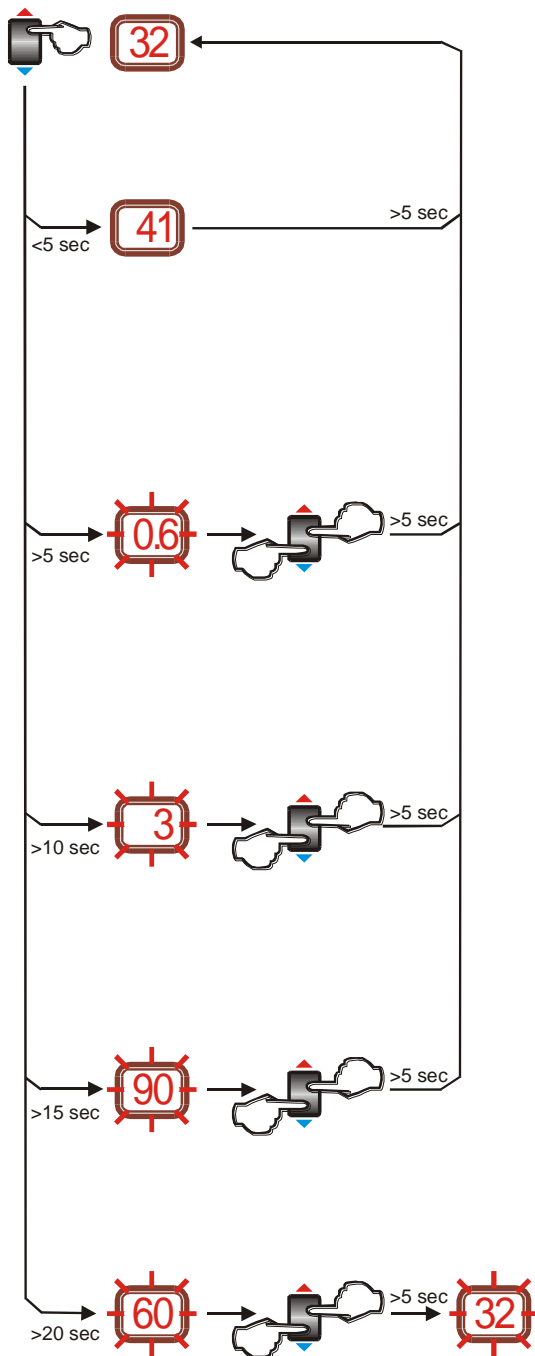
Indicates the circulation pump operation for sanitary warm water conditioning.

### 11. Indicator of water pressure in heating system.

### 12. Safety thermostat

## INSTRUCTIONS FOR USE

## 2.3.2. Central heating functions



### Display of desired temperature inside the boiler

By pressing the key (6) user can see the desired temperature inside the boiler. (calculated from the selected correction curve)

The Display shows the desired temperature of water in the boiler. The value is displayed for 5 s, after which display normally shows the real temperature of water in the boiler.

### Correction curve selection

By pressing the key (6) user can enter curve selection menu.

The number of set curve is blinking, according to which the correction of water temperature in the boiler is corrected in relation to external temperature. Values are between 1 and 3 or 0,2 and 0,9. Curves between 1 and 3 are for radiators' central heating and curves 0,2 to 0,9 are for under floor heating.

By pressing the key, numbers of curves are changing with the step of 0,1 within the set, according to the diagram on the front plate. If the key is held pressed less than 5 s the display value becomes valid regulation curve.

### Limiting maximum boiler power

By pressing the key (6) user can limit the power level.

By pressing the key it is possible to select 1 2 or 3 as number of available power levels. If the key is held pressed less than 5 s the selected power level mode will become active.

**Boilers from 6 to 16 kW have only two power levels.**

### Limiting maximum temperature inside the boiler

By pressing the key (6) user can limit maximum temperature inside the boiler.

Factory defined maximum temperature starts to blink. By pressing up or down user can set new maximum temperature. If the key (6) is held pressed less than 5 s the selected maximum temperature will become active.

**This temperature represents maximum temperature that can be achieved regardless of selected curve.**

### Manual selection of desired temperature inside the boiler

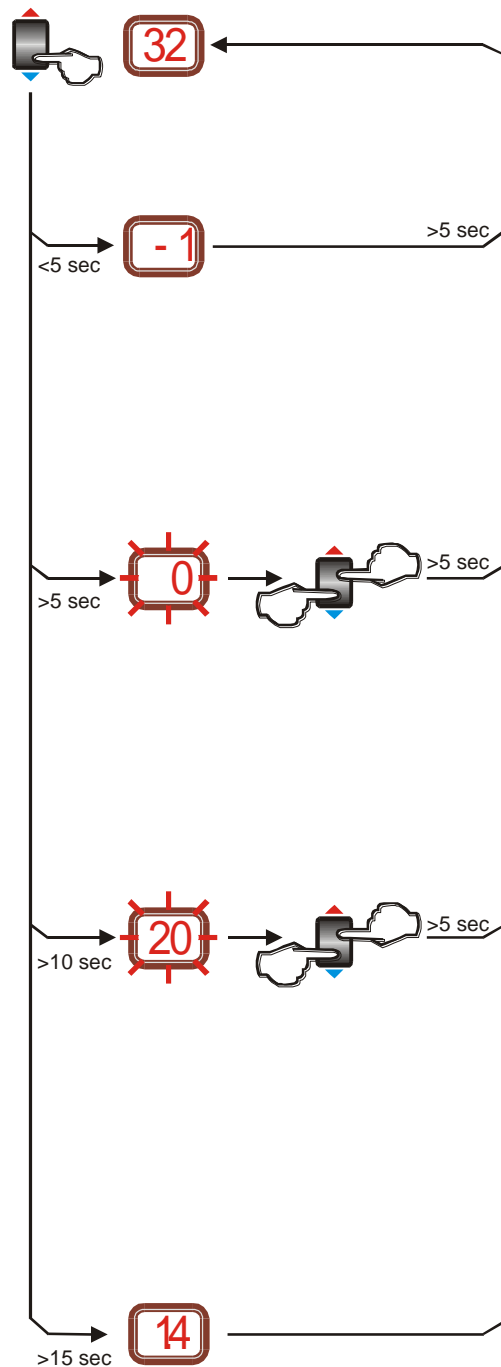
By pressing the key (6) user can set temperature in the boiler, regardless of previously selected curve.

Desired temperature starts to blink. By pressing the key up or down user can select fixed temperature in the boiler. If the key is held pressed less than 5 s the fixed temperature becomes active.

When boiler is in fixed temperature mode, the LED display blinks while displaying current temperature in the boiler. User can just press the key (6) up or down for next change of fixed temperature.

**When boiler is in fixed temperature mode, all correction curves are disregarded. To return to the correction curve mode, the boiler must be switched off and back on using ON/OFF switch.**

Continuation...



#### Display of external temperature

By pressing the key (6) user can see external temperature.

The Display shows the external temperature. The value is displayed for 5 s, after which the display normally shows the real temperature of water in the boiler.

#### Offset of currently selected correction curve

By pressing the key (6) user can enter the curve selection menu.

The LED display will show current offset in °C. Offset does not affect maximal or minimal temperature, they are set in absolute values

By pressing the key (6) it is possible to change offset in steps of 1°C.

**Factory setting is 0°C.**

**Offset range is from -9 to +20°C.**

If the key is held pressed less than 5 s the displayed value becomes valid offset in °C.

#### Setting the minimal temperature inside the boiler

By pressing the key (6) user can select minimal temperature inside the boiler.

Minimal temperature starts blinking.

**Factory setting is 27°C for radiator heating.**

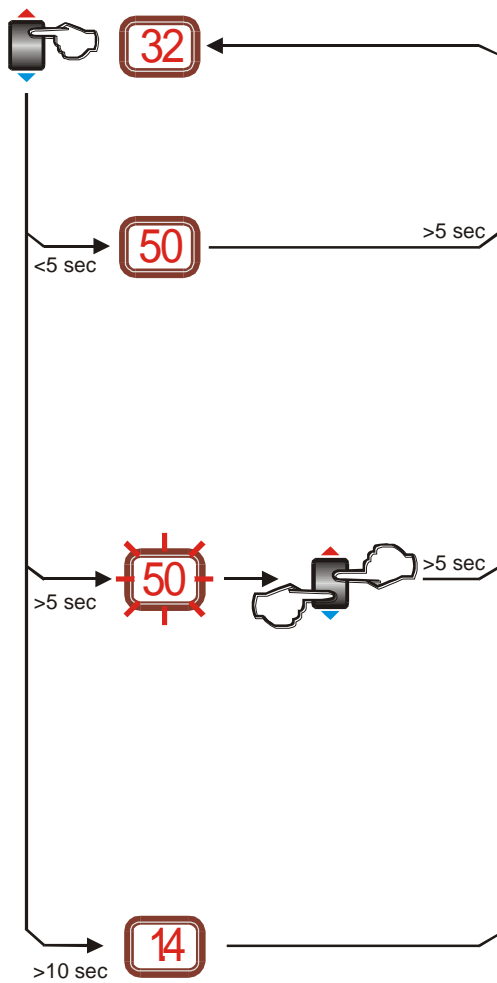
**Factory setting is 20°C for under floor heating.**

By pressing the key user can select the desired temperature in range from 10 to 50°C. Temperature changes in steps of 1°C. If the key is held pressed less than 5 s the value from the display becomes the desired minimal boiler temperature.

#### Displaying software version and factory reset

By pressing the key (6) longer than 15 seconds, the LED will show the software version and the factory reset of central heating parameters will occur.

### 2.3.3. Domestic water functions (control panel type 2)



#### Display of desired temperature of domestic water

If the key is held pressed less than 5 s the LED display will show the desired temperature in domestic water storage. The value is displayed for 5 seconds, after which the display normally shows the real temperature of water in the boiler.

#### Setting the desired temperature in domestic water storage

By pressing the key (8) user can enter the domestic water temperature menu.

The desired water temperature in domestic water storage is blinking.

By pressing the key (8) the value of desired domestic water temperature in domestic water storage is changing in steps of 1°C. If the key is held pressed less than 5 s the value from the display becomes the desired domestic water temperature.

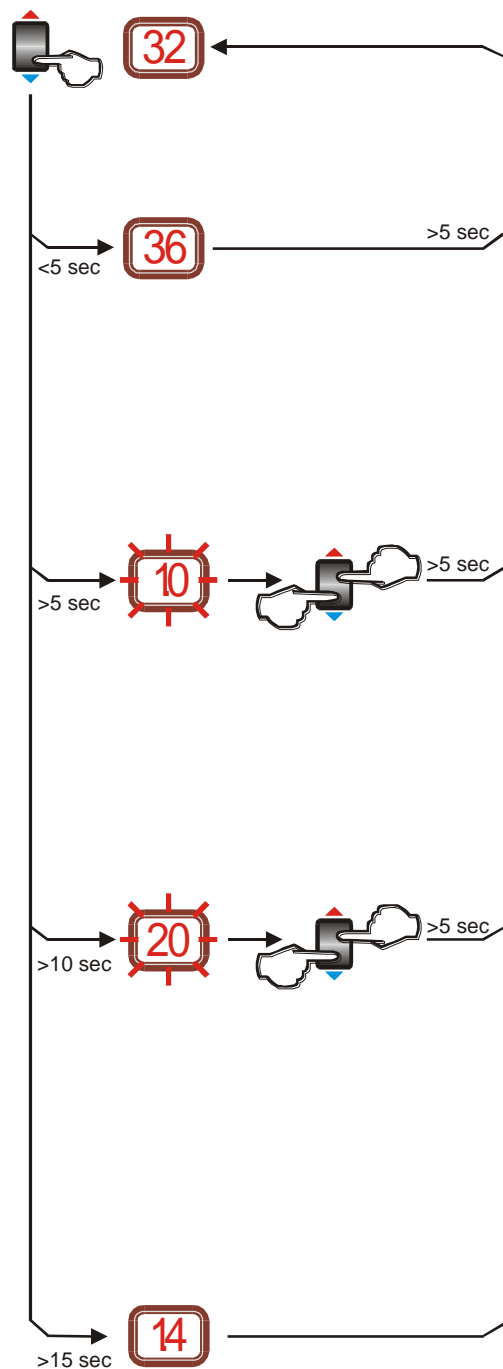
**Possible adjustment is from 10°C up to 65°C.**

**Factory adjustment is 50°C.**

#### Displaying software version and factory reset

By pressing the key (8) longer than 15 seconds, the LED will show the software version and the factory reset of the central heating parameters will occur.

Continuation...



#### Display of current temperature in domestic water storage

By pressing the key (8) user can select the display of current temperature in the domestic water storage. The value is displayed for 5 s, after which the display normally shows the real temperature of water in the boiler.

#### Setting additional working time of domestic water pump

By pressing the key (8) user can setup additional working time of domestic water pump.

The time of supplemental operation of circulation pump operation for domestic water conditioning is blinking.

By pressing the key the time is changing from 0,1 min up to 19 min. with the step of 1 digit. If the key is held pressed less than 5 s, the value from a display becomes valid time of supplemental operation of circulation pump for domestic warm water conditioning.

**Factory setting is 1 min.**

#### Setting stand by temperature inside boiler

By pressing the key (8) user can setup stand by temperature inside the boiler.

The LED will show current standby temperature inside the boiler.

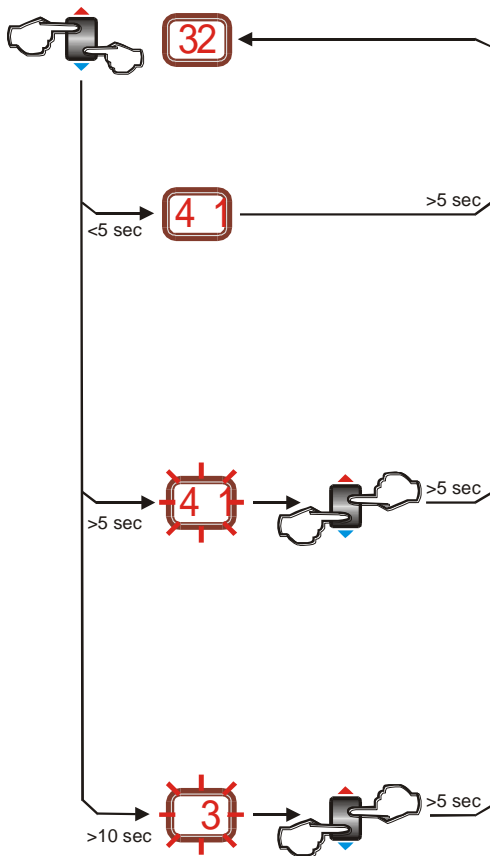
Pressing the key (8) will change standby temperature in range from 10°C to 50°C by 1°C. If the key is held pressed less than 5 s the value from the display becomes the valid standby temperature inside the boiler.

#### Displaying software version and factory reset

By pressing the key (8) longer than 15 seconds, the LED will show the software version and the factory reset of central heating parameters will occur.



### 2.3.4. Central heating functions with heating curves disabled



#### Display of desired temperature in boiler

If the key (6) is held pressed less than 5 s the LED display will show the desired temperature in the boiler. The value is displayed for 5 seconds, after which the display normally shows the real temperature of water in the boiler.

#### Setting of the desired temperature in the boiler

By pressing the key (6) user can enter the boiler temperature menu.

The desired boiler temperature is blinking.

By pressing the key (6) UP or DOWN, the desired boiler temperature can be set in steps of 1°C.

If the key is held pressed less than 5 s the value from the display becomes the desired boiler temperature.

**Possible adjustment is from 20°C up to 90°C for radiator heating.**

**Possible adjustment is from 15°C up to 45°C for under floor heating.**

#### Limiting maximum power of the boiler

By pressing the key (6) user can limit the power level.

By pressing the key it is possible to select 1 2 or 3 as number of the available power levels. If the key (6) is held pressed less than 5 s the selected power level mode will become active.

**Boilers from 6 to 16 kW have only two power levels.**

## 3. Maintenance

### 3.1. Periodic checking

We recommend the inspection of the device once a year by the authorized service provider (before heating season). This service is not included in the warranty. **During the inspection all electric and water connections should be tightened, the system should be vented and – if necessary – filled up, valves and general functionality of the device should be checked.**

**RCCD switch - pressing the TEST button must disconnect the RCCD switch. This testing procedure insures that switch is functioning properly. We recommend this test once or twice in heating season.**

**Safety thermostat – we recommended to check safety thermostat before every heating season by heating up the sensor with heating fan or lighter over 100°C must actuate overheating protection by switching off the RCCD switch.**

Safety valve should be checked once a year (before the beginning of heating season) to ensure proper functioning and avoiding appearance of water calculus.

If the boiler is not connected to the room thermostat or if the boiler is out of function during the winter time, there is a danger of installation freezing.

In this case the system should be filled with antifreeze liquid for central heating, and if this is not possible water should be drained out.

### 3.2. Cleaning

It is not permitted to use aggressive media (e.g. gasoline, kerosene or solvent) for cleaning the product. Media for cleaning plastics or dishwashing media can be used for the external shell and decorative cover. Control panel should be cleaned with dry or moist cloth (not wet).

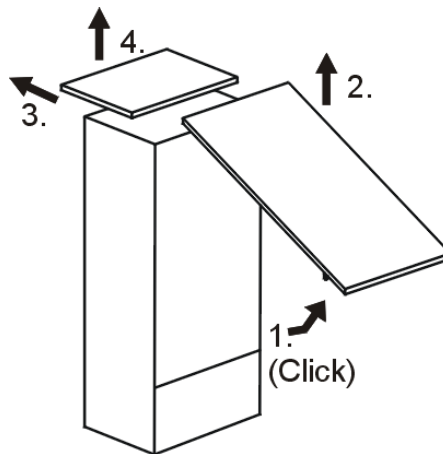
### 3.3. Central heating system

If the boiler is not connected to the room thermostat (Termo boilers without C or W option), or if the boiler is out of function during wintertime, there is a danger of installation freeze. In this case the system should be filled with antifreeze liquid for central heating, if this is not possible water should be drained out of the system with the help of charge and discharge.

**The recommended pressure of central heating installation is 0,15 mpa (1,5 bar), the maximum pressure is 0,25 mpa (2,5 bar).**

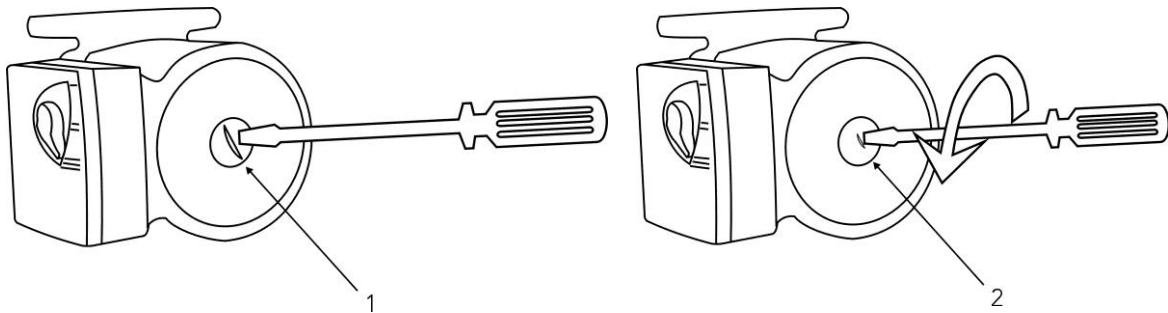
### 3.4. Starting the pump manually

In order to access the pump, remove the front cover of the boiler as described below. In most cases steps 1 and 2 are sufficient.



Grasp the front case by its sides, pull it towards the front and remove it by lifting it off the unit, push the top cover backwards and lift it off the unit.

To start the pump it is necessary to turn off the protection plug on its front side (1), below which there is an axis with the groove for screwdriver. Using the screwdriver, the pump (2) should be turned several times in the direction of the arrow on the pump head and the boiler should be put on again.



When the pump starts the operation the temperature of water in the boiler and the temperature of sanitary water should be selected. The optimal temperature for central heating is between 60 and 70°C.

If the room thermostat is connected to the boiler, the desired room temperature should be adjusted according to the instructions of the producer of the room thermostat.

#### 4. Survey of possible malfunctions and irregularities in operation

<b>MALFUNCTION</b>	<b>CAUSE</b>	<b>ELIMINATION</b>
- there is no voltage on the control panel at switching on	<ul style="list-style-type: none"> <li>- there is no power supply from the net on one or more phases</li> <li>- fuse 2,5A on the control panel is burned through</li> <li>- RCCB switch is disconnected</li> </ul>	<ul style="list-style-type: none"> <li>- replace fuse 2,5A and check the cause of burning</li> <li>- <b>contact authorized service personnel to resolve the problem</b></li> </ul>
- By switching on, the switches on the control panel display the voltage, but the boiler does not heat	<ul style="list-style-type: none"> <li>- check the adjustment of the room thermostat,</li> <li>- limiting thermostat is activated</li> <li>- indicator of air presence in the boiler blocked the operation,</li> <li>- defective switch,</li> <li>- operation thermostat is defective,</li> <li>- heaters are burned through</li> </ul>	<ul style="list-style-type: none"> <li>- check the set temperature on the room thermostat, replace batteries, or the room thermostat is faulty,</li> <li>- deaerate the boiler in order to turn off the lamp "air in boiler"</li> </ul>
- temperature in boiler is on desired value, but radiators do not heat	<ul style="list-style-type: none"> <li>- circulation pump does not operate,</li> <li>- air stopper on central heating installation prevents circulation</li> </ul>	<ul style="list-style-type: none"> <li>- start mechanical pump (CHAPTER 4.)</li> <li>- deaerate installation</li> </ul>
- boiler does not provide enough heat	<ul style="list-style-type: none"> <li>- one phase is missing on supply</li> <li>- in two-stage thermostats the second stage is not functioning</li> <li>- the second or the third stage is not manually turned on,</li> <li>- one switcher is defective,</li> <li>- a part of heater is burned through</li> <li>- in a three-phase system the three different phases are not brought to the boiler</li> </ul>	<ul style="list-style-type: none"> <li>- check fuses on the main panel,</li> <li>- <b>contact authorized service personnel to resolve the problem</b></li> </ul>
- the switcher can be heard while operating (it buzzes) radio and TV-interferences	<ul style="list-style-type: none"> <li>- poor voltage in the net</li> <li>- defective switcher</li> </ul>	<ul style="list-style-type: none"> <li>- <b>contact authorized service personnel to resolve the problem</b></li> </ul>
- when turning on or off the operation thermostat, radio and TV-interferences occur	<ul style="list-style-type: none"> <li>- defective operation thermostat,</li> <li>- defective blockade (RC – protection)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>contact authorized service personnel to resolve the problem</b></li> </ul>
- boiler in operation "roars"	<ul style="list-style-type: none"> <li>- the system is not well deaerated,</li> <li>- defective heater</li> </ul>	<ul style="list-style-type: none"> <li>- deaerate the system</li> <li>- <b>contact authorized service personnel to resolve problem</b></li> </ul>
- pressure in the system varies	<ul style="list-style-type: none"> <li>- defective expansion vessel,</li> <li>- the vessel pressure is too low or too high</li> </ul>	<ul style="list-style-type: none"> <li>- <b>contact authorized service personnel to resolve the problem</b></li> </ul>

<ul style="list-style-type: none"> <li>- the actual temperature in the boiler is higher than the desired temperature and the safety thermostat is activated</li> </ul>	<ul style="list-style-type: none"> <li>- defective contactors</li> <li>- defective operation thermostat</li> </ul>	<ul style="list-style-type: none"> <li>- <b>contact authorized service personnel to resolve the exact source of the problem</b></li> </ul>
<ul style="list-style-type: none"> <li>- RCCB switch disconnects</li> </ul>	<ul style="list-style-type: none"> <li>- defective heater,</li> <li>- humidity on conductors,</li> <li>- safety thermostat is activated</li> </ul>	<ul style="list-style-type: none"> <li>- check leakage,</li> <li>- <b>contact authorized service personnel to resolve the exact source of the problem</b></li> </ul>
<ul style="list-style-type: none"> <li>- RCCB switch cannot be reset</li> </ul>	<ul style="list-style-type: none"> <li>- safety thermostat is activated</li> </ul>	<ul style="list-style-type: none"> <li>- pre-reset safety thermostat and then the RCCB switch</li> <li>- <b>contact authorized service personnel to resolve the exact source the of problem</b></li> </ul>