



## ***ELECTRIC BOILERS FOR CENTRAL HEATING***

# ***ThermoMax***



### ***INSTRUCTIONS FOR INSTALLATION***

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INSTRUCTIONS FOR INSTALLATION

We reserve the right of alternations



**WE ARE NOT LIABLE FOR DAMAGES RESULTING FROM NON-OBSERVING THESE INSTRUCTIONS**

**Safety information and warnings**

**Read this document carefully before manipulation, any installation, setup, or service, and follow the instructions**

- **Keep these instructions in the vicinity of the boiler!**
- **The boiler is not allowed to modify.**
- **Adjusting correctly is important for economical heating.**
- **At each contact with the manufacturer or authorized service call to the factory-a number that is printed on the identification label on the boiler.**

**Children in the household!!!**

- Please supervise children who are retained in the vicinity of the device. Do not allow children to play with the device.
- User cleaning and maintenance may not work children unattended.
- The boiler is not intended for the installation in the open air.

**Technical security!!**

- Keep the water pressure in the boiler according to the manufacturer's recommendations-see section 3.2.
- Do not mount the boiler in the vicinity of sources of heat (open fireplace, wood stove, etc.).
- Improper repairs can cause a serious danger to the safety of the user.
- Defective parts may be replaced only with original or approved by the manufacturer.
- Turn off the main power before opening or any work on the boiler.
- The boiler has a built-in protection against frost damage. If the boiler in winter period does not use mandatory should be left active main power (boiler can be turned off on the control panel) so that the protection was active.

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## 1. Introduction

Thank you for the 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

**ThermoMax** is economical central heating boilers that may be used as an independent or additional source of heat.

**ThermoMax** boilers offer you a possibility to reduce the power of the heater if necessary. The power is switched on automatically when necessary with built-in 7 or 15 steps regulator. You have a possibility to reduce maximum power using boiler control panel. In this way, it is possible to adapt the boiler to the utmost to circumstances on the spot.

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

### 1.4. Heating curves

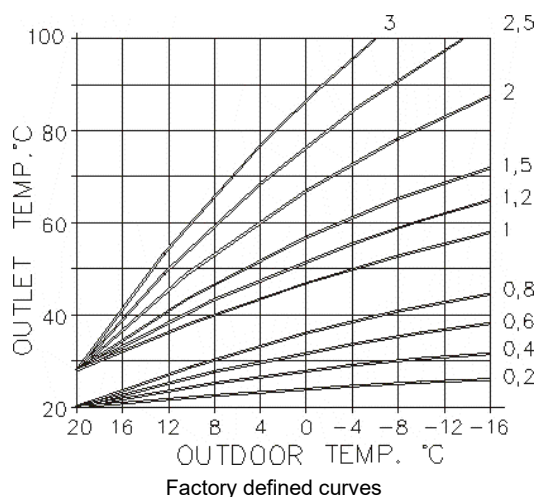
#### 1.4.1. Availability of heating curves

Use of heating curves, outside temperature compensation can be achieved with option O control panel.

#### 1.4.2. About Heating curves

The modern way of heating is based on energy saving 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 of your apartment or 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 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 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 the quality of the building.

#### **1.4.4. Corrections of the room temperature**

Based on the 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 in that way, the temperature of 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 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 to.

**Experience has shown the following (for the average building quality):**

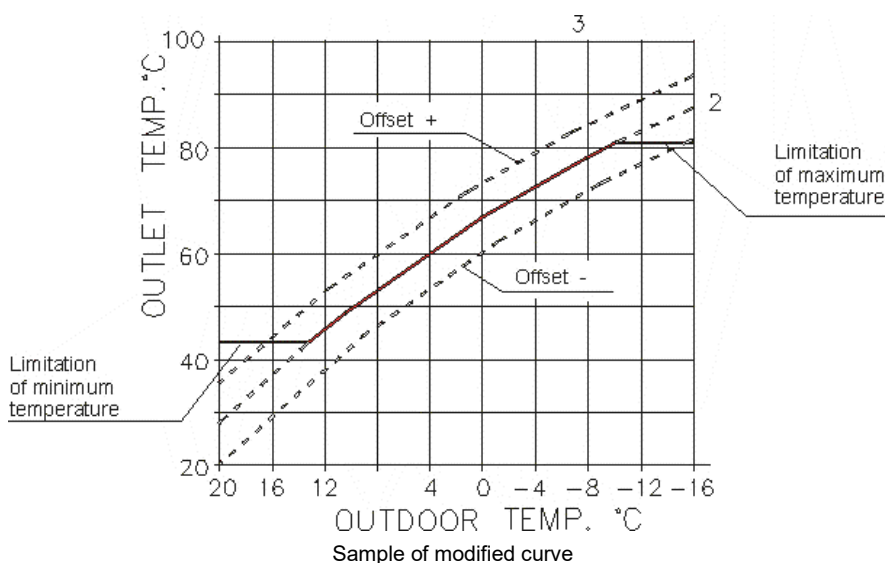
**when the temperature of water for heating changes from 5 to 7°C that will change the room temperature by approximately 2°C.**

**Thermal (heating) processes are slow, all corrections function after a 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 (within a 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>                |
| Room temperature is too low if the external temperature is above + 5°C             | Change with the first lower curve  | Add with offset + 6°C   |
| Room temperature is too low if the external temperature is between + 5°C and - 5°C | Leave the curve 1,5                | Add with offset + 3°C   |
| Room temperature is too low if the external temperature is below - 5°C             | Change with the first higher curve | Leave offset 0°C        |
| Room temperature is too high if the external temperature is above + 5°C            | Change with the first higher curve | Lower with offset - 6°C |
| Room temperature is too high if the external temperature is between + 5°C - 5°C    | Leave the curve 1,5                | Lower with offset - 3°C |
| Room temperature is too high if the external temperature is below - 5°C            | Change with the first lower curve  | Leave offset 0°C        |



In a combined heating system, radiator and under floor heating, or other heating elements, the temperature of 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 water in the boiler

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

If a building cannot accumulate heat (sudden and short warming during the day) 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 at 90°C, and we suggest lowering it at 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. Frost protection

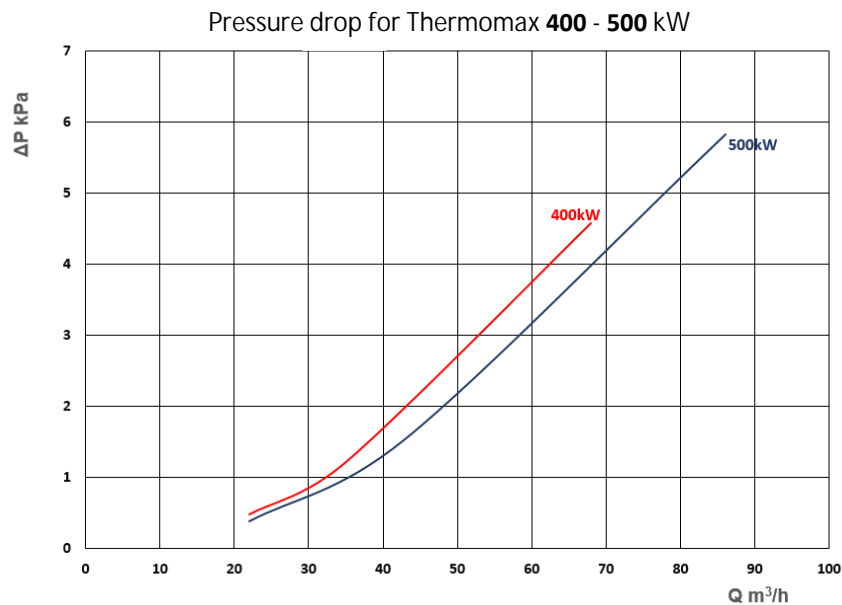
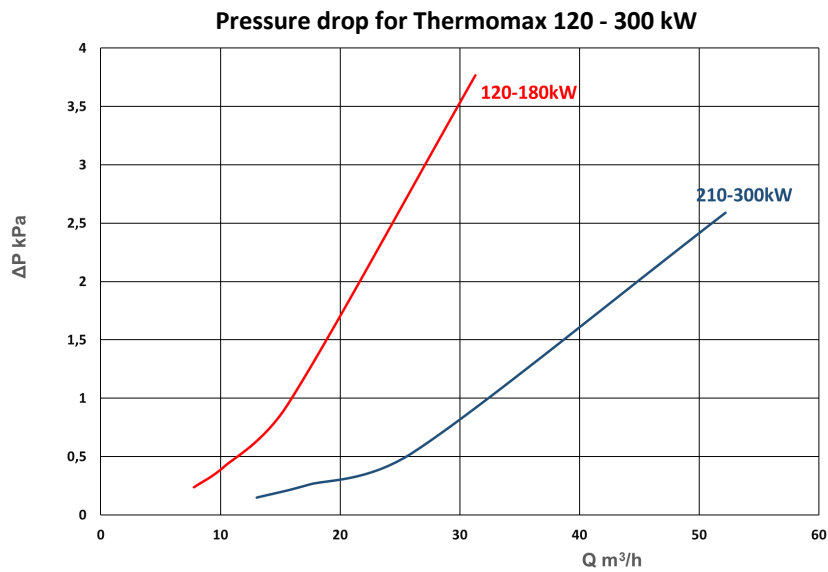
Frost protection, as boiler's function, is standard for **ThermoMax** boilers. When frost protection is controlled by room thermostat please consult room thermostat manuals for more details.

If the boiler is on for supply and heating or both (heating and warm water conditioning) are off, the protection from freezing of 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, until the conditions of possible freezing disappear. Switching on is signalled by appropriate symbol on control panel.

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

## 2. Boiler specifications

### 2.1 Hydraulic pressure drop

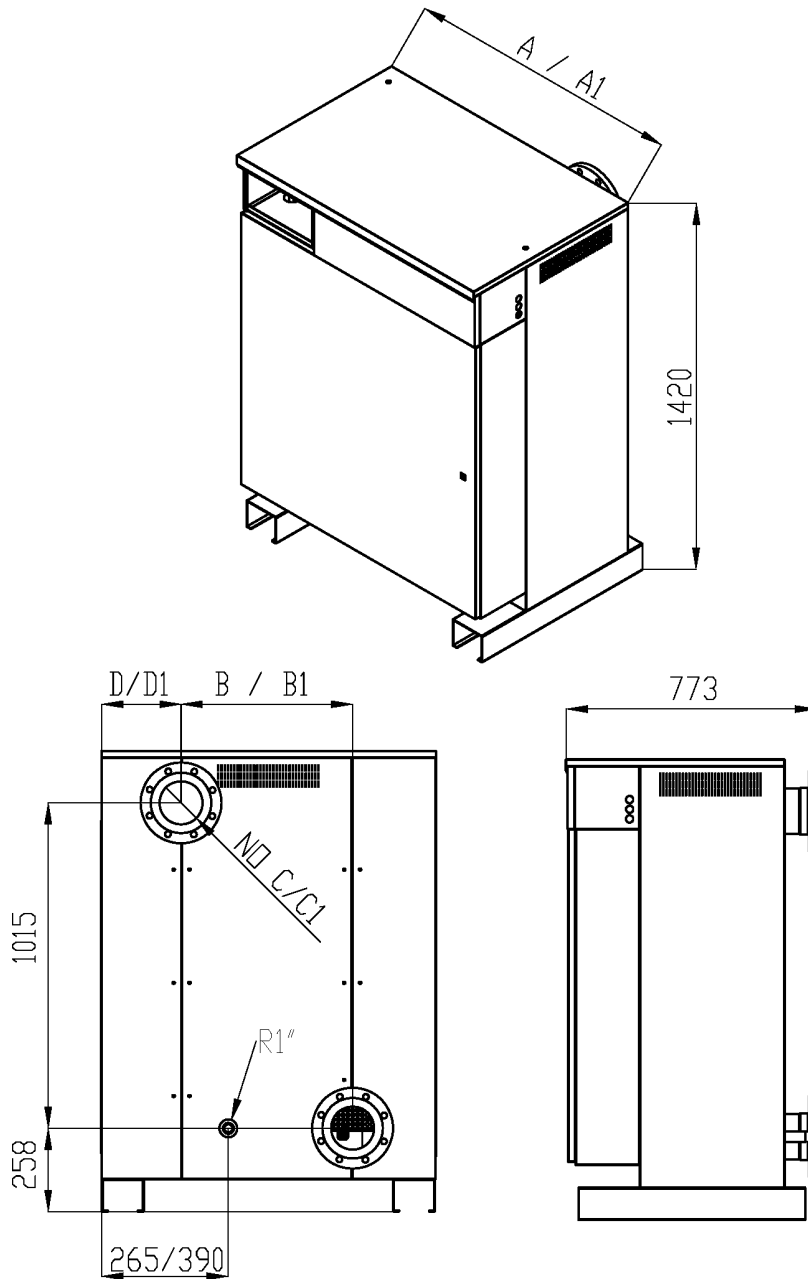




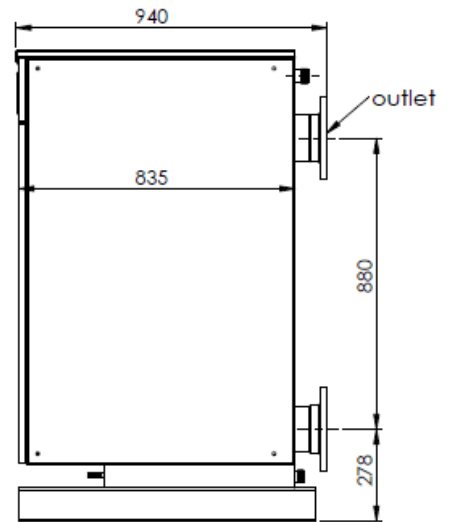
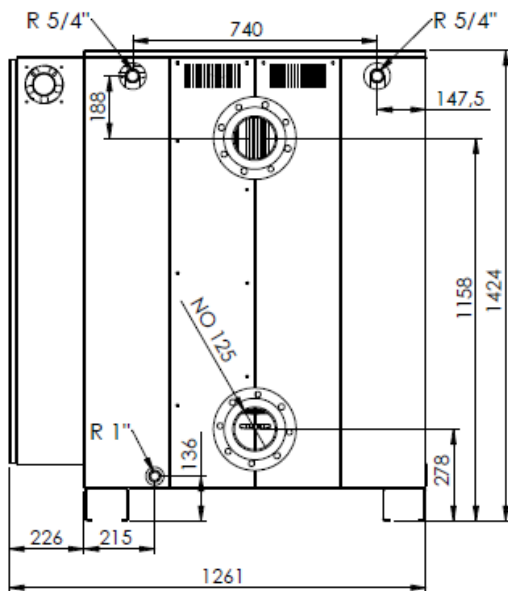
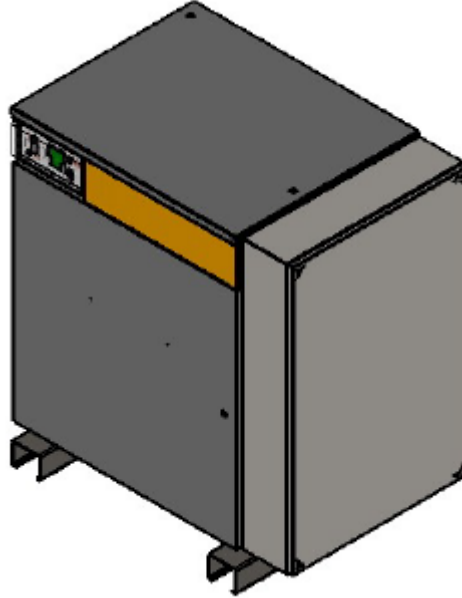
## 2.2 Dimensions

### ThermoMax 120-300kW

|                      | <b>A</b><br><i>mm</i> | <b>A1</b><br><i>mm</i> | <b>B</b><br><i>mm</i> | <b>B1</b><br><i>mm</i> | <b>C</b><br><i>mm</i> | <b>C1</b><br><i>mm</i> | <b>D</b><br><i>mm</i> | <b>D1</b><br><i>mm</i> |
|----------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|-----------------------|------------------------|
| ThermoMax 120-180 kW | 743                   | -                      | 305                   | -                      | 80                    | -                      | 200                   | -                      |
| ThermoMax 210-300 kW | -                     | 1033                   | -                     | 530                    | -                     | 125                    | -                     | 245                    |



**ThermoMax 400-500kW**



2.2 TECHNICAL DATA FOR **ThermoMax** BOILERS

| Model                       | 120  | 150     | 180     | 210                 | 255             | 300       | 400                 | 500             |
|-----------------------------|--|---------|---------|---------------------|-----------------|-----------|---------------------|-----------------|
| Power                       | 120 kW   | 150 kW  | 180 kW  | 210 kW              | 255 kW          | 300 kW    | 400 kW              | 500 kW          |
| Fuse (A)                    | 3 x 200  | 3 x 250 | 3 x 315 | 3 x 315             | 3 x 400         | 2x(3x250) | 2x(3x315)           | 3x(3x250)       |
| Power circuit               | 3 x 400 V  |         |         |                     |                 |           |                     |                 |
| Control circuit             | 230 V - 50/60 Hz   |         |         |                     |                 |           |                     |                 |
| Heating elements<br>No x kW | 8 x 15   | 10 x 15 | 12 x 15 | 13x12 +<br>7x7,8    | 5x15 +<br>15x12 | 20 x 15   | 25x15 +<br>2x12     | 31x15 +<br>3x12 |
| Water capacity              | 95 lit.  |         |         | 145 lit.            |                 |           | 280 lit.            |                 |
| Max. working pressure       | 6 bars   |         |         |                     |                 |           |                     |                 |
| Max. working temperature    | 90 °C  |         |         |                     |                 |           |                     |                 |
| Hydraulic pressure drop     | Refer to chapter 2.1 <i>Hydraulic pressure drop</i> for more details |         |         |                     |                 |           |                     |                 |
| Pipe connection             | Flange DN 80, NP16   |         |         | Flange DN 125, NP16 |                 |           | Flange DN 125, NP16 |                 |
| Height                      | 1420 mm  |         |         | 1420 mm             |                 |           | 1424 mm             |                 |
| Width                       | 743 mm   |         |         | 1033 mm             |                 |           | 1261 mm             |                 |
| Depth                       | 780 mm   |         |         | 780 mm              |                 |           | 940 mm              |                 |
| Weight empty (kg)           | 274  | 289     | 297     | 366                 | 386             | 396       | 630                 | 665             |

## 2.3 Power stages

| Model kW     | ThermoMax 120 - 180 |        |        | ThermoMax 210 - 300 |        |        | ThermoMax 400 - 500 |        |
|--------------|---------------------|--------|--------|---------------------|--------|--------|---------------------|--------|
|              | 120 kW              | 150 kW | 180 kW | 210 kW              | 255 kW | 300 kW | 400 kW              | 500 kW |
| Stage1 [kW]  | 15                  | 12     | 15     | 12                  | 12     | 15     | 30                  | 30     |
| Stage2 [kW]  | 30                  | 15     | 30     | 24                  | 36     | 45     | 60                  | 66     |
| Stage3 [kW]  | 45                  | 27     | 45     | 36                  | 48     | 60     | 90                  | 96     |
| Stage4 [kW]  | 75                  | 45     | 45     | 64                  | 72     | 75     | 105                 | 135    |
| Stage5 [kW]  | 90                  | 57     | 60     | 76                  | 84     | 90     | 135                 | 165    |
| Stage6 [kW]  | 105                 | 60     | 75     | 88                  | 108    | 120    | 165                 | 201    |
| Stage7 [kW]  | 120                 | 72     | 90     | 100                 | 120    | 135    | 195                 | 231    |
| Stage8 [kW]  |                     | 78     | 90     | 112                 | 135    | 165    | 204                 | 270    |
| Stage9 [kW]  |                     | 90     | 105    | 124                 | 147    | 180    | 234                 | 300    |
| Stage10 [kW] |                     | 93     | 120    | 136                 | 171    | 210    | 264                 | 336    |
| Stage11 [kW] |                     | 105    | 135    | 148                 | 183    | 225    | 294                 | 366    |
| Stage12 [kW] |                     | 123    | 135    | 176                 | 207    | 240    | 309                 | 405    |
| Stage13 [kW] |                     | 135    | 150    | 188                 | 219    | 255    | 339                 | 435    |
| Stage14 [kW] |                     | 138    | 165    | 200                 | 243    | 285    | 369                 | 471    |
| Stage15 [kW] |                     | 150    | 180    | 210                 | 255    | 300    | 399                 | 501    |

## 2.4 Nominal current per phase

| Model kW                        | 120   | 150   | 180   | 210   | 255   | 300     | 400     | 500     |
|---------------------------------|-------|-------|-------|-------|-------|---------|---------|---------|
| Power cable*<br>mm <sup>2</sup> | 70    | 120   | 150   | 185   | 185   | 2x(120) | 2x(185) | 3x(150) |
| Stage1 [A]                      | 21,7  | 17,3  | 21,7  | 17,3  | 17,3  | 21,7    | 43,4    | 43,4    |
| Stage2 [A]                      | 43,3  | 21,7  | 43,3  | 33,8  | 52,0  | 65,0    | 86,7    | 95,4    |
| Stage3 [A]                      | 65,0  | 39,0  | 65,0  | 51,1  | 69,3  | 86,6    | 130,1   | 138,7   |
| Stage4 [A]                      | 108,3 | 65,5  | 65,0  | 91,8  | 103,9 | 108,3   | 151,7   | 195,1   |
| Stage5 [A]                      | 129,9 | 82,3  | 86,6  | 109,1 | 121,2 | 129,9   | 195,1   | 238,4   |
| Stage6 [A]                      | 151,6 | 86,6  | 108,3 | 125,6 | 155,9 | 173,2   | 238,4   | 290,5   |
| Stage7 [A]                      | 173,2 | 103,9 | 129,9 | 142,9 | 173,2 | 194,9   | 281,8   | 333,8   |
| Stage8 [A]                      |       | 112,6 | 129,9 | 161,1 | 194,9 | 238,2   | 294,8   | 390,2   |
| Stage9 [A]                      |       | 129,9 | 151,6 | 178,4 | 212,2 | 259,8   | 338,2   | 433,5   |
| Stage10 [A]                     |       | 134,2 | 173,2 | 194,9 | 246,8 | 303,1   | 381,5   | 485,6   |
| Stage11 [A]                     |       | 151,6 | 194,9 | 212,2 | 264,1 | 324,8   | 424,9   | 529,0   |
| Stage12 [A]                     |       | 177,5 | 194,9 | 252,9 | 298,8 | 346,4   | 446,5   | 585,3   |
| Stage13 [A]                     |       | 194,9 | 216,5 | 270,2 | 316,1 | 368,1   | 489,9   | 628,6   |
| Stage14 [A]                     |       | 199,2 | 238,2 | 286,7 | 350,7 | 411,4   | 533,2   | 680,6   |
| Stage15 [A]                     |       | 216,5 | 259,8 | 304,0 | 368,1 | 433,0   | 576,6   | 724,0   |

\*Remark:

The power cables are sized depending of the type and current of the circuit breaker. The size of cable depends of the ambient temperature, the length, the wires duct, the environment etc...

The values above are given for information only for copper cables, ambient temperature 25 °C and length up to 10m. In all the circumstances, the installation must be in accordance with the current IEE wiring regulations.

**Please note the mm2 dimension is for each power cable , i.e., L1,L2 & L3, When you get to our larger units 300,400 & 500 each phase has two cables per live connection**

## 2.5 The boiler flow requirements

The boiler must have a constant and **adequate flow in order to work properly**. The flow characteristics of the system must be sized to fall within specified limits

**If the flow through the boiler is too low, the following problems may cause:**

- The difference between the temperature setting and the actual temperature achieved in the boiler increases.
- Erratic regulation, which increases wear on the boiler contactors, with a consequent reduction in service life.

**If the flow is too fast, the following problems may be caused:**

- Vibrations in the immersion heaters, resulting in noise and reduced service life.
- Unnecessary wear to the system components.

The recommended flow produces a  $\Delta t$  of 10 °C with the boiler on full power.

| Boiler        | Recommended Flow m <sup>3</sup> /h | Min Flow m <sup>3</sup> /h | Max flow m <sup>3</sup> /h |
|---------------|------------------------------------|----------------------------|----------------------------|
| ThermoMax 120 | 11                                 | 6                          | 21                         |
| ThermoMax 150 | 13                                 | 6.5                        | 26                         |
| ThermoMax 180 | 16                                 | 8                          | 32                         |
| ThermoMax 210 | 18                                 | 10                         | 42                         |
| ThermoMax 255 | 22                                 | 12                         | 49                         |
| ThermoMax 300 | 25                                 | 14                         | 53                         |
| ThermoMax 400 | 35                                 | 22                         | 68                         |
| ThermoMax 500 | 43                                 | 22                         | 86                         |

The maximum flow rate is based on a delta T of 5 C , minimum flow rate is based on 20 C for our electric boilers

## 2.6 Filling the heating system – Water quality

For the heating system to operate properly the indicator of manometer must be between 1.0 and 3.0 bar when the system is cold. It is very important to use soft water or liquid for central heating.

Water that is high quality from the point of view of hygiene is not necessarily suitable for use in a large heating system. To avoid the problems, the water should be analysed from a technical point of view, and any differences from standard values should be corrected. In such systems, an oxygen-demanding agent can be added so there is always a slight surplus in the system. These agents often contain anti-corrosive additives.

Water quality, based on suitable mains water:

- The alkalinity should exceed 60 mg/l to avoid corrosion.
- Carbon dioxide contents exceeding 25 mg/l increase the risk of corrosion.
- Sulphate contents exceeding 100 mg/l may hasten corrosion, and if the sulphate content is higher than the alkalinity of copper corrosion.
- Hard water produces scale that is not suitable in heating systems.
- Very soft water can cause corrosion.
- Chloride contents exceeding 100 mg/l make the water aggressive, especially combined with lime scale.
- Low pH values can cause corrosion – the pH value should be between 7.5 – 8.5
- The occurrence of carbon dioxide combined with a low pH value and hardness value makes the water aggressive.

## 3. General requirements

### 3.1. Contents included in delivery

**ThermoMax**, boilers are delivered in a package unit. Make sure that all parts have been delivered intact. For the exact list of parts see the table below. If parts are damaged or missing, please consult our local sales office.

| Quantity | Description  |
|----------|--|
| 1        | ThermoMax  |
| 1        | Instructions for installation and use<br>Electrical drawing<br>Warranty card |
| 1        | External temperature sensor (optional)                                       |
| 1        | Water cylinder temperature sensor (optional)                                 |

Table of contents included with delivery

### 3.2 Preliminary remarks

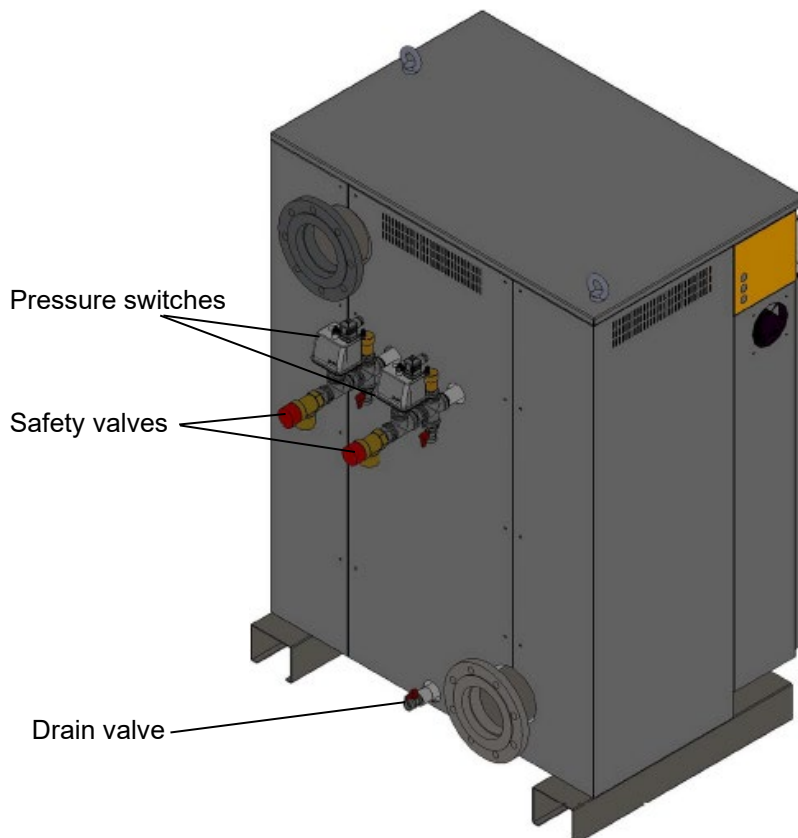
When connecting the appliance to the fixing wiring, the means for disconnection (circuit breaker) must be incorporated in fixing wiring in accordance with the local wiring regulations.

A safety valve is not mounted on ThermoMax boilers at the factory. A safety valve with a 6 bar setting must be installed either on the boiler ( see below), or on the system for overpressure protection

“Pressure switches or a combined hi / low pressure switch to protect the boiler from low (1 Bar) or high (6 Bar maximum) pressure must be fitted to either the heating system or the boiler – to switch the boiler off in the event of these conditions – **these are by others**”

Recommended pressure of central heating installation is to 1 - 4 bar, maximum pressure is 6 bar

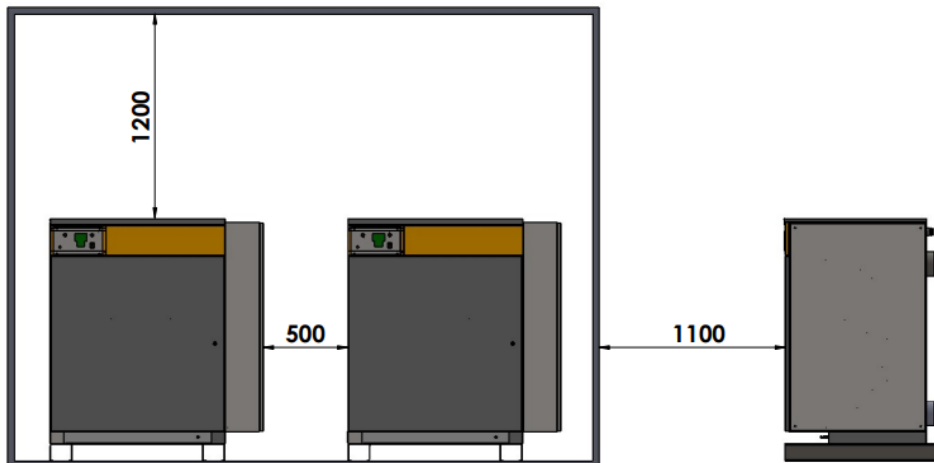
In the below picture the tapping locations are shown for our 300kW electric boiler and the smaller boiler sizes, on the 400 and 500kW boiler the connections are in the top left and right of the boiler



### 3.3. Installation site 3.3.1.

#### Position of the boiler

The location must provide adequate space for servicing and air circulation around the boiler. The boiler must be mounted on a flat, horizontal floor, which must be sufficiently robust to bear the weight of the boiler.



All the range can be “buted up “together , except for the 400kW & 500kW models – these need 500mm between the units. All other clearances – i.e., above and in front are the same for all the units

### 3.3.2. Power supply

The boiler is rated as a high-power appliance and fixed wiring must be used. Please observe chapter 2.2. about fuse and conductor requirements. When connecting the appliance to the fixing wiring the means for disconnection (circuit breaker) must be incorporated in fixing wiring in accordance with the local wiring rules.

*Note: In some cases, additional measures must be taken, subject to the requirements of the Local Authorities.*

## 3.4. System requirements

### 3.4.1. Pipe work

Pipe work that is not a forming part of the useful heating surface should be insulated to help prevent heat loss and possible freezing, particularly where pipes are run through roof spaces and ventilated under floor spaces. Draining taps must be located in accessible positions, which permit the draining of the whole system including the boiler and the hot water system. All capillary joints in all DHW pipe work must be made with lead free solder.

### 3.4.2. Cleansing and flushing the system

Flushing of system is highly recommended. This will prevent damage to the appliance made by dirt from the system.

**Particularly where a new boiler is to be fitted to an existing system, it is a good practice that the system is thoroughly cleansed.**

To prevent the formation of deposits and to prevent serious damage to the appliance and system, cleansers must be used carefully and must be completely removed by thoroughly flushing the system. Cleansers should only be left in systems for the maximum of 24 hours.

### 3.4.3. Filling and preparing heating system

The system can be filled using the built-in filling valve or via a separate filling point fitted at a convenient position on the heating circuit. The connection must be removed when filling is completed. Where local Water Authority regulation does not allow temporary connection, a sealed system filler pump with break tank must be used. The heating system will not be filled automatically from the domestic hot water side. Regularly check that the water pressure is correct. Air may remain in the system for a while after installation, so venting should be repeated a few times.

**Note:**

**For the heating system to operate properly the indicator of manometer must be between 1,0 and 4,0 bar when system is cold. It is very important to use soft water or fluids for central heating (see chapter 2.6).**

**Do not fill the system with water from private source.**

### 3.4.4. Pressure relief valve

A pressure relief valve is not provided with the boiler. A pressure relief is required on all sealed C.H. systems and is to be set at 6.0 bar. The pressure relief valve must not be used for draining purposes.

To preserve the safety function, the safety valves in the heating system must be closed and opened four times a year.

## 4. Boiler installation sequence

### 4.1. Select position for boiler

Refer to chapter 3.4.1. for information regarding the appliance position. **In general, the boiler must be positioned in such manner that:**

- There is enough space around the boiler for service and maintenance
- There is no chance for the boiler to be submerged into water
- There is no chance for the boiler to be splashed with a significant amount of water
- Normal level of air circulation can be maintained
- All necessary pipe work can be connected

## 4.2. Power supply connection

### Note:

Before working with the appliance, turn off the power supply (circuit breaker) and secure against restart.

A boiler is rated as a high power appliance and fixed wiring must be used. Please observe chapters 2.2. for fuse and conductor requirements. When connecting the appliance to the fixing wiring, the means for disconnection circuit breaker) must be incorporated in fixing wiring in accordance with the local wiring rules and regulations.

This device must be earthed.

Power cable must be connected to input terminals, earth must be connected to separate terminal.

## 4.3. Connecting temperature sensors or external electrical controls

### 4.3.1. Accessing connection terminals

In order to access connection terminals top protection cover must be removed by unwinding two screws for hanging boiler.

### 4.3.2. Connecting external temperature sensor

External temperature sensor (delivered with boiler) must be fitted in such manner that it is not affected by sudden temperature changes (exposure to direct sunlight). When fitting sensor please observe the arrow marking top position (it can be seen when protective cover is removed).



### Note:

For connecting external temperature sensor two-wire cable can be used, of diameter from 0.6mm<sup>2</sup> to 1.5 mm<sup>2</sup>.

### 4.3.3. Connecting room thermostat and time switch

The boilers terminals 3, 4 and L N PE (power supply for control unit) are for connecting room thermostat or another external control unit. Terminals 4 and L (power supply for control unit) are linked together. If external control unit is used this link must be removed.

## 4.4. Connecting external alarm and display of power/stage control

Boiler can be connected to external system providing output for alarm signal and display of active power/stage.

### 4.4.1. External alarm connection

Relay K200 provides voltage-free connection for external alarm. Alarm can be triggered by air in boiler, defective temperature sensor, under voltage or overheating protection. Please observe electrical drawing, *page 4, control* for more details.

### 4.4.2. Connection for external display of power/stage

Terminals P4 and P13 are sending 0-10Vdc signal with active power proportional to 0 – 100% of installed/total power. Please observe electrical drawing, *page 4, control* and *chapter 2.3* for more details.



## 4.5. Connecting boilers in cascade

For cascade connection link terminal marked by “Lk” (maximum power signal) from regulation part of primary boiler and terminal marked by “4” inside the regulation part of second boiler. For cascade work of more than 2 boilers, the procedure is the same for all additional boiler.

For more details see electrical diagram.

### Note:

**For cascade connecting it is necessary that live and neutral wires of control power are connected correct on all boilers. If to any of boilers are live and neutral wires replaced, cascade won't be activated.**

## 5. Commissioning

### 5.1. Central heating system check

Check for pressure in the system, it should be from 1.0 to 4,0 bar when the system is cold. Vent all heating elements and installation.

### 5.2. Preliminary electrical check

For three phase system:

- Check if power cable is tightened on power terminals
- Check the presence of each phase on input terminals inside boiler
- Measure exact voltage between L1 – L2, L1 – L3, L2 – L3, L1 –N. If there is no voltage between any combinations of phases one phase is missing and the heating elements inside the appliance can be damaged. If the voltage between phases is 10% higher than nominal voltage of the appliance, the appliance itself can be damaged

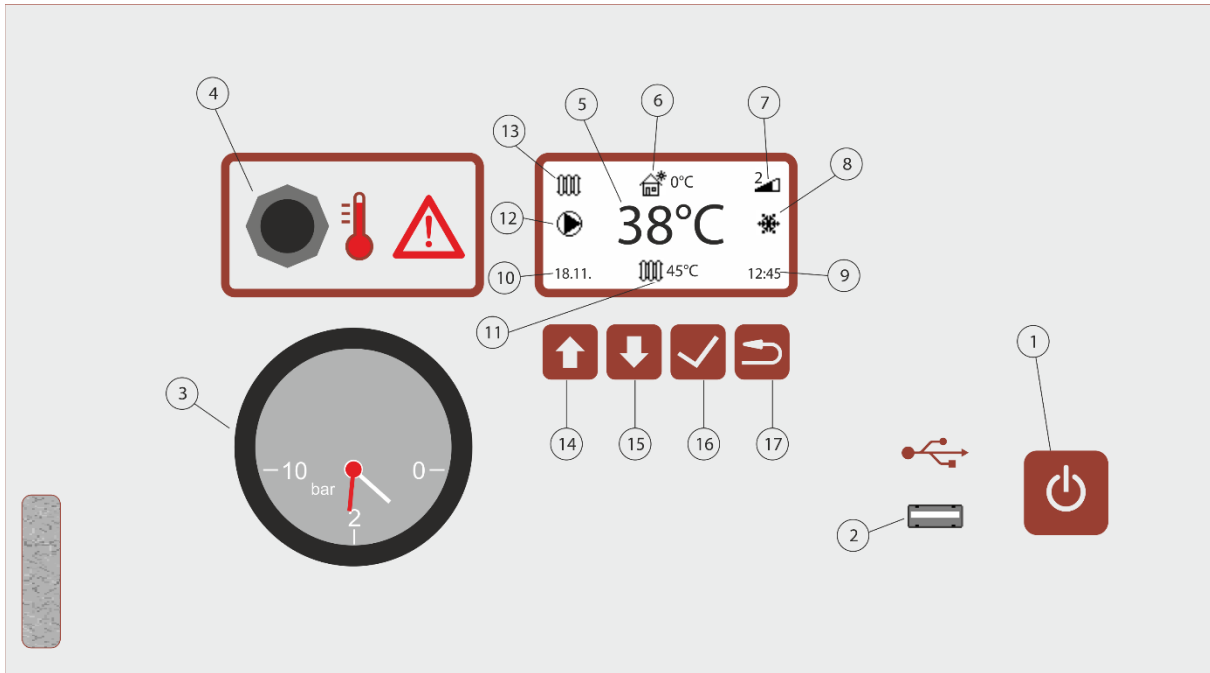
## 6. Working with control panel






### 6.1 Available control panels





ThermoMax boilers can be used for different tasks and therefore different control panels are available. Electronic control panel is standard. Electronic control panel with weather compensator is option.

**In following chapters please observe availability of options as not all options are available on all control panels.**


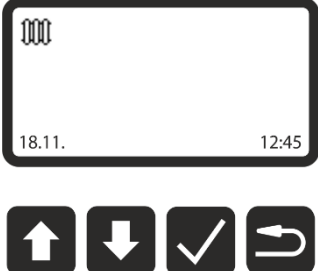
## 6.2. Introduction to control panels



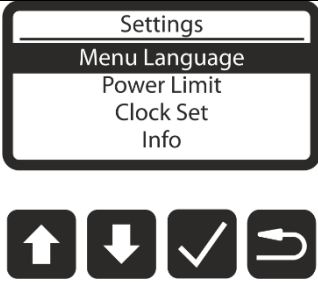





| Number | Description   |
|--------|---|
| 1      | ON / OFF switch   |
| 2      | USB port for service access   |
| 3      | Pressure gauge  |
| 4      | Cutout thermostat with manual deactivation  |
| 5      | Current temperature in boiler   |
| 6      | External temperature, visible only if external temperature sensor is installed and enabled  |
| 7      | Number of active heating steps  |
| 8      | Boiler is running in anti-frost protection mode   |
| 9      | Current time  |
| 10     | Current date  |
| 11     | Active mode and desired temperature<br> - Radiator heating<br> - Underfloor heating<br> - Domestic hot water cylinder heating, ( <i>option "Z"</i> ) |
| 12     |  - Cental heating pump is active<br> - Domestic hot water cylinder pump is active ( <i>option "Z"</i> )   |

|    |  |
|----|--|
| 13 | <p>Enabled modes</p> <p> - Radiator heating</p> <p> - Underfloor heating</p> <p> - Radiator and domestic hot water heating</p> <p> - Underfloor and domestic hot water heating</p> |
| 14 | <p>Multifunction key</p> <ul style="list-style-type: none"> <li>• Home screen with heating curves disabled, used to change desired temperature</li> <li>• Home screen with heating curves enabled, used to offset current curve</li> <li>• Inside menu, used for menu navigation and changing values</li> </ul>  |
| 15 | <p>Multifunction key</p> <ul style="list-style-type: none"> <li>• Home screen with heating curves disabled, used to change desired temperature</li> <li>• Home screen with heating curves enabled, used to change desired temperature</li> <li>• Inside menu, used for menu navigation and changing values</li> </ul>  |
| 16 | <p>Multifunction key</p> <ul style="list-style-type: none"> <li>• Home screen, press 5 seconds for user menu</li> <li>• Inside menu, used for selecting menu items and confirming values</li> </ul>  |
| 17 | <p>Escape key</p>  |

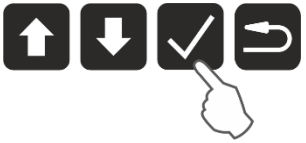

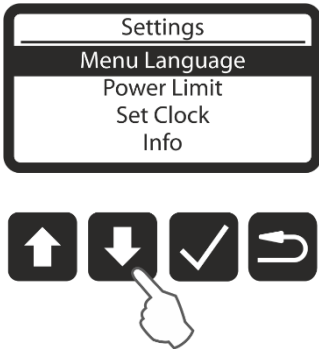

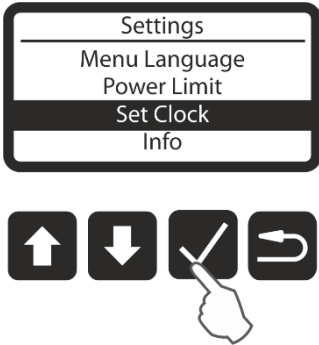

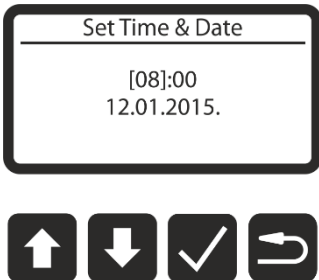




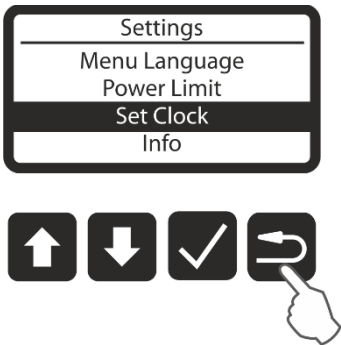

**6.2.1. Control panel display**

|   |                      |
|---|----------------------|
|  | <p>Active mode</p>   |
|  | <p>Stand-by mode</p> |

**5.5.1. Entering and navigating user menu**









|   |  |
|---|--|
|  | <p>Press and hold  for 5 seconds to enter user menu.</p> <p>Press  and  to navigate through options and set desired value.</p> <p>Press  to select option and confirm values.</p> <p>Press  to exit either from menu or option inside menu.</p> |
|---|--|

**6.2.2. Example how to change date and time**

|   |  |
|---|--|
|    | <p>Press and hold  for 5 seconds to enter user menu.</p>  |
|    | <p>Press  in order to navigate to “Clock Set” menu option.</p>  |
|   | <p>Press  to enter “Clock Set” option.</p>  |
|  | <p>Press  and  to change value.<br/>         Press  for next value.<br/>         When time and date are set press  for returning to user menu.</p> |
|  | <p>Press  for exiting user menu.</p>  |



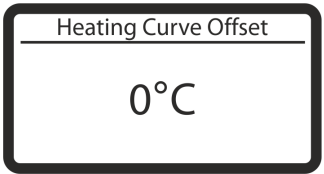




### 6.2.3. Temporary override heating curves (Turbo Mode)

Available only with external temperature sensor enabled.

|   |   |
|---|---|
|  | <p>Press and hold  for 5 seconds to enter mode.</p> <p>Press  and  to set desired fixed temperature in boiler.</p> <p>Press  to activate mode, or  to exit without change.</p> |
|  | <p>When activated  0°C will blink.<br/>Mode is automatically deactivated when desired room temperature is reached.</p>   |

### 6.2.4. Offsetting Heating curve













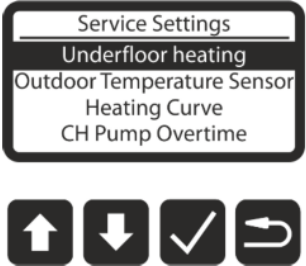




Available only with external temperature sensor enabled.

|   |   |
|---|---|
|  | <p>Press  to enter mode.</p>   |
|  | <p>Press  and  to set desired curve offset.</p> <p>Press  to accept selected value, or  to exit without change.</p> |

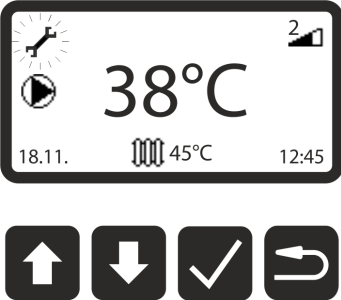

### 6.2.5. User menu options

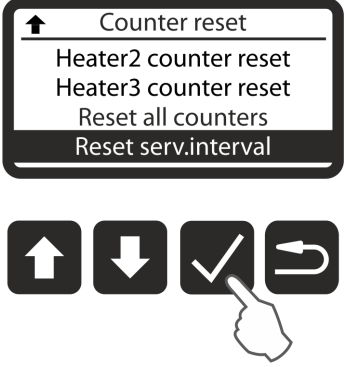

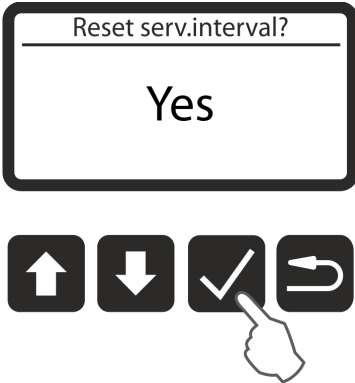

|                      |  |
|----------------------|--|
| <b>Menu Language</b> | Select language for menus and messages   |
| <b>Power Limit</b>   | Limit boiler's power stages refer to table 2.3 <i>Power stages</i> for more details.                                 |
| <b>Clock Set</b>     | Set time and date.   |
| <b>Info</b>          | Display various information about boiler, including serial number, software version and counters for heating groups. |

### 6.2.6. Entering and navigating service menu

|  |  |
|--|--|
|   | <p>Press and hold  and  simultaneously for 5 seconds to enter service menu.</p>  |
|   | <p>Enter service PIN by pressing combination of keys , ,  and . Service PIN is available for</p> <p>Number related to each key:</p> <ul style="list-style-type: none"> <li> - 1</li> <li> - 2</li> <li> - 3</li> <li> - 4</li> </ul> |
|  | <p><b>** This code should only be entered by a competent technician</b></p>  |
|  | <p>Press  and  to navigate through options and set desired value.</p> <p>Press  to select option and confirm values.</p> <p>Press  to exit either from menu or option inside menu.</p>   |

### 6.2.7. Reset service interval

|   |   |
|---|---|
|  | <p>When time for service declared by manufacturer expires, service symbol  will blink.</p> |
|---|---|

|   |   |
|---|---|
|  | <p>Navigate to “Reset serv.interval” and press  to reset option.</p>       |
|  | <p>Choose “Yes” and press  to reset service interval to default value.</p> |

### 6.2.8. Service menu options

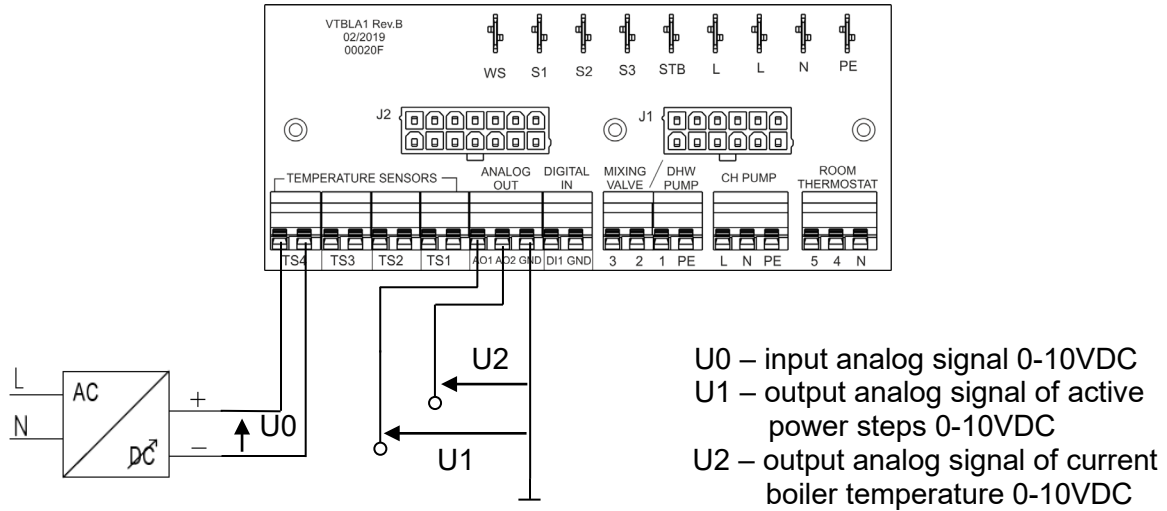
| Option                            | Description   | Availability       |
|-----------------------------------|---|--------------------|
| <b>Underfloor heating</b>         | Switch off or on underfloor heating. Switching underfloor heating on or off will reset Heating Curve, heating minimal and maximal temperature to factory defaults.<br><b>Default: Off</b> | All control panels |
| <b>Outdoor Temperature Sensor</b> | Switch on or off use of external temperature sensor. When on Heating Curves will be used to calculate boiler temperature.<br><b>Default: On</b>   | Options C          |
| <b>Heating Curve</b>              | Select heating curve for underfloor or radiator heating.<br><b>Default for radiator heating: 1.5</b><br><b>Default for underfloor heating: 0.6</b>  | Options C          |
| <b>CH Pump Overtime</b>           | Set time in seconds central heating pump will run after room temperature has been reached.<br><b>Default: 60 seconds</b>  | All control panels |
| <b>Stand-by Temperature</b>       | Minimal temperature that will be maintained inside boiler when in standby.  | All control panels |

|   |  |                    |
|---|--|--------------------|
|   | <b>Default: 15 °C</b>  |                    |
| <b>CH Minimal Temperature</b>   | Limit minimal temperature in boiler that can be calculated by heating curves.<br><b>Default for radiator heating: 40 °C</b><br><b>Default for underfloor heating: 15 °C</b>                    | All control panels |
| <b>CH Maximum Temperature</b>   | Limit maximum temperature in boiler that can be calculated by heating curves.<br><b>Default for radiator heating: 80 °C</b><br><b>Default for underfloor heating: 40 °C</b>                    | All control panels |
| <b>Stage turn-on delay</b>  | Time delay between power steps activation.   | All control panels |
| <b>Set Date&amp;Time</b>  | Set time and date  | All control panels |
| <b>Manual Pump Run</b>  | Using this option pump controlled by boiler can be started manually. During manual pump run heaters are switched off.<br>This option is useful for manual venting of heating system.           | All control panels |
| <b>Reset Counters</b>   | Reset counters for heating groups. Counter information is displayed in <i>User Menu -&gt; Info</i>   | All control panels |
| <b>Reset service interval</b><br>( <i>Service Menu -&gt; Reset Counters -&gt; Reset serv.interval</i> ) | Reset service interval to factory defaults.<br><b>Default:</b> <ul style="list-style-type: none"> <li>- 12 months (home used boilers)</li> <li>- 6 months (industrial used boilers)</li> </ul> | All control panels |
| <b>Apply Factory Settings</b>   | <ul style="list-style-type: none"> <li>- Reset control panel to factory settings</li> </ul>  | All control panels |
| <b>Cascade mode</b>   | Without central heating pump. Maximum power signal.  | All control panels |
| <b>Control mode</b>   | Remote control by 0-10V analog input signal  |                    |



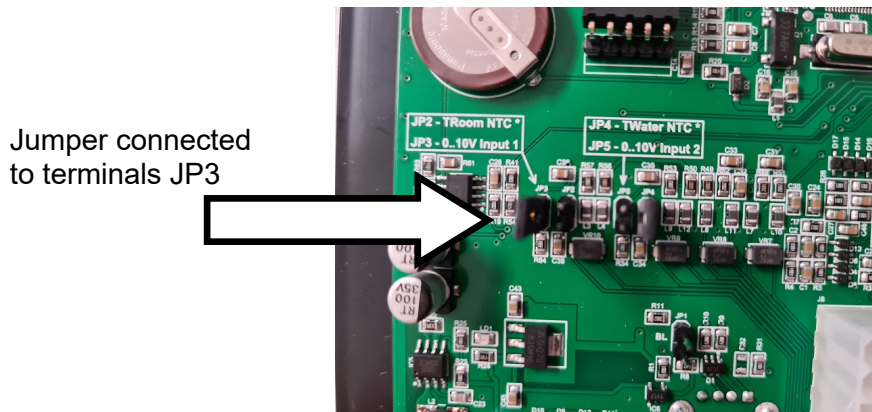
### 6.3. Control mode (0-10V analog signal)

#### 6.3.1. Connection to PCB

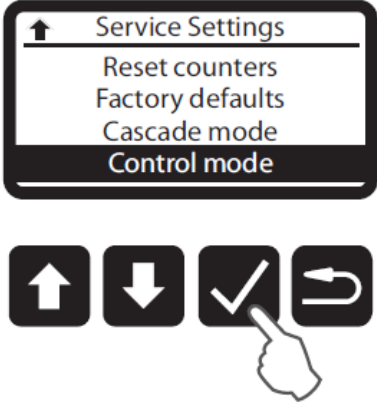

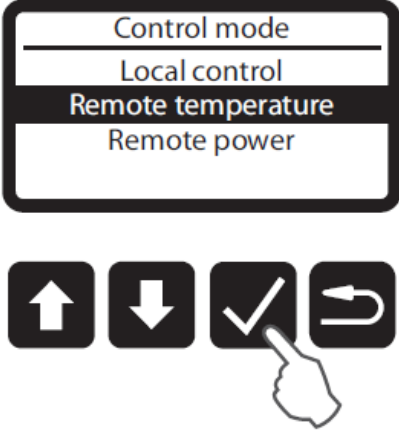



#### 6.3.2. Remote control settings

The first condition to enable remote control is connect jumper to terminals JP3 on control panels back. If jumper is connected to JP2, it's necessary to move him to JP3, and JP2 must be unconnected, as shown on picture below.



After the jumper is connected to JP3 terminals, remote control is enabled and it's necessary to select desired mode from service menu, as shown in the further instructions.

|  |   |
|--|---|
|   | <p>Enter service menu and navigate to “Control mode” then press  to enter control mode menu.</p> |
|  | <p>Navigate to desired option, then press  to select mode.</p>                                  |

### 6.3.3. Remote control instructions

**If remote control is activated, all local functions as temperature or power stages adjustment will be disabled.**

Available modes:

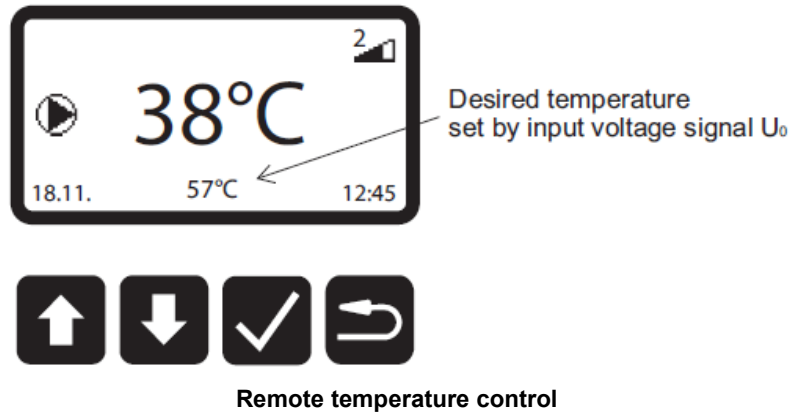
1. **Local control** – remote control disabled. Local control of desired temperature and power limit
2. **Remote temperature** – remote control of desired boiler temperature by using analog signal in range of 0-10VDC.

The input signal range (0-10VDC) is approximated to desired temperature in range of 0°C to 100°C, according to formula below.

$$U_0 = 10V * \frac{T_D}{100^{\circ}C} [V]$$

$U_0$  – input direct voltage signal [V]  
 $T_D$  – desired boiler temperature [°C]

Boiler will be inactive until input signal value is greater than value which corresponding to set minimum boiler temperature, and operation is enabled only in range between set minimum and maximum temperature.



### 3. Remote power – remote control of active power steps by using analog signal in range of 0-10VDC

The input signal range (0-10VDC) is approximated to power steps in range regarding to minimum and maximum values according to formulas below:

$$U_{0min} = 10V * \frac{L_D}{1 + L_M} [V] \quad ; \quad U_{0max} = 10V * \frac{L_D + 1}{1 + L_M} [V]$$

$U_{0min}$  – minimum value of input direct voltage signal [V]

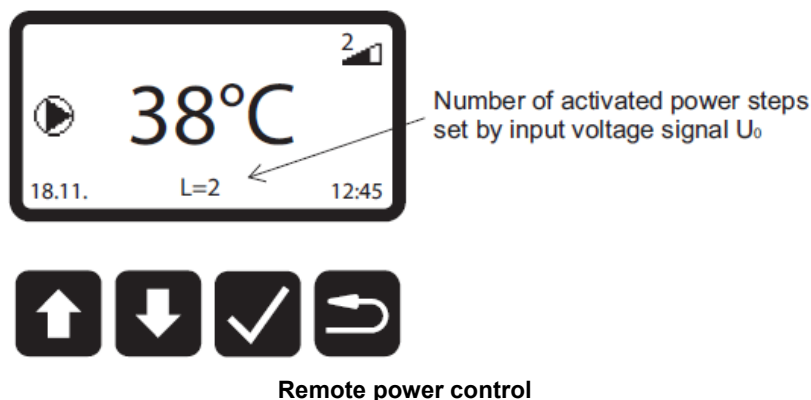
$U_{0max}$  – maximum value of input direct voltage signal [V]

$L_D$  – desired number of active power steps

$L_M$  – maximum number of power steps depending on type of boiler (3, 7 or 15)

Value of input signal must be in range of  $U_{0min}$  and  $U_{0max}$  for desired power steps.

In this mode boiler will run according to set power limit, adjusted by input voltage value, until boiler reaches maximum set temperature. It's not allowed to set desired temperature in this mode.



#### 6.3.4. Analog output signals

According to picture from chapter 5.6.1., two output signals are used.

**AO1** – analog signal of active power steps (0-10VDC)

The output signal value is approximated to currently active number of power steps.  
Number of active power steps corresponding to measured output value according to formula below:

$$L = L_M * \frac{U_1}{10V} [^{\circ}C]$$

$U_1$  – output direct voltage signal value [V]

$L$  – number of active power steps

$L_M$  – maximum number of power steps depending on type of boiler (3, 7 or 15)

**AO2** – analog signal of current boiler temperature (0-10VDC)

The output signal value is approximated to current temperature in range of 0°C to 100°C.  
Current temperature corresponding to measured output value according to formula below:

$$T_b = 100^{\circ}C * \frac{U_2}{10V} [^{\circ}C]$$

$U_2$  – output direct voltage signal value [V]

$T_b$  – current boiler temperature [°C]

## 7. Maintenance

### 7.1. 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.**

**Safety thermostat – we recommended to check the safety thermostat before every heating season by heating up the sensor with a heating blow lamp to over 100°C - this must actuate the overheating protection by switching off the boiler.**

**After approx. 500 hours of operation, the contact screws must be tightened using a torque wrench.**







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

### 7.2. 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).



## 8. Troubleshooting

|   |   |
|---|---|
|  <p>Air in Boiler</p>                        | <p>Air is present inside boiler's reservoir and heating is not active. Even if boiler is equipped with automatic venting valve, manual venting is advisable if large amount of air is present inside reservoir.</p> <p>When boiler is properly vented the error will be automatically dismissed and boiler will continue with normal operation.</p>   |
|  <p>Low Mains Voltage</p>                    | <p>Power supply voltage is below 180 V per phase. Heating is not active in order to protect contactors / power relays.</p> <p>When power supply voltage raises above 180 V per phase error will be automatically dismissed and boiler will continue with normal operation.</p>  |
|  <p>Outdoor Temperature Sensor open</p>      | <p>Outdoor temperature sensor is not properly connected. Check sensor's wiring.</p> <p>When sensor is operational, error will be automatically dismissed and boiler will continue with normal operation.</p> <p><i>Refer to <b>Temperature sensor</b> section of this chapter for more details on troubleshooting temperature sensor.</i></p>   |
|  <p>Outdoor Temperature Sensor shorted</p> | <p>Outdoor temperature sensor is not properly connected or short circuit is present on sensor's wiring. Check sensor's wiring.</p> <p>When sensor is operational, error will be automatically dismissed and boiler will continue with normal operation.</p> <p><i>Refer to <b>Temperature sensor</b> section of this chapter for more details on troubleshooting temperature sensor.</i></p>  |
|  <p>Boiler Temperature Sensor open</p>     | <p>Boiler's temperature sensor is not properly connected. Check sensor's wiring.</p> <p>When sensor is operational, error will be automatically dismissed and boiler will continue with normal operation.</p> <p><i>Refer to <b>Temperature sensor</b> section of this chapter for more details on troubleshooting temperature sensor.</i></p>  |
|  <p>Boiler Temperature Sensor shorted</p>  | <p>Boiler's temperature sensor is not properly connected or short circuit is present on sensor's wiring. Check sensor's wiring.</p> <p>When sensor is operational, error will be automatically dismissed and boiler will continue with normal operation.</p> <p><i>Refer to <b>Temperature sensor</b> section of this chapter for more details on troubleshooting temperature sensor.</i></p> |

| Temperature sensor  | <p>If temperature sensor is properly connected but control panel is signaling problem, use following table to compare measured resistance of sensor with actual temperature readings.</p> <table border="1"> <thead> <tr> <th colspan="2">AMBIENT TEMPERATURE</th> <th colspan="3">RESISTANCE (<math>\Omega</math>)</th> </tr> <tr> <th>(°C)</th> <th>(°F)</th> <th>MIN.</th> <th>TYP.</th> <th>MAX.</th> </tr> </thead> <tbody> <tr><td>-20</td><td>-4</td><td>1338</td><td>1367</td><td>1396</td></tr> <tr><td>-10</td><td>14</td><td>1467</td><td>1495</td><td>1523</td></tr> <tr><td>0</td><td>32</td><td>1603</td><td>1630</td><td>1656</td></tr> <tr><td>10</td><td>50</td><td>1748</td><td>1772</td><td>1797</td></tr> <tr><td>20</td><td>68</td><td>1901</td><td>1922</td><td>1944</td></tr> <tr><td>25</td><td>77</td><td>1980</td><td>2000</td><td>2020</td></tr> <tr><td>30</td><td>86</td><td>2057</td><td>2080</td><td>2102</td></tr> <tr><td>40</td><td>104</td><td>2217</td><td>2245</td><td>2272</td></tr> <tr><td>50</td><td>122</td><td>2383</td><td>2417</td><td>2451</td></tr> <tr><td>60</td><td>140</td><td>2557</td><td>2597</td><td>2637</td></tr> <tr><td>70</td><td>158</td><td>2737</td><td>2785</td><td>2832</td></tr> <tr><td>80</td><td>176</td><td>2924</td><td>2980</td><td>3035</td></tr> <tr><td>90</td><td>194</td><td>3118</td><td>3182</td><td>3246</td></tr> </tbody> </table> | AMBIENT TEMPERATURE     |      | RESISTANCE ( $\Omega$ ) |  |  | (°C) | (°F) | MIN. | TYP. | MAX. | -20 | -4 | 1338 | 1367 | 1396 | -10 | 14 | 1467 | 1495 | 1523 | 0 | 32 | 1603 | 1630 | 1656 | 10 | 50 | 1748 | 1772 | 1797 | 20 | 68 | 1901 | 1922 | 1944 | 25 | 77 | 1980 | 2000 | 2020 | 30 | 86 | 2057 | 2080 | 2102 | 40 | 104 | 2217 | 2245 | 2272 | 50 | 122 | 2383 | 2417 | 2451 | 60 | 140 | 2557 | 2597 | 2637 | 70 | 158 | 2737 | 2785 | 2832 | 80 | 176 | 2924 | 2980 | 3035 | 90 | 194 | 3118 | 3182 | 3246 |
|---------------------|--|-------------------------|------|-------------------------|--|--|------|------|------|------|------|-----|----|------|------|------|-----|----|------|------|------|---|----|------|------|------|----|----|------|------|------|----|----|------|------|------|----|----|------|------|------|----|----|------|------|------|----|-----|------|------|------|----|-----|------|------|------|----|-----|------|------|------|----|-----|------|------|------|----|-----|------|------|------|----|-----|------|------|------|
| AMBIENT TEMPERATURE |  | RESISTANCE ( $\Omega$ ) |      |                         |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| (°C)                | (°F)   | MIN.                    | TYP. | MAX.                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| -20                 | -4   | 1338                    | 1367 | 1396                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| -10                 | 14   | 1467                    | 1495 | 1523                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 0                   | 32   | 1603                    | 1630 | 1656                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 10                  | 50   | 1748                    | 1772 | 1797                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 20                  | 68   | 1901                    | 1922 | 1944                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 25                  | 77   | 1980                    | 2000 | 2020                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 30                  | 86   | 2057                    | 2080 | 2102                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 40                  | 104  | 2217                    | 2245 | 2272                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 50                  | 122  | 2383                    | 2417 | 2451                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 60                  | 140  | 2557                    | 2597 | 2637                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 70                  | 158  | 2737                    | 2785 | 2832                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 80                  | 176  | 2924                    | 2980 | 3035                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |
| 90                  | 194  | 3118                    | 3182 | 3246                    |  |  |      |      |      |      |      |     |    |      |      |      |     |    |      |      |      |   |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |    |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |    |     |      |      |      |

|  |   |
|--|---|
| There is no voltage on the control panel at switching on | <p>Power supply on one or more phases is missing, please check wiring to boiler's power terminals.<br/>                     Fuse on the control panel has been blown and should be replaced.<br/>                     Circuit breaker has been disconnected, please check it.</p> |
|--|---|

|  |   |
|--|---|
| Boiler can't reach desired temperature | <p>Check symbols on control panel if all heating stages (7) are active, also check voltage between phases on boiler's power terminals.</p> <p>If all heating stages are active and voltage between phases is correct, defective heater(s), fuse(s) or contactor(s) can be responsible and should be replaced.</p> |
|--|---|

|  |  |
|--|--|
| Boiler is reaching desired temperature but does not provide heat to system | <p>Check symbol on control panel if pump is active (12) and running.</p> |
|--|--|

|                             |  |
|-----------------------------|--|
| Boiler in operation "roars" | <p>Heating system/boiler should be vented.</p> |
|-----------------------------|--|

|                          |   |
|--------------------------|---|
| The contactors are noisy | <p>Boiler is equipped with under voltage protection in order to protect contactors. Possible cause are faulty contactors.</p> |
|--------------------------|---|

Boiler operates incorrectly, moving up a couple of stages before immediately moving down again, etc...

The flow of water through boiler is too low, please refer to chapter 2.5 *The boiler flow requirements*. Pump or valves could be defective and should be checked.