



FLEXIHEAT UK LTD

www.flexiheatuk.com

01202 822221

ELECTRIC BOILERS FOR CENTRAL HEATING & DHW PRODUCTION VIA AN INDIRECT CYLINDER

These boilers are heat only - thus come with no pump or expansion vessel - these are by others to suit system requirements - we always recommend modulating pumps - to ramp up and down based on the delta T of the heating system - see pump sizing section for more detail

Thermo Extra 28 - 96kW

INSTRUCTIONS FOR INSTALLATION AND USE

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General



Read this document carefully before carrying out any installation, adjustment or service and follow the instructions

- **Keep these instructions close to the boiler!**
- **The boiler must not be modified, changed, or rebuilt.**
- **The correct settings are important for economical heating.**
- **The type and serial number of the boiler must be quoted whenever you contact manufacturer or service, see the identification plate.**

General safety instructions!

- Children shall not play with the appliance.
- Cleaning and user maintenance shall not be made by children without supervision.
- Children should be supervised to ensure that they do not play with the appliance.
- Boiler is not intended for outdoor use.

Technical safety instructions!!

- Keep the water pressure between recommended limits – see chapter 3.4.3, page 7.
- Do not install the boiler close to another heat source (for instance, fireplace, wood stove etc
- **Incompetent repairs can cause danger to users.**
- Defective parts may be replaced only by the original or approved by the manufacturer.
- Switch off main power by MCB before opening the boiler.
- **The boiler has built-in frost protection. When the boiler is not in use, leave the main power active so that the frost protection will stay active.**

1. Introduction

Thank you for the confidence you have shown in us by purchasing our electric heating boiler.

To use the boiler correctly and safely, and above all economically, read these instructions thoroughly 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 in force.

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

Thermo Extra are economical central heating heat only boilers that may be used as an independent or additional source of heat for a wet heating system.

The thermo extra boiler are fully modulating boilers, which will ramp up and down their output range automatically to suit the heating system demands – Thus ensuring close heat load matching and better efficiency of the power used.

They also can be downrated to a set maximum output via the control panel.

Electric boilers are 100% efficient, as all the energy into the immersion heaters is converted into direct heat for the heating system.

The Thermo Extra boilers are manufactured with upper and bottom connections so you can choose which of them will be used for system connection. The temperature operation range is from 20 °C to 90 °C.

1.4. Heating curves

1.4.1. Availability of heating curves

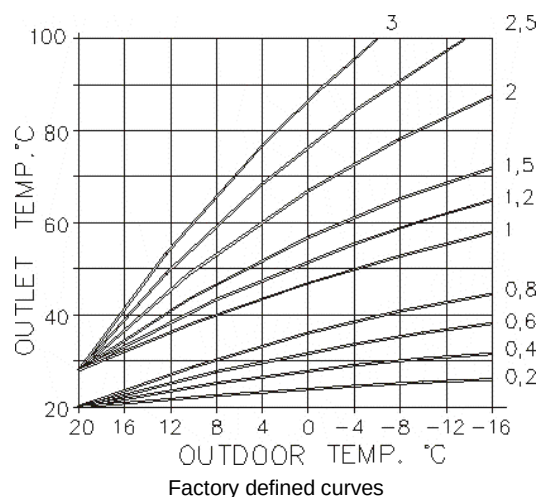
Use of heating curves, temperature compensation, comes as standard with our Thermo Extra boilers with the “X” control panel. This is our standard control panel.

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, the 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 condense 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 must be chosen depending on the characteristics of the object and the heating system.



If the heating curve is set optimally for heating your building, 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 system is different. 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 must 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 changes too, and in that way the temperature of water in the boiler changes 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 average insulation building quality):

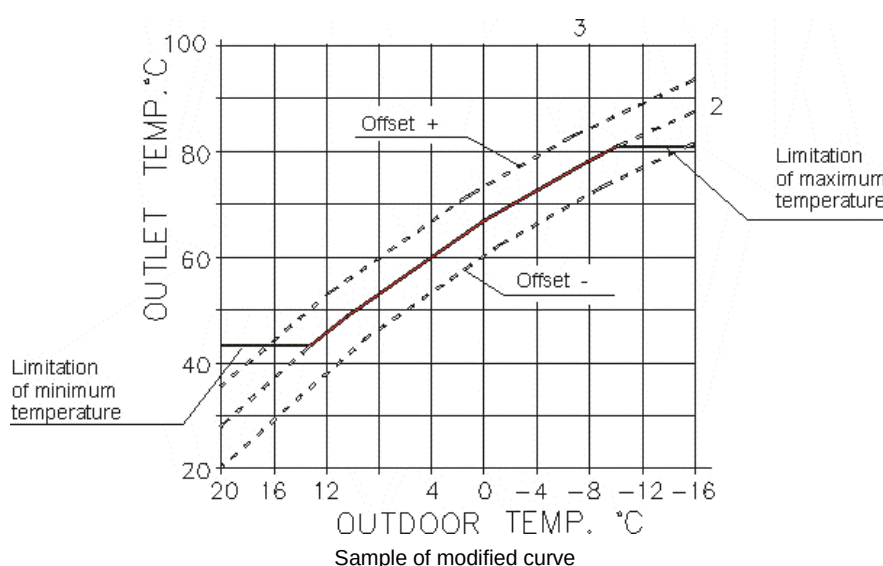
When the temperature of water for heating changes from 5 to 7°C that will change the room temperature by approximately 2°C.

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 on how to correct the heating curve for the radiator heating depending on the desired room temperature.

	Inclination of the curve	Offset
Factory settings	1,5	0
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 must be chosen in a way to achieve the highest desired temperature. On the parts of heating where temperature of the primary flow must be lower, one element must be built in the system such as a 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 must be changed. If a 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. **The factory setting is at 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 lower temperatures.

1.5. Functionality of hot domestic water

1.5.1. Availability

It is possible to produce **domestic hot water via an indirect hot water cylinder** by using a Thermo Extra electric boiler and a water cylinder temperature sensor (optional)

1.5.2. Description

Domestic water production has a preference order over central heating. Now via signalling the need to heat up the domestic hot water cylinder by the domestic water temperature sensor, the circulation pump of central heating is switched off and the circulation pump for domestic water is switched on.

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

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

If the central heating is off, either underfloor or radiator heating, at the moment of reaching the desired domestic water temperature, the desired water temperature in a boiler is set to the minimum value of water temperature in the boiler (i.e. stand by).

At repeated request for heating the domestic water cylinder the desired water temperature in the boiler is set to 25°C higher than set values of the desired domestic hot water temperature.

Circulation pump for domestic water conditioning is switched on as late as the water temperature in the boiler reaches the same or higher temperature than the 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 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 heating is longer than 30 min., especially if the desired temperature of domestic water tank is not reached within 30 min., the process will be automatically interrupted and it switches to the heating regime, which in this case this lasts for at least 30 min.

1.6. Frost protection

1.6.1. Availability

Frost protection can also be provided using an appropriate room thermostat. When frost protection is controlled by room thermostat, please consult the room thermostat manuals for more details.

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 of 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 an indirect DHW cylinder) 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 the blinking display, as well as by the LED diode of the heater and the boiler.

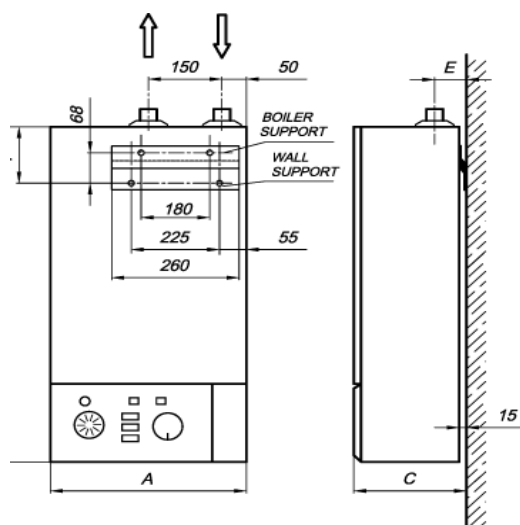
In this case, domestic water heating has priority.

For the **frost protection system of central heating to operate**, the room thermostat should be in the mode of frost protection, too (otherwise, the circulation pump of central heating would not operate).

2. Boiler specifications

2.1 Dimensions

Thermo Extra



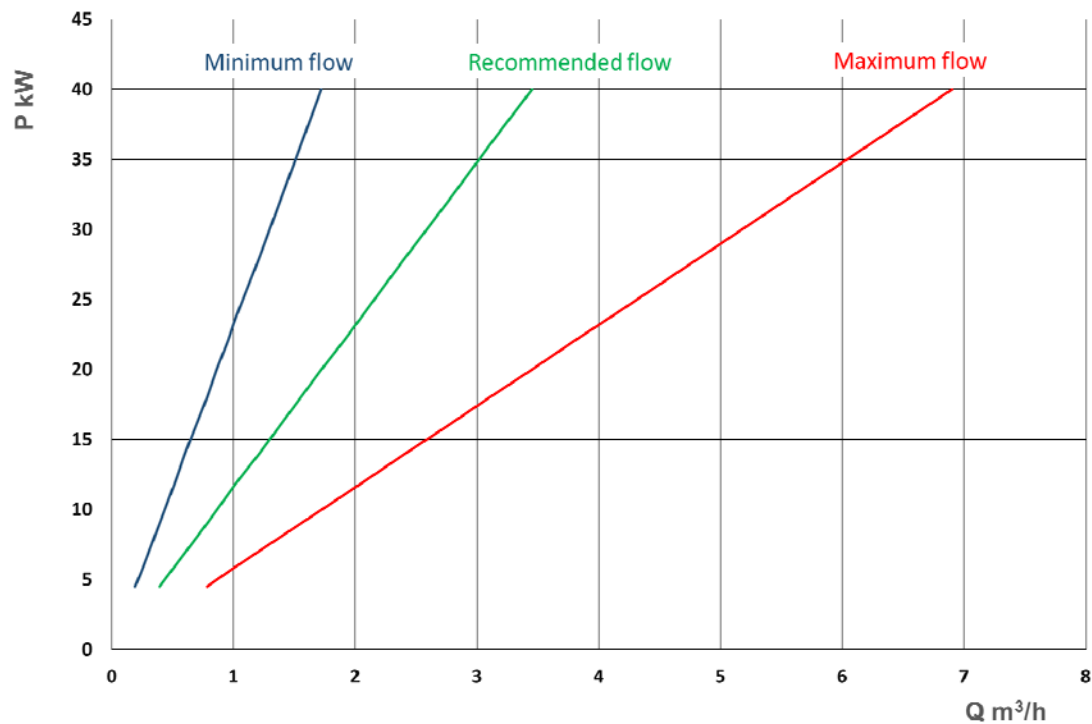
BOILERS 28 - 96 kW

TECHNICAL DATA FOR THERMO EXTRA ELECTRIC BOILERS

Power kW	Capacity Lit.	Dimensions mm	Weight kg	Maximum operating pressure (bar)	Pipes BSP male	Power supply
28	19	A 400 B 930 C 310 D 162 E 115 F 109	45	2.5	1 ½"	400V 3N ~ 50/60 Hz
32						
36						
40						
44						
48						
52						
56						
60		A 550 B 930 C 310 D 316 E 115 F 175	72	2.5	2"	400V 3N ~ 50/60 Hz
64						
72						
80						
88						
96						

2.1.1 Recommended flows for Thermo Extra up to 40kW output

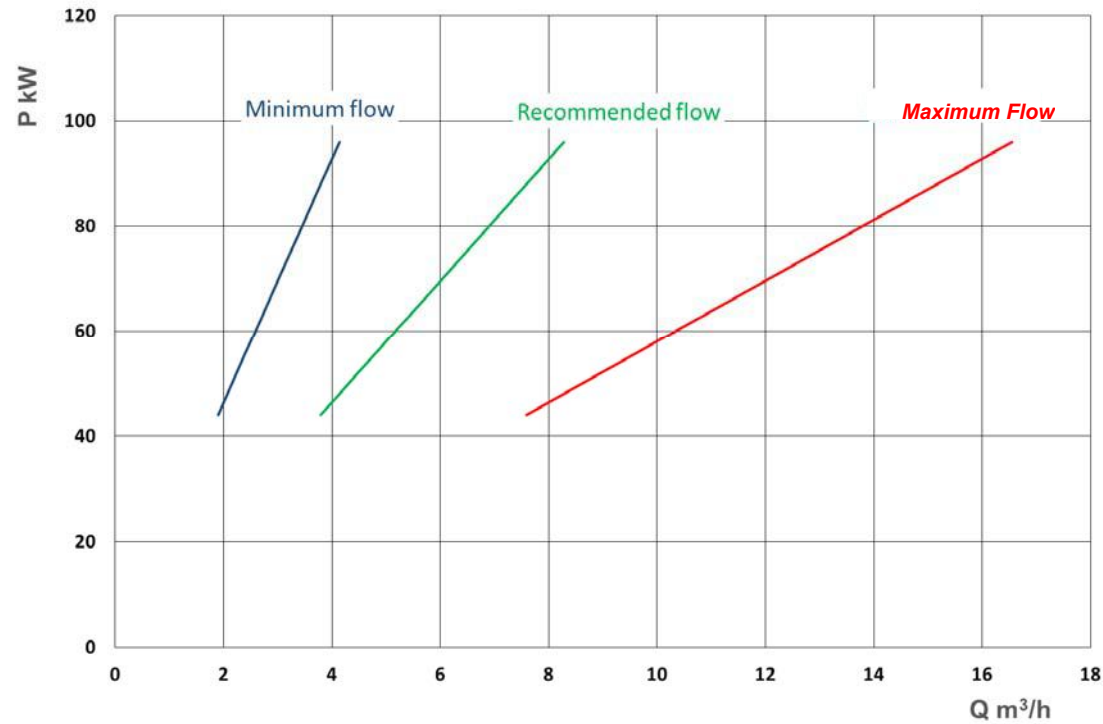
Recommended flows for boilers Thermo Extra up to 40kW



The maximum flow rate is based on a delta T of 5°C ,minimum flow rate is based on 20°C

2.1.2 Recommended flows for Thermo Extra 44-96 kW

Recommended flows for boilers Thermo Extra 44-96kW



The maximum flow rate is based on a delta T of 5°C ,minimum flow rate is based on 20°C

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 to go **directly through the boiler**.

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

- 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 will result :

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

Boiler modulation steps - all this range has 7 boiler output steps - which the units will ramp up and down according to the heating system demands

Power step	Thermo Extra 28kW	Thermo Extra 32kW	Thermo Extra 36kW	Thermo Extra 40kW	Thermo Extra 44kW	Thermo Extra 48kW	Thermo Extra 52kW
1	6	8	6	8	8	8	8
2	8	8	8	8	14	16	16
3	14	16	14	16	22	24	24
4	14	16	22	24	22	24	28
5	20	24	28	32	30	32	36
6	22	24	30	32	36	40	44
7	28	32	36	40	44	48	52

Power step	Thermo Extra 56kW	Thermo Extra 60kW	Thermo Extra 64kW	Thermo Extra 72kW	Thermo Extra 80kW	Thermo Extra 88kW	Thermo Extra 96kW
1	8	8	8	8	8	16	16
2	16	16	16	24	24	24	24
3	24	24	24	32	32	40	40
4	32	36	40	40	48	48	56
5	40	44	48	48	56	64	72
6	48	52	56	64	72	72	80
7	56	60	64	72	80	88	96

Boiler flow rates

Flow rates for the boilers – should be based on a **maximum Delta T of 20°C** and a **minimum Delta T of 5°C** – we recommend a Delta T of 11°C as this is the ideal delta T, but the boiler will work with no issues with a delta T between 5°C and 20°C **directly through the boiler**

Flow Rate in a Heating System – calculation example

A water circulating heating systems delivers 230 kW with a temperature difference of 20°C .The volumetric flow can be calculated as:

$$q = (230 \text{ kW}) / ((4.2 \text{ kJ/kg } ^\circ\text{C}) (1000 \text{ kg/m}^3) (20^\circ\text{C})) = 2.7 \cdot 10^{-3} \text{ m}^3/\text{s}$$

The mass flow can be expressed as:

$$m = (230 \text{ kW}) / ((4.2 \text{ kJ/kg } ^\circ\text{C}) (20 ^\circ\text{C})) = 2.7 \text{ kg/s (kg/s is the same as litres/second)}$$

Please size your **pump to cover both the highest kW output and the lowest output from the boiler** (see previous page for output ranges). We recommend using a **variable speed pump to modulate the flow rate according to you desired Delta T.**

For example, our 96kW boilers **maximum output is 96kW** – based on a Delta T of 20C, the **pump must be able to produce -**

1.142 litres a second = which is 4.114 m³/h at **full output**

And must be able to ramp down to the **minimum output of 16kW** for the 96kW boiler (see heating step modulation table on the previous page) -

thus

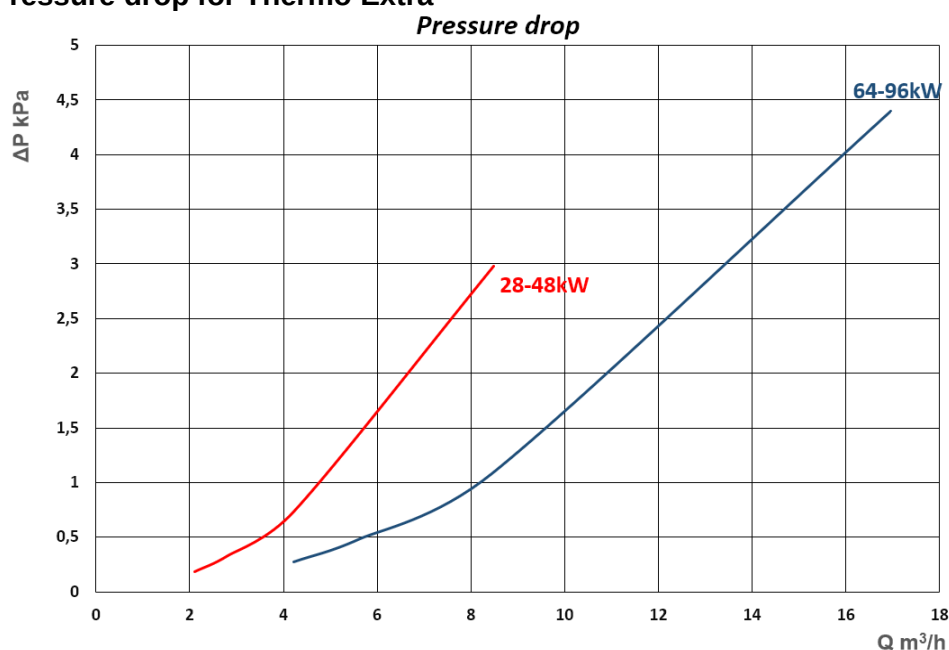
0.1904 litres a second = which is 0.68571 M³/hour at **lowest output**

If your system has variable **low rates outside of these parameters**, then you will need to use a **low loss header** or a **hydraulic separator plate heat exchanger** , to make a primary and secondary heating circuit.

As electric boilers are flow sensitive, and issues will arise if the **flow rates can't be guaranteed directly through the boiler**. See point on previous page

2.2 Hydraulic pressure drop and recommended flows

Pressure drop for Thermo Extra



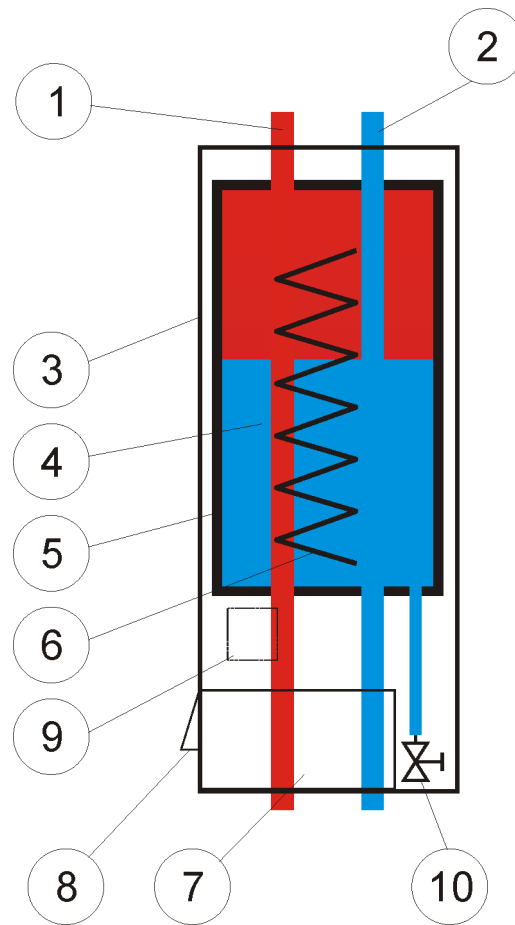
2.4. Power supply characteristics

POWER	Nominal current	Fuse current	Rated short-circuit breaking capacity I _{cn} (EN 60898)	Rated short-circuit breaking capacity I _{cn} (IEC 947-2)	Min. conductor's cross-section	Fuse type	RCCB switch type
400V 3N ~ 50/60 Hz							
28 kW	40,58 A	50 A			5 x 10 mm ²	B50-3	63 / 0,03 A (0.3A Thermo Extra)
32 kW	46,38 A	63 A			5 x 16 mm ²	B63-3	
36 kW	52,17 A						
40 kW	57,97 A						
44 kW	63,77 A	80 A	50 kA	105 kA	5 x 25 mm ²	NH 160 A	0.3A
48 kW	69,57 A	100 A					
52 kW	75,36 A						
56 kW	81,16 A						
60 kW	86,96 A	125 A			5 x 35 mm ²		
64 kW	92,75 A						
72 kW	104,35 A						
80 kW	115,94 A	160 A			5 x 50 mm ²		
88 kW	127,54 A						
96 kW	139,13 A				5 x 70 mm ²		

min. conductor's cross-section in mm² is based on maximum length of 20 m.

2.5. Function elements of Thermo Extra boilers

Thermo Extra



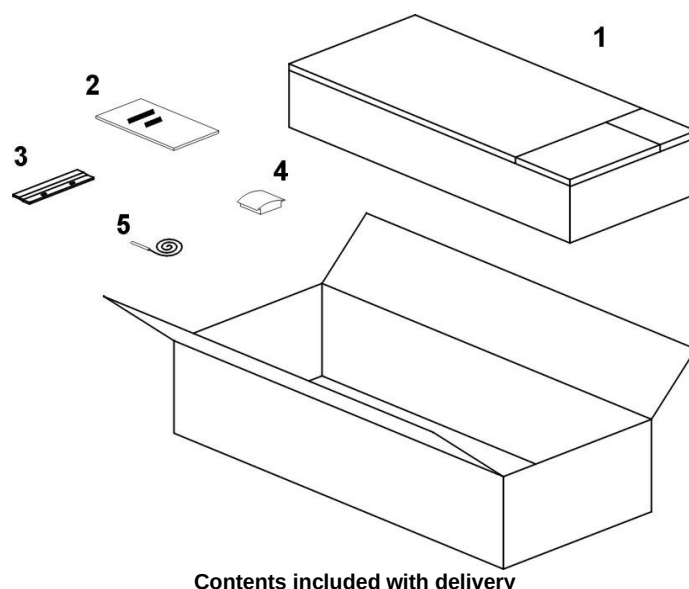
- 1. Primary flow
- 2. Return flow
- 3. External boiler jacket
- 4. Boiler
- 5. Heat insulation

- 6. Electrical heaters
- 7. Control panel
- 8. Inducers for el. Connections
- 9. Contactors
- 10. Charge and discharge valve

3. General requirements

3.1 Contents included in delivery

The Thermo Extra boilers are delivered pre-mounted in a package unit. Make sure that all parts have been delivered intact. For the exact list of parts see the figure and table below. If parts are damaged or missing, please consult our local sales office.



Item	Quantity	Description
1	1	Thermo Extra boiler
2	1	Instructions for installation and use
3	1	Electrical drawing
4	1	Hanging bracket
5	1	External temperature sensor (optional)
6	1	Water cylinder temperature sensor (optional)

Table of contents included with delivery.

Note:

3.2 Preliminary remarks

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

A safety valve must be installed in the system, with a maximum pressure blow off rating of 4.5 Bar.

If the boiler is not connected to a room thermostat or the boiler is not in use during wintertime, there is a danger of freezing. In this case they 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.

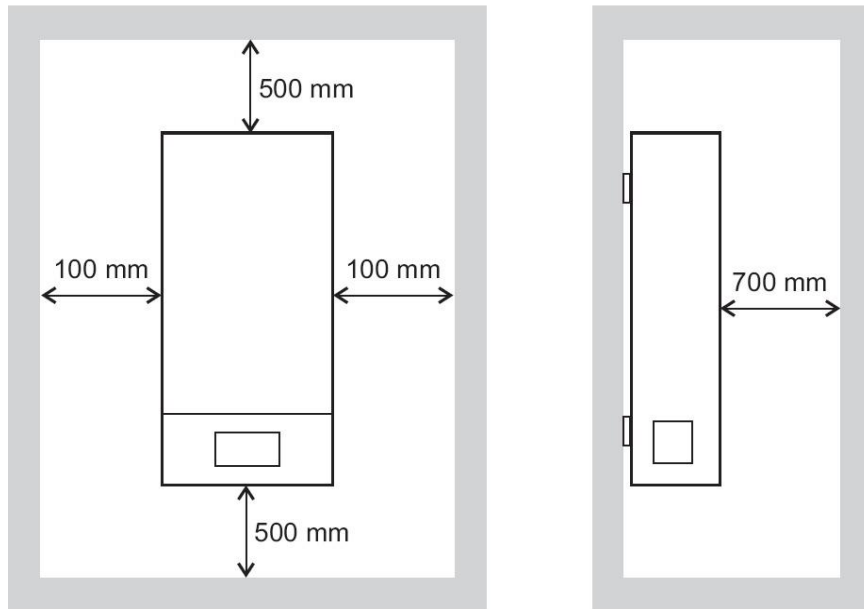
Recommended pressure of the central heating system is 1.5 bar, maximum pressure is 4.5 bar, and the minimum pressure is 0.8 bar.

3.4. Installation site

3.4.1. Position of a boiler

The location must provide adequate space for servicing and air circulation around the boiler. The boiler may be installed in any room, except a room containing a bath or a shower. The boiler must be mounted on a flat, vertical wall, which must be sufficiently robust to bear the weight of the boiler. The boiler may be installed on a combustible wall, subject to the requirements of the Local Authorities and Building Regulations.

The following figure shows the recommended minimal distances.



Minimal distances

It is possible to reduce recommended minimal distances, but the following requirements must be met:

- Power supply connection, located at the **bottom side of boilers must be accessible.**
- **The bottom part of the boiler must be accessible to allow a change of any immersion heaters.**
- The control panel on the bottom side of boiler must be accessible.
- Basic air circulation must be maintained.

3.4.2. Power supply

The boiler is rated as a high-power appliance and fixed wiring must be used. Please observe chapter [2.4.](#) about fuse and conductor requirements. When connecting the appliance to the wiring the means for disconnection via a (MCB) must be incorporated into the supply wiring in accordance with the local wiring rules and regulations.



The house installation to which this device is connected must contain an electric differential protection switch (RCCB), which must be protected by the device itself. Also, the device must be protected from electrical overload and short circuit by selecting an element from the table in Chapter 2.4.

Note:

In some cases, additional measures must be taken, subject to the requirements of the Local Authorities/ regulations in force.

3.5. System requirements

3.5.1. Pipe work.

Pipe work that is not 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 valves must be 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.

3.5.2. Cleansing and flushing the system.

Flushing of the system is highly recommended; this will prevent damage to the boiler made by dirt from the system.

We also recommend a good quality magnetic dirt and air separator is fitted to the heating system, as per the building regulations and the separator should normally be fitted where water is at the highest temperature and the lowest pressure available.

Dirt and air in hydronic systems cause operational problems and their removal is a key factor in achieving maximum efficiency and longevity of the boiler.

Particularly where a new boiler is to be fitted to an existing system, it is a good practice that the system is thoroughly cleansed. Please ensure the cleaner is suitable for use with **Incoloy and steel materials, which are used in the boiler.**

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 the heating system for a maximum of 24 hours.

Please refer to the cleanser manufacturer for their exact time requirements, as this can vary from manufacturer to manufacturer.

3.5.3. 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 the 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.

Note:

For the heating system to operate properly the indicator of manometer must be between 1.2 and 1.5 bar when system is cold. It is very important to use soft water or fluids for central heating.

Do not fill the system with water from private source i.e. borehole water.

3.5.4. Pressure relief valve.

A **pressure relief valve is not provided with the boiler**. This safety device is required on all sealed C.H. systems and should be **preset at 4.5 bar maximum**. The pressure relief valve must not be used for draining purposes.

3.5.5. Expansion vessel

Thermo Extra boilers are not equipped with an expansion vessel. This is by others to suit system volume

3.5.6. Circulating pumps

A Circulation pump is not included with Thermo Extra boilers.

This pump must be controlled separately to the boiler i.e. it can't be controlled from the boiler directly.

4. Boiler installation sequence

4.1. Transporting the appliance

Important:

The following lift operation exceeds the recommended weight for a one-man lift.

General recommendations when handling

Clear the route before attempting the lift. Safe lifting techniques are used – keep back straight – bend using legs. Keep the load as close to the body as possible. Do not twist – reposition your feet. If 2 people are performing the lift, ensure coordinated movements during lift. Avoid upper body/top heavy bending - do not lean forward/sideways. It is recommended to wear suitable cut resistant gloves with a good grip to protect against sharp edges and ensure a good grip. Always use assistance if required.

Positioning of Appliance for Final Installation

Fit bracket securely onto wall before lifting appliance into position. Ensure that stable balance is achieved and lift upwards to drop into place onto bracket. Ensure coordinated movements during a two-person lift to ensure equal spread of weight of load. It is recommended to wear suitable cut resistant gloves with good grip to protect against sharp edges and ensure good grip when handling appliance.

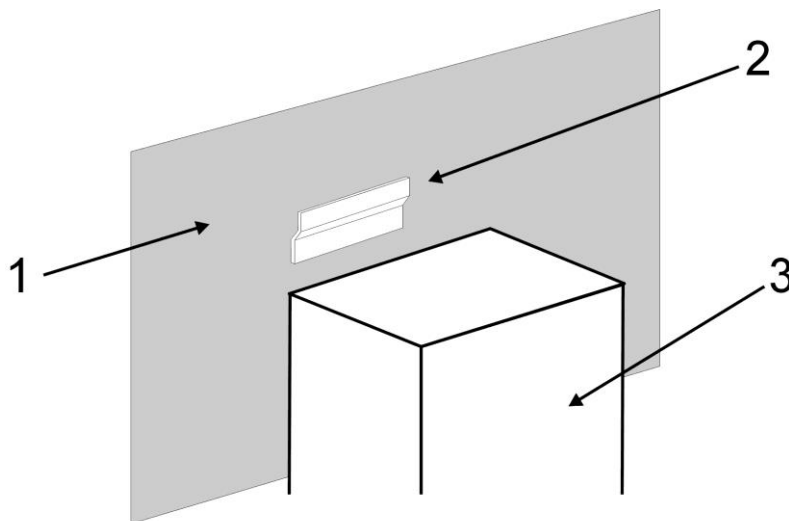
4.2. Select position for boiler

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 boiler to be splashed with a significant amount of water.
- Normal levels of air circulation can be maintained.
- All necessary pipework can be connected.

4.3. Fitting the boiler hanging bracket

Fix the hanging bracket (2) to the wall (1) using the plugs and M8 or M10 screws. Lift up boiler (3) above hanging bracket (2), gently lean it to the wall (1) and slide it down to the hanging bracket (2).

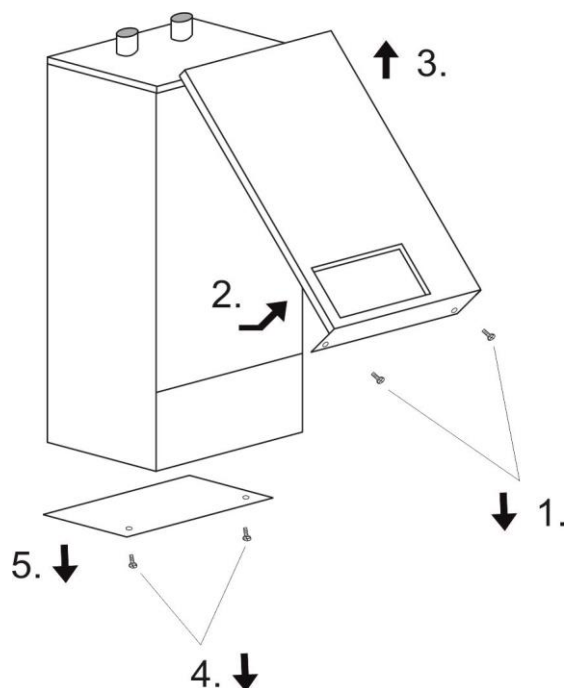


Wall mounting

Note:

If the boiler is to be fitted in a timber framed building, ensure that the bracket is secured to a substantial part of the timber frame capable of bearing the weight of the boiler.

4.4. Removing/fixing the front and bottom case



Unwind two screws from the bottom side of boiler (1) and grasp the front panel by its sides, pull it towards the front (2) and remove it by lifting it off the unit (3).

For service purposes as element replacing, or power cable installation, remove the bottom cover by unwinding two screws (4) and remove the cover from the case (5).

4.5. Pipe work connection.

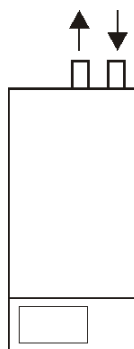
Note:

Observe chapter 3.5. for the system requirements before proceeding.

System flushing is necessary to prevent damage to the appliance.

It is recommended to fit valves on the flow and return pipe work to enable easy disconnection/separation of boiler from the central heating system.

The following figure indicates the flow and return for the central heating on Thermo Extra boilers.



Flow and return on Thermo Extra boilers

4.6. Power supply connection



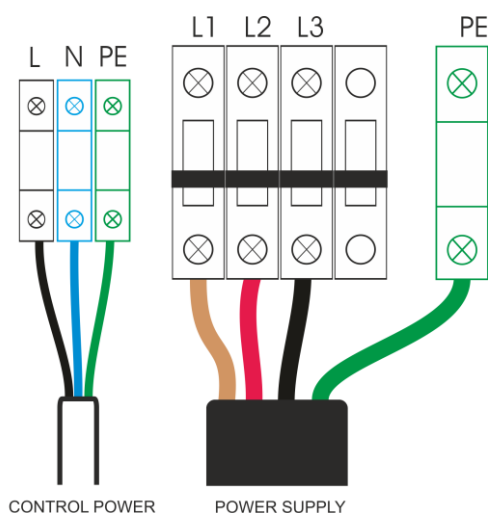
Note:

Before working on the boiler, turn off the power (e.g. MCB, switches) and protect against accidental switching on. The tightening torque for MCB is 2.0 Nm.

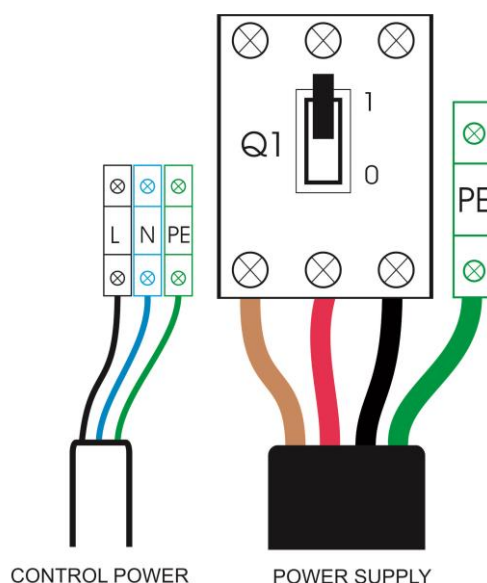
A boiler is rated as a high-power appliance and fixed wiring must be used. **Please observe chapter 2.4. about fuse and conductor requirements.** When connecting the appliance to the fixing wiring, the means for disconnection (MCB) must be incorporated in fixing wiring in accordance with the local wiring rules.

This device must be earthed.

Power connection (main power terminals):



Thermo Extra 28-40kW



Thermo Extra 44-96kW



Connection way to the main power terminal may be vary depending on elements installed inside the boiler.



Note:

The power cable of the intersection from Ø6 mm to Ø21 mm must be connected with the bottom of the boiler, with the help of a special introducer (located on the boiler).

All wires inside the electrical connection place must be tightened.

Pay attention when connecting the power cable so that the phase conductor is not mistakenly connected to the remote shunt release marked by "-KF11", to the right of the MCB.

4.7. Connecting temperature sensors or external electrical controls

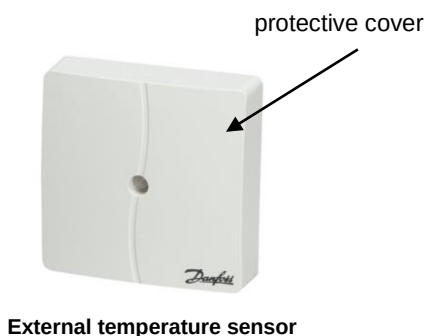
4.7.1. Accessing sensor terminals

To access sensor terminals, the **main and control power supply must be disconnected**. After the power supply is disconnected remove the front panel according to chapter 4.4.

4.7.2. Connecting external temperature sensor

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

Connector for outdoor temperature sensor has factory mounted resistor for testing boiler at -13°C. After installation and initial testing, the resistor must be removed and wires from external temperature sensor must be connected.



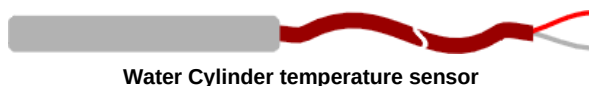
Note:

For connecting external temperature sensor two-wire cable can be used, of diameter from 0.6mm² to 1.5 mm².

See **controls section for wiring point into the control system**.

4.7.3. Connecting domestic hot water temperature sensor

The domestic hot water temperature sensor (**an optional extra**) must be fitted in such manner that correct reading of the cylinder temperature is ensured. The water cylinder usually has a location provided for inserting a temperature sensor. If this is not the case temperature sensor must have contact with metal part of the cylinder (under the insulation).



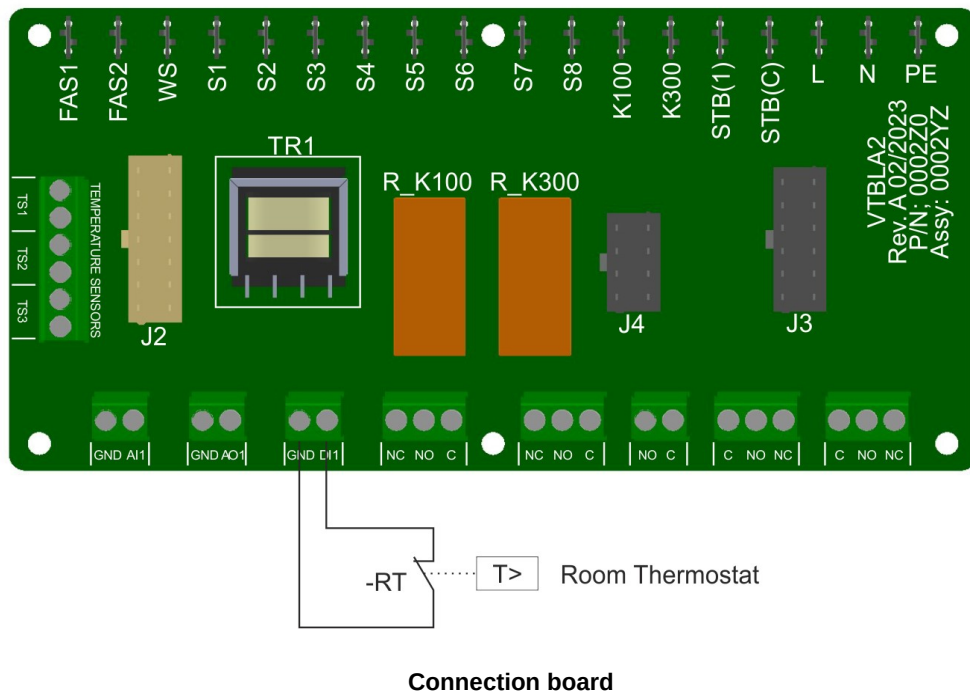
Note:

For connecting water cylinder temperature sensor, two-wire cable of diameter from 0.6mm² to 0.75 mm² can be used

See **controls section for wiring point into the control system**.

4.7.4. Connecting a room thermostat and / or time switch

The terminals GND and DI1 on the control board are used for connecting a room thermostat or time switch. Please note any thermostat or time switch **must be voltage free - i.e a voltage free contact**



Note:

For more details see selected appendix from chapter 3.3.

4.8. Filling the heating system

For the heating system to operate properly the indicator of manometer must be between 1.2 and 1.5 bar when the system is cold. It is very important to use soft water or fluids for central heating.

5. Commissioning

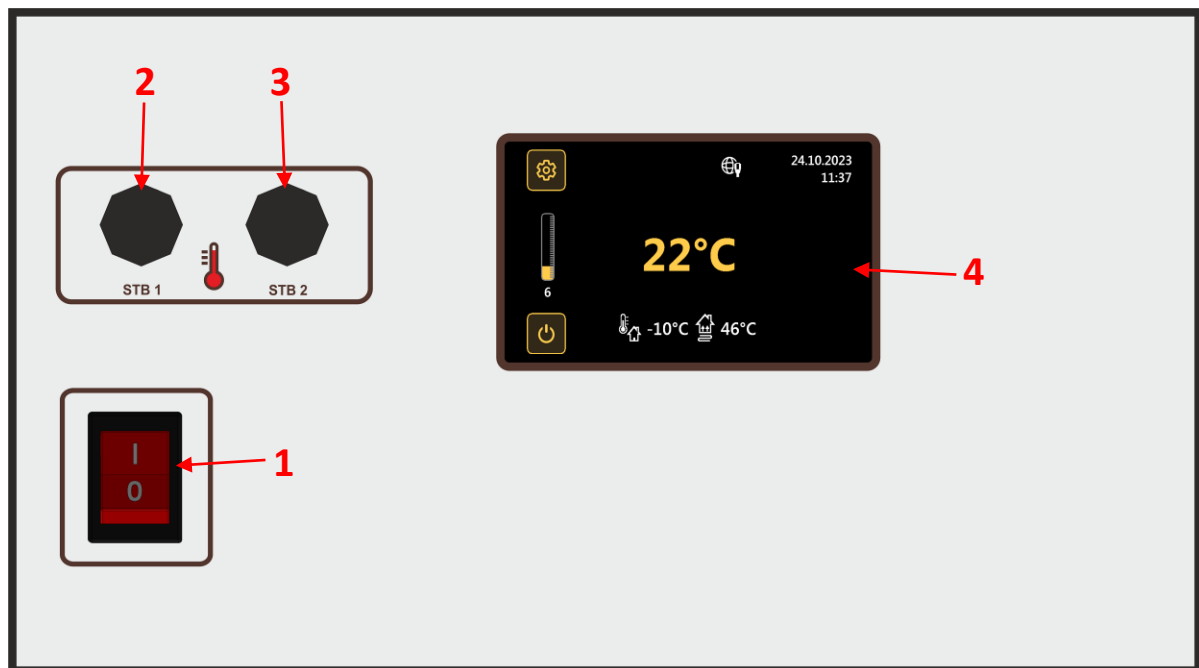
5.1. Central heating system check

Check for pressure in the system, it should be from 1.2 to 1.5 bar when the system is cold. Vent all heating elements and installation.

5.2. Preliminary electrical check

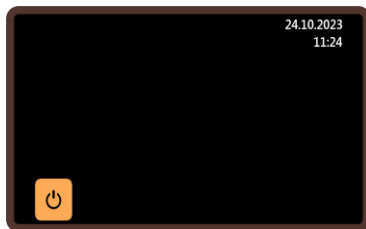
- Check if power cable is tightened on terminals.
- Check the presence of each phase on MCB input terminals inside boiler.
- Measure exact voltage between L1 – L2, L1 – L3, L2 – L3, L1 –N. If there is no voltage between any combinations of phases one phase is missing and the heating elements inside the appliance can be damaged. If the voltage between phases is 10% higher than nominal voltage of the appliance, the appliance itself can be damaged.
- Check if fixed wiring system is used and that overcurrent protection device is installed and conform to chapter 2.3. or 2.4.
- Check if the used power cable conforms to chapter 2.3 or 2.4.
- Test the overheating system as described in appendix 9.

5.3 Control panel – option "X"



Mark	Description
1	Control panel power switch
2	Cutout thermostat with manual deactivation (1)
3	Cutout thermostat with manual deactivation (2)
4	Touch screen

5.1.1. Control panel display



Control panel in stand-by mode

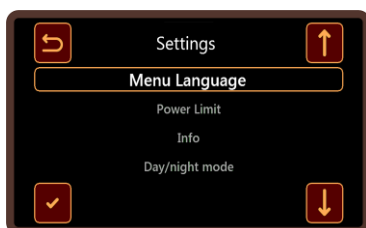


Operating panel

1.2. Entering and navigating through the user menu



Touch icon  to enter the user menu.



Touch icons  or  for moving through the menu and changing values.

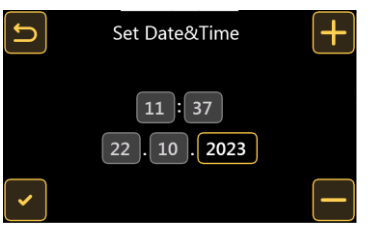
Touch the desired option or symbol  to select and confirm the value.

Touch the symbol  to leave the option without making any changes or to leave the menu itself.

5.1.2. User menu options

Menu language	Language selection for menus and messages
Power limit	Limiting the maximum number of stages
Info	Display of information about the device itself and the operation of individual groups of heaters and the energy used
Day/night mode	Enabling/disabling operation in day and night mode
Night temperature (displayed only if Day/Night operation is active)	Setting the night mode temperature
Beginning of night work (displayed only if Day/Night operation is active)	Setting the start time of the night mode
End of night work (displayed only if Day/Night operation is active)	Setting the end time of the night mode
Network settings	Settings for connecting the boiler to the network
Service menu	Example of changing the date and time

5.1.4. Example of changing the date and time

 The image shows a main screen with a dark background. At the top right, the date '24.10.2023' and time '11:37' are displayed. A hand icon is pointing at the time. On the left, there is a vertical temperature scale with '22°C' in the center. Below it, a power button icon is visible. At the bottom, there are two temperature readings: '-10°C' and '46°C'.	Tap on the date and time screen to open the settings. REMARK: The time and date are automatically updated over the network!!
 The image shows a 'Set Date&Time' screen. It has a dark background with a title bar at the top containing a back arrow on the left and a plus sign on the right. The screen displays the time '11:37' and the date '22.10.2023'. There are four buttons: a checkmark at the bottom left, a minus sign at the bottom right, and a plus sign at the top right. A hand icon is pointing at the date field.	Touch the field you want to change the value of, then after the marked field frame, by touching the symbol  or  set the desired value. Touch the symbol  to confirm and save the change or touch  for recall.

5.1.5. Selecting the desired boiler temperature

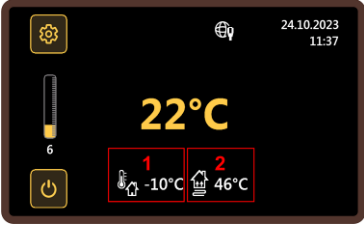
The function is not available when the outdoor sensor is active.

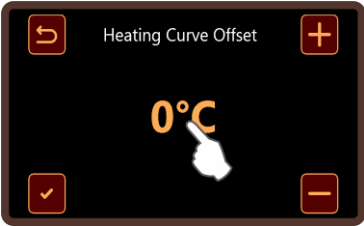
 The image shows a main screen with a dark background. At the top right, the date '24.10.2023' and time '11:37' are displayed. On the left, there is a vertical temperature scale with '22°C' in the center. Below it, a power button icon is visible. At the bottom, there is a boiler temperature reading '60°C' with a hand icon pointing at it.	Display of the desired boiler temperature
 The image shows a main screen with a dark background. At the top right, the date '24.10.2023' and time '11:37' are displayed. On the left, there is a vertical temperature scale with '22°C' in the center. Below it, a power button icon is visible. At the bottom, there is a boiler temperature reading '60°C' with a hand icon pointing at it.	Touch the display of the desired temperature on the screen to open the adjustment menu.
 The image shows a 'CH Desired Temperature' screen. It has a dark background with a title bar at the top containing a back arrow on the left and a plus sign on the right. The screen displays the temperature '60°C'. There are four buttons: a checkmark at the bottom left, a minus sign at the bottom right, and a plus sign at the top right. A hand icon is pointing at the temperature field.	Touch the symbol  or  to set the desired value and touch to confirm and save the change or touch  for recall.

	It is also possible to adjust the desired value using the dial. To access the dial, touch the displayed temperature on the screen.
	Tap to enter the desired value, then tap the symbol on the screen  to confirm and save the change or touch  for recall.

5.1.6. Offsetting heating curve

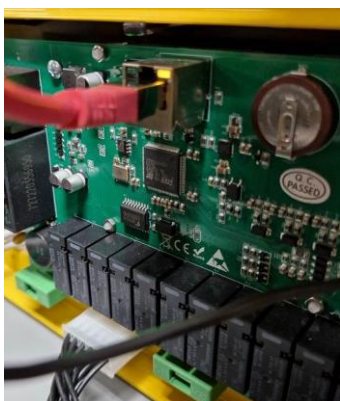
The function is available only when the outdoor sensor is active.

	Boiler in operation with outdoor temperature sensor 1. Outdoor temperature display 2. Display of the required temperature determined by the temperature curve
	Touch the display of the external temperature on the screen to open the menu for adjusting the offset of the temperature curve.
	By touching symbols  or  set the desired value and touch the symbol  to confirm and save the change or touch  for recall.

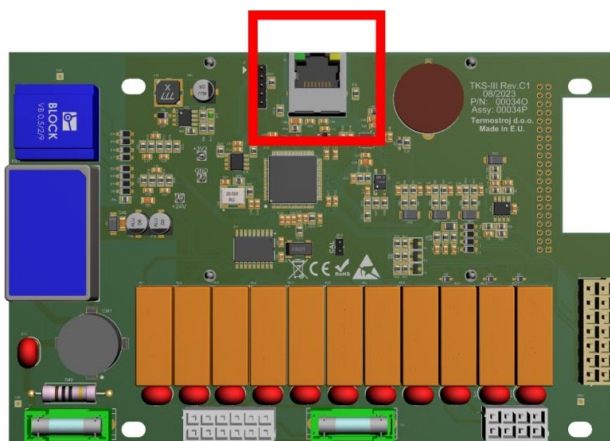
	It is also possible to adjust the desired value using the dial. To access the dial, touch the displayed temperature on the screen.
	Tap to enter the desired value, then tap the symbol on the screen  to confirm and save the change or touch  for recall.

5.1.7. Connecting the control panel to the network

The RJ45 connector on the back of the control panel is used to connect the boiler to the network.



Picture 1 Connecting to network

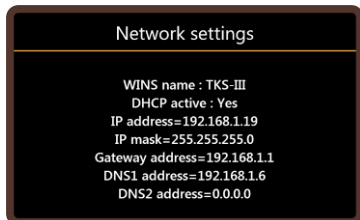


Picture 2 RJ45 connector position

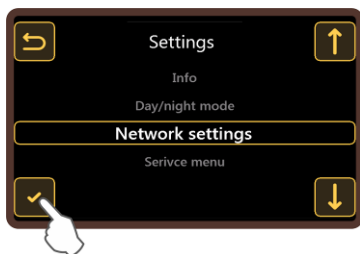


Control panel connected to the network.

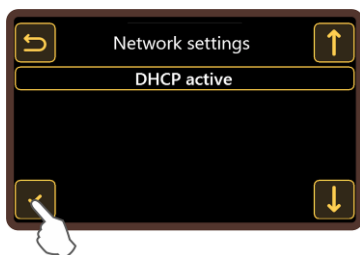
To display the network settings, touch the marked icon on the screen.



Network settings view.



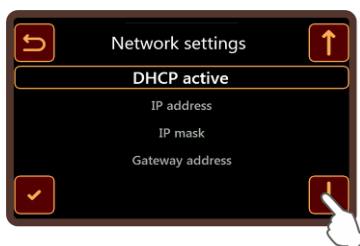
To adjust the network parameters, it is necessary to select the "Network settings" option in the user menu.



If DHCP is active, it must be deactivated to adjust the parameters.



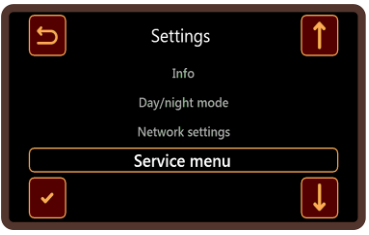
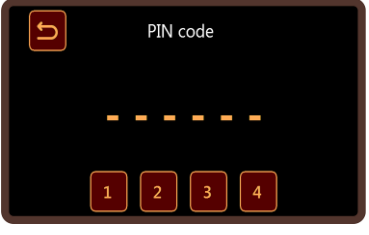
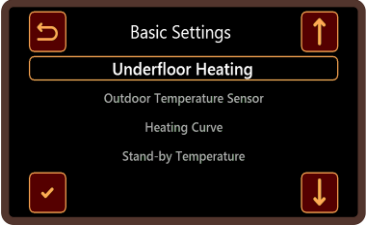
DHCP activation/deactivation.



Use the drop-down menu to select the desired parameter for adjustment.

- IP address
- IP mask
- Gateway address
- DNS1 address
- DNS2 address

5.1.8. Entering and moving through the service menu

	To access the service menu, select the "Service menu" option in the user menu
	Enter the PIN to access the service menu. PIN code: 334112
	Touch icons  or  for moving through the menu and changing values. Touch the desired option or symbol  to select and confirm the value. Touch the symbol  to leave the option without making any changes or to leave the menu itself.

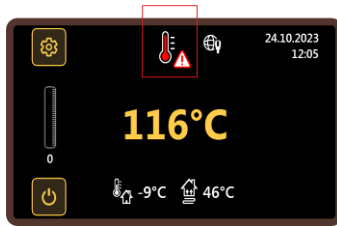
5.1.9. Service menu options

Option	Description
Underfloor heating	Switching the underfloor heating option on or off. Turning this function on or off will reset the selection of the correction curve, minimum and maximum temperature to factory settings.
Outdoor temperature sensor	Enable or disable the use of an external temperature sensor. When the outdoor temperature sensor is on, the boiler temperature will be guided according to the heating correction curves.
Heating curve	Selection of the heating correction curve for underfloor or radiator heating.

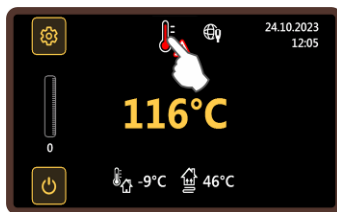
(displayed only if the outdoor temperature sensor is active)	Factory value: - Radiator heating: 1.5 - Floor heating: 0.6
Stand-by temperature	The minimum temperature that will be maintained in the boiler when in standby mode. Factory value: 15 °C
Minimum boiler temperature	Limitation of the minimum boiler temperature that can be selected. Factory setting value: - Radiator heating: 40 °C - Floor heating: 15 °C
Maximum boiler temperature	Limitation of the maximum boiler temperature that can be selected. Factory setting value: - Radiator heating: 80 °C - Floor heating: 40 °C
Counter reset	Resetting the operation counter of all groups of heaters. Work counters are located in the User menu -> Information
Power step on delay	Time delay between activation of power levels in seconds.
Cascade	Boiler operation in which it is signaled when the boiler is working at maximum power and gives a signal to the next boiler connected in the cascade to start.
Control mode	Control mode choice: - Manual (local) - Remote – by temperature - Remote – by power - MODBUS
Current limit	Maximum boiler current limitation (0 – 500 A)
Factory settings	Boiler factory defaults

5.1.10. Signaling and display of errors in operation

Error example "Overheating"



If the boiler overheats, the overheating symbol will flash at the top of the screen.

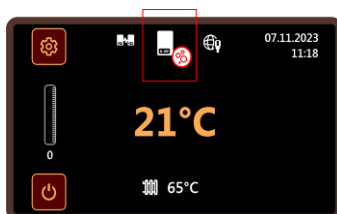


Tapping on the error symbol will open a message with a more detailed description of the error.

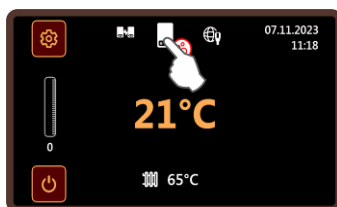


A message with a description of the error.

Error example "Air in boiler"



If there is air in the boiler during operation, the symbol for air in the boiler will flash at the top of the screen.

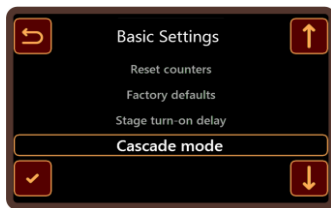


Tapping on the error symbol will open a message with a more detailed description of the error.



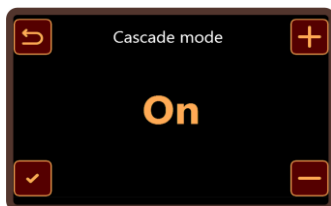
A message with a description of the error.

5.1.11. Cascade mode



Cascade mode must be enabled in the service menu, section:

"Cascade mode"

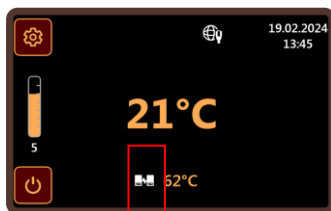


Cascade mode must be enabled on all slave boilers that are connected to the cascade!!!

Do not turn on **Cascade mode on the primary (master) boiler.**

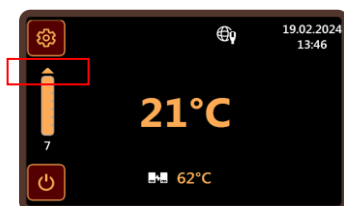
In cascade mode, the input and output signal symbols of cascade operation are shown on the screen.

The operation input is given to the primary (master) boiler through a voltage-free contact, and to the slave boilers also in the same way, but the slave boilers must be connected to the panel of the primary (master) boiler, that is, to the previous slave boiler as described in chapter 2.7.



The boiler is working in cascade mode.

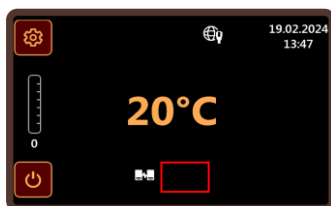
The cascading icon is displayed.



The boiler is operating at maximum power in cascade operation.

The maximum power signal is active.

The symbol shows that the maximum power signal is active.



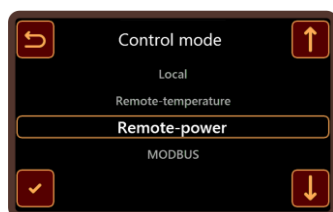
There is no display of the requested temperature at the bottom of the screen.

The boiler in cascade operation is waiting for an order to operate from an external device if it is the primary (master) boiler, or it is waiting for an order from the primary (master) or previous boiler if it is a slave boiler.

If boilers in cascade operation are controlled by means of an external temperature sensor or by means of analogue input signals 0-10 V, external control is performed only on the primary (master) boiler, all slaves must be set to "Local" control mode, and the external temperature sensor must be switched off. **External control will be disabled automatically on all slave boilers if cascade mode is activated.**

It is recommended that the desired temperature be set to the maximum possible on all slave boilers in order to avoid power modulation of individual slave boilers.

5.1.12 Remote control via 0-10 Volt



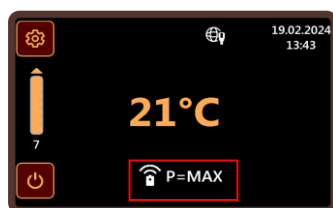
Select the desired control mode from the service menu, section:

“Control mode”

Remote power control



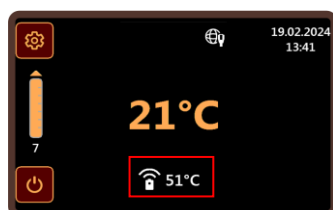
If remote power control is selected as the control mode, the remote control symbol and information about the active number of steps depending on the value of the input signal AI1 will be displayed at the bottom of the screen.



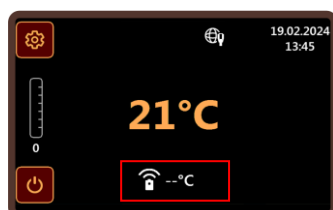
If the maximum power signal is activated by input signal AI1, the same will be displayed as in the photo.

The maximum power signal is used if there is a need for cascade mode of operation.

Remote temperature control



If remote temperature control is selected as the control method, the remote control symbol and information about the set temperature of the boiler will be displayed at the bottom of the screen depending on the value of the input signal AI1.

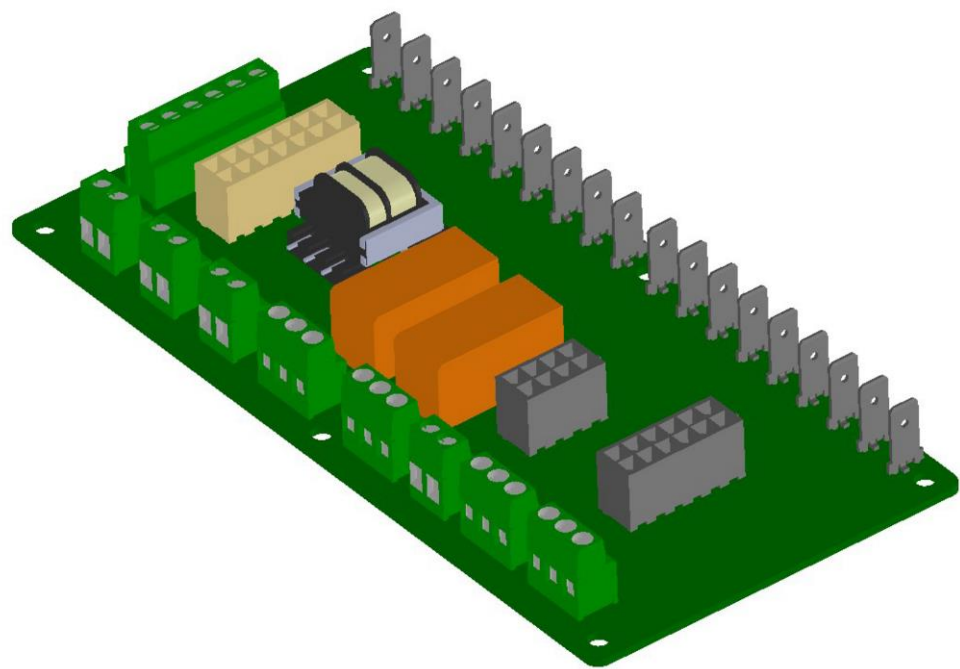


If the value of the input signal AI1 is equal to 0 V, the operation of the boiler will stop.

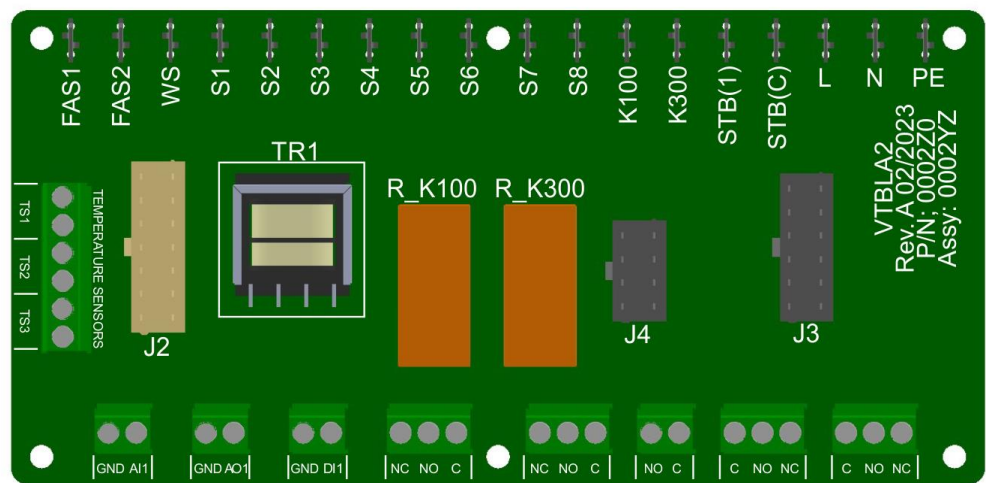
At the bottom of the screen a symbol will be displayed as in the photo

5.2 Connecting module

5.2.1. Connecting module layout



Picture 3 Connecting module

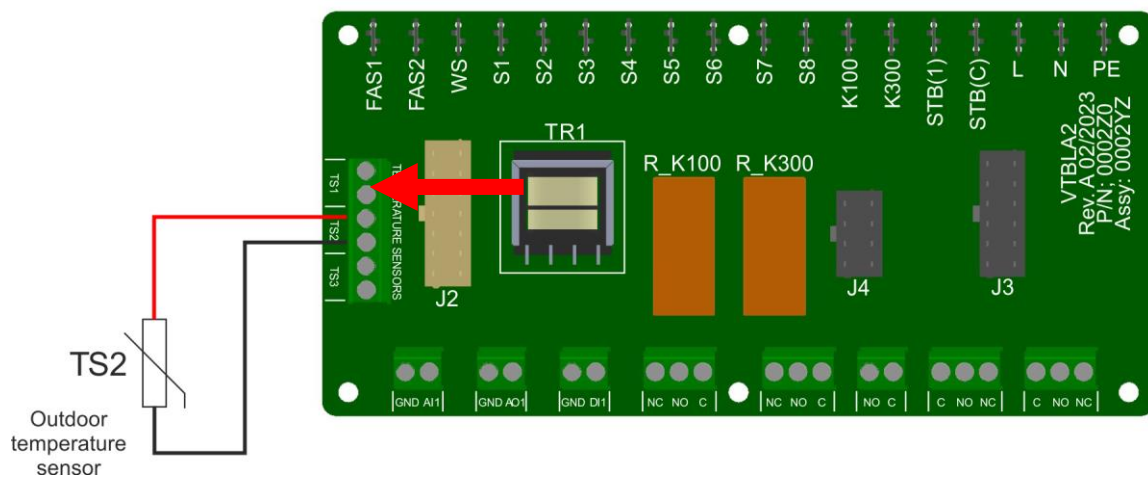


Picture 4 Connecting module – pin layout

5.2.2 Outdoor temperature sensor connection

The outdoor temperature sensor is connected to the screw terminals marked "TS2" on the connection module.

The terminals of the outdoor sensor and the connection method are shown in the picture below:

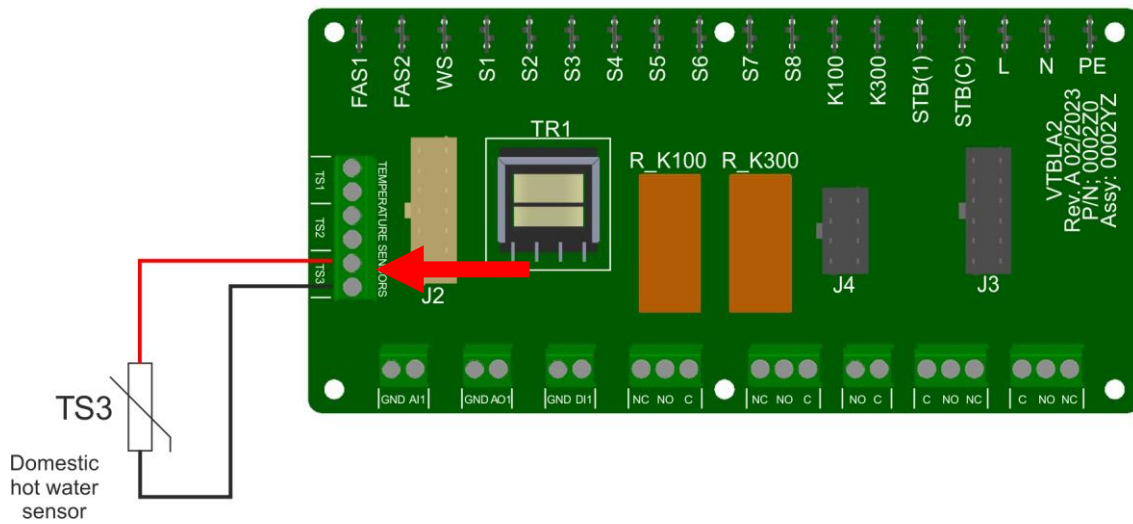


Picture 5 Connecting the external temperature sensor.

5.2. Connecting the sensor for DHW tank

The sensor for DHW tank is connected to the screw terminals marked "TS3" on the connection plate.

The sensor terminals for DHW tank and the connection method are shown in the picture below:



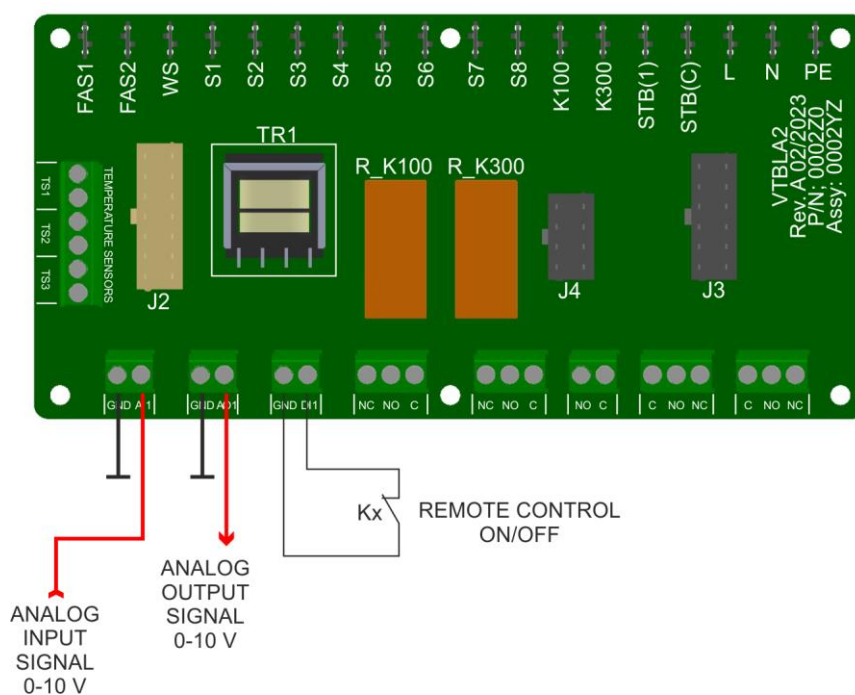
Picture 6 Connecting the sensor for DHW

5.2.4 Connection of signals for remote control via analogue inputs

In the case of remote control via analogue signals 0-10 V, the following terminals are connected to the connection module:

- a) AI1 – analogue input
(depending on the settings, it is possible to manage the desired temperature of the boiler or the desired active power)
- b) AO1 – analogue output
(depending on the settings, the control panel on pin "AO1" generates a voltage as information about the current temperature of the boiler)
- c) DI1 – digital input
(order to start/stop the boiler. A short circuit with the "GND" pin sends an order to the boiler to operate, while an interruption sends an order to the boiler to stop operation)

Remote control terminals are shown in the picture below:



Picture 7 Signals for external control

5.2.5 Contacts connection remote MCB shutdown

In case of overheating, when the temperature inside the boiler reaches a value of 110°C, the safety thermostats will activate the -K100 relay.

In order to prevent the destruction of the boiler, it is necessary to interrupt the main power supply of the boiler in such a way as to turn off the main protective device MCB of the same.

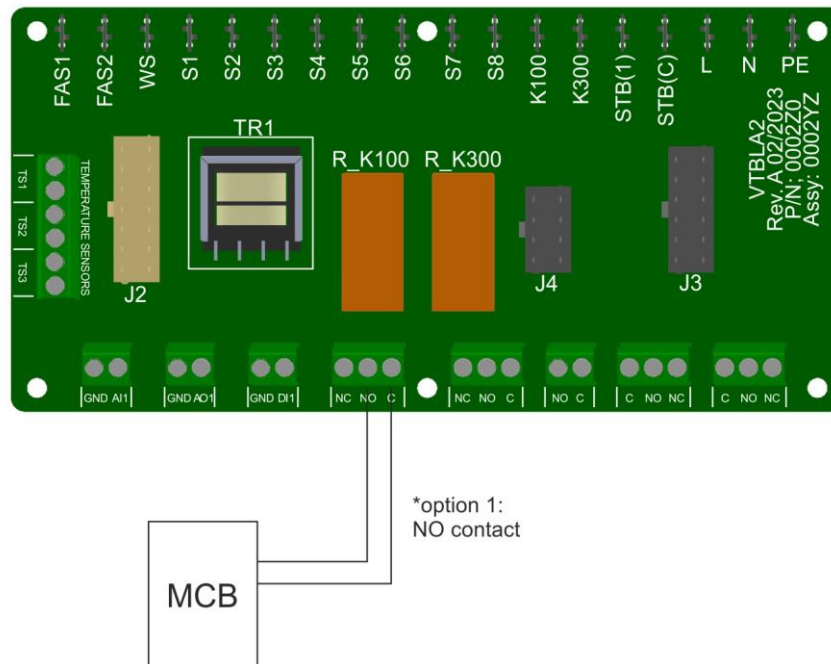
On the connection module, 1 C/O voltage-free contacts of the relay -K100 are made and depending on the MCB device of the main switch, it is possible to select NO or NC type of contacts for automatic shutdown of the main switch in case of emergency.

The contacts of the relay -K100 for turning off the main switch must necessarily be connected to the switch-off device, otherwise the warranty on the boiler cannot be verified.

The following images show both options for connecting the contacts for automatic emergency shutdown.

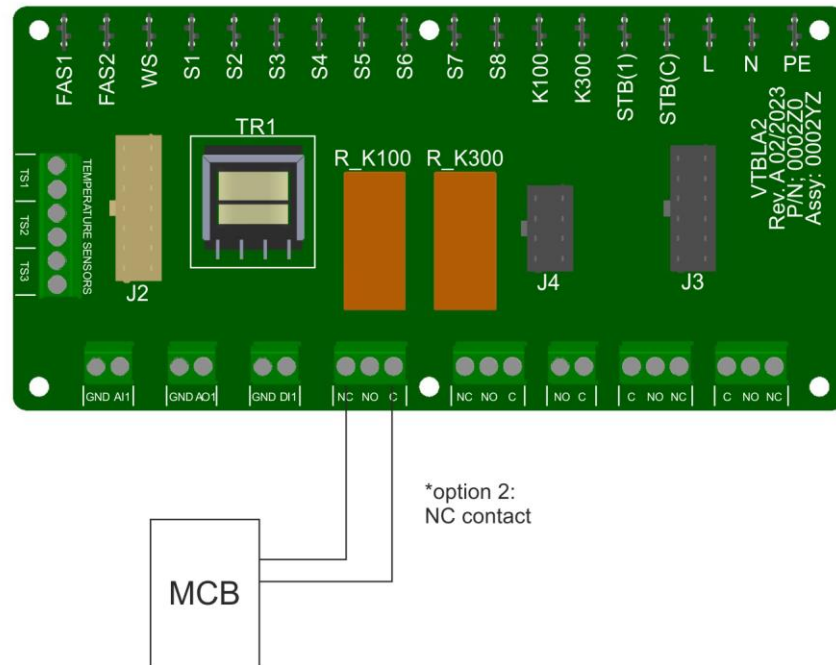
Option 1:

NO contacts for automatic shutdown in case of emergency



Picture 8 Option 1 - NO

NC contacts for automatic shutdown in case of emergency



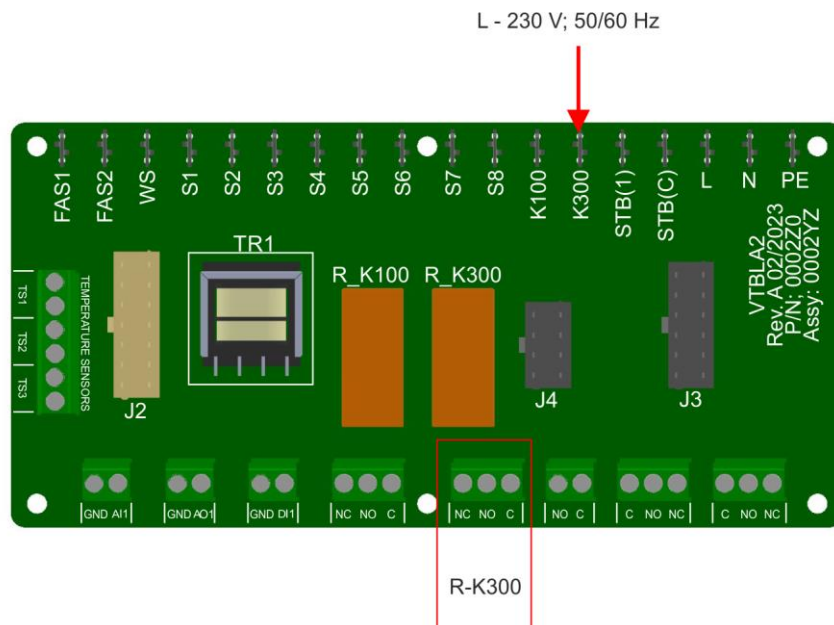
Picture 9 Option 2 – NC

5.2.6 Connecting pressure switches or other protective devices

On the connection module there is a relay -K300 with 1 C/O contact outputs, to which the user is free to connect a pressure switch or any similar protection/signaling device.

The relay is activated by connecting the signal conductor of the device (230 V; 50/60 Hz) to the faston output, which will activate the relay at the moment of action. Also, on the connection module there are outputs of the relay contacts, and they are used in a similar way as in the case of the -K100 relay.

The figure below shows the faston outlet and the contacts of the relay -K300.

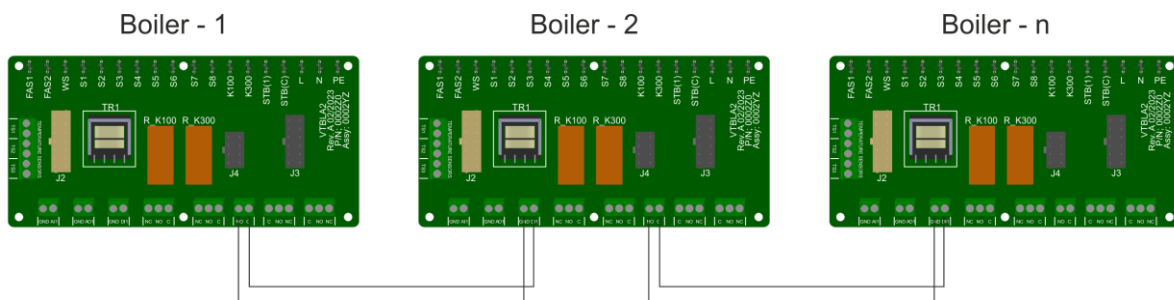


Picture 10 Connecting relay -K300

5.2.7. Maximum power signal

If the boiler reaches the maximum level of power, a signal will be activated on the connection module and it is used to give an order to start operation to the next boiler with which it is connected in cascade.

The maximum power signal and boiler connections in a cascade are shown in the picture below:

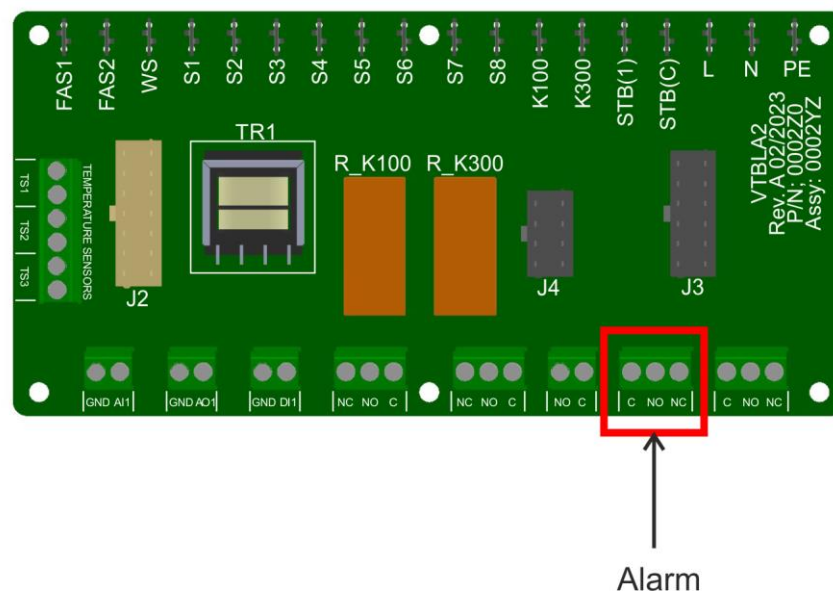


Picture 11 Cascade mode connection

5.2.8. Alarm

In case of any boiler malfunction, the control panel will deactivate the alarm relay, which is constantly activated during normal operation. The voltage-free 1 C/0 contacts of the same are available to the user on the connection plate.

The alarm relay contacts are shown in the picture below:



Picture 12 Alarm relay contacts

5.5. Service menu options

Option	Description	Availability
Underfloor heating	Switch off or on underfloor heating. Switching underfloor heating on or off will reset Heating Curve, heating minimal and maximal temperature to factory defaults. Default: Off	X control panel
Outdoor Temperature Sensor	Switch on or off use of external temperature sensor. When on Heating Curves will be used to calculate boiler temperature. Default: On	X control panel
Heating Curve	Select heating curve for underfloor or radiator heating. Default for radiator heating: 1.5 Default for underfloor heating: 0.6	X control panel
CH Pump Overtime	Set time in seconds central heating pump will run after room temperature has been reached. Default: 60 seconds	X control panel
DHW Pump Overtime	Set time in seconds, domestic hot water pump will run after temperature in cylinder has been reached. Default: 60 seconds	X control panel
Stand-by Temperature	Minimal temperature that will be maintained inside boiler when in standby. Default: 15 °C	X control panel
CH Minimal Temperature	Limit minimal temperature in boiler that can be calculated by heating curves. Default for radiator heating: 40 °C Default for underfloor heating: 15 °C	X control panel
CH Maximum Temperature	Limit maximum temperature in boiler that can be calculated by heating curves. Default for radiator heating: 80 °C Default for underfloor heating: 40 °C	X control panel
Stage turn-on delay	Time delay between power steps activation.	X control panel
Set Date Time	Set time and date	X control panel
Manual Pump Run	Using this option pump controlled by boiler can be started manually. During manual pump run heaters are switched off. This option is useful for manual venting of heating system.	X control panel

Reset Counters	Reset counters for heating groups. Counter information is displayed in <i>User Menu -> Info</i>	X control panel
Reset service interval. (<i>Service Menu -> Reset Counters -> Reset serv.interval</i>)	Reset service interval to factory defaults. Default: - 12 months (home used boilers) - 6 months (industrial used boilers)	X control panel
Apply Factory Settings	- Reset control panel to factory settings	X control panel
Cascade mode	Without central heating pump. Maximum power signal.	X control panel
Control mode	Desired temperature or power remote control by using 10V analog inputs.	X control panel

6. 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 fan or lighter to over 110°C must actuate overheating protection by switching off the main MCB or disconnection switch inside the boiler.

The 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 period, there is a danger of the 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.

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).

7. Survey of possible malfunctions and irregularities in operation

7.1. General list

MALFUNCTION	CAUSE	ELIMINATION
- there is no voltage on the control panel at switching on	- there is no power supply from the power net on one or more phases. - fuse 100mA on the control panel is burned through. - there is no control power	- replace fuse 100mA and check the cause of the blown fuse on your electrical supply. -
- By switching on, the switches on the control panel display the voltage, but the boiler does not heat	- check the adjustment of the room thermostat, - limiting thermostat is activated. - indicator of air presence in the boiler blocked the operation, - defective switch, - heaters are burned through	- check the set temperature on the room thermostat, replace batteries, or the room thermostat is faulty, - vent the boiler to turn off the error "air in boiler" alert
- temperature in boiler is on desired value, but radiators do not heat	- circulation pump does not operate, - air stopper on central heating installation prevents circulation	- vent installation
- boiler does not provide enough heat.	- one phase is missing on the supply. - a part of heater is burned through. - in a three-phase system the three different phases are not brought to the boiler	- check fuses on the main panel, - contact authorized service personnel to resolve the problem
- the switcher can be heard while operating (it buzzes) radio and TV-interferences	- poor voltage in the net - defective relay	- contact authorized service personnel to resolve the problem
- boiler in operation "roars"	- the system is not well vented, - defective heater	- vent the system. - contact authorized service personnel to resolve problem
- pressure in the system varies.	- defective expansion vessel, - the vessel pressure is too low or too high	- Replace the expansion vessel
- the actual temperature in the boiler is higher than the desired temperature and the safety thermostat is activated	- defective relays	- contact authorized service personnel to resolve the exact source of the problem
- RCCB switch disconnects (in home fuse box)	- defective heater, - humidity on conductors, - safety thermostat is activated	- check leakage, - contact authorized service personnel to resolve the exact source of the problem

- MCB cannot be reset	- safety thermostat is activated	- pre-reset safety thermostat and then the MCB switch - contact authorized service personnel to resolve the exact source of the problem
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7.2. List of errors

MALFUNCTION	CAUSE	ELIMINATION
 Air in Boiler	Air is present inside the boiler's reservoir and heating is not active. Even if the boiler is equipped with automatic venting valve, manual venting is advisable if large amount of air is present inside reservoir. When boiler is properly vented the error will be automatically dismissed and boiler will continue with normal operation.	- vent installation. - contact authorized service personnel to resolve the problem
 Low Mains Voltage	Power supply voltage is below 175 V per phase. Then the Heating is not active in order to protect contactors / power relays. When power supply voltage raises above 185 V per phase error will be automatically dismissed and boiler will continue with normal operation.	- check power supply voltage. - contact authorized service personnel to resolve the problem
 Boiler Temperature Sensor open	The boiler's temperature sensor is not properly connected. When sensor is operational, error will be automatically dismissed, and boiler will continue with normal operation.	- check sensor wiring. - contact authorized service personnel to resolve the problem
 Boiler Temperature Sensor shorted	The boiler's temperature sensor is not properly connected, or a short circuit is present on sensor's wiring. When sensor is operational, error will be automatically dismissed, and boiler will continue with normal operation.	- check sensor wiring - contact authorized service personnel to resolve the problem
 Outdoor Temperature Sensor open	The outdoor temperature sensor is not properly connected. When sensor is operational, error will be automatically dismissed, and boiler will continue with normal operation.	- check sensor wiring - contact authorized service personnel to resolve the problem
 Outdoor Temperature Sensor shorted	The outdoor temperature sensor is not properly connected, or a short circuit is present on sensor's wiring. When sensor is operational, error will be automatically dismissed, and boiler will continue with normal operation.	- check sensor wiring - contact authorized service personnel to resolve the problem

 DHW Temperature Sensor open	Domestic hot water cylinder temperature sensor is not properly connected. Check sensor's wiring. When sensor is operational, error will be automatically dismissed, and boiler will continue with normal operation.	- check sensor wiring - contact authorized service personnel to resolve the problem
 DHW Temperature Sensor shorted	Domestic hot water cylinder temperature sensor is not properly connected, or a short circuit is present on sensor's wiring. Check sensor's wiring. When the sensor is operational, error will be automatically dismissed and boiler will continue with normal operation.	- check sensor wiring - contact authorized service personnel to resolve the problem
 Overheating	Safety thermostat is activated	- Wait until the temperature inside the boiler drops below at least 90°C, reset safety thermostat and switch on miniature circuit breaker –F11 inside the boiler. - ** for 44 to 96kW output it is the Q1- MCB
	Blinking of service symbol  indicates that time for service declared by manufacturer has expired.	- service the boiler. - reset service interval after performing the boiler service. - contact authorized service personnel

Possible malfunctions – graphic control panel



After resetting the thermal fuse, make sure the MCB or disconnection switch inside the boilers is switched on. The control and energy power circuits are separated and the boiler control can be active if energy part is disfunctioned.