FLEXIHEAT UK LTD
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ELECTRIC BOILERS FOR CENTRAL HEATING

Covers the following models

THERMO EXTRA 4.5KW - 24KW

ThermoBlok

ThermoBlok PTV

Please note

- This manual covers 3 types of boilers

Thermo Blok is a heating boiler with fitted circulation pump and system expansion vessel.

Thermo Extra is a heat only boiler - no circulation pump - no expansion vessel.

Thermo PTV - 2 pumps and expansion vessel (1 for space heating and 1 for water heating in separate cylinder)

Please look at the information relating to your specific boiler requirements

We reserve the right of alternations

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We reserve the right of alternations

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We reserve the right of alternations

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 boiler close the heat source (for instance, fireplace, wood stove etc…).
- Incompetent repairs can cause serious danger to users.
- Defective parts may be replaced only by the original or approved by the manufacturer,
- Switch off the main power supply before opening the boiler.
- Boiler has built-in frost protection. When the boiler is not in use, leave the main power active that protection stay active.

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:	**For the qualified technician:**
Instructions for use	Instructions for installation
Warranty card	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, Thermo Blok and Thermo Blok-PTV are economical central heating boilers that may be used as an independent or additional source of heat.
Thermo Extra, Thermo Blok and Thermo Blok-PTV boilers offer you a possibility to reduce the power of the heater if necessary. The power may be switched on automatically when necessary with built-in step regulator or manually with switches on the control board. In this way it is possible to adapt the boiler to the utmost to circumstances on the spot.
The boiler operates on a principle of rapid heating smaller water quantities, so that exploiting energy is already 100%.

They are particularly suitable for heating smaller business premise, where you are short of space (small apartments, efficiency apartments, representation offices, smaller coffee-shop spaces etc.) or for heating larger spaces in early season when the main boiler is over dimensioned.
Thermo Extra, Thermo Blok and Thermo Blok-PTV are manufactured with upper and bottom connections so costumer would be able to choose which of them will be used for system connection. Temperature operation area is from 20 °C to 90 °C.
The boilers are designed in such a way that in apartment-contained central heating they can fit well with your furniture.

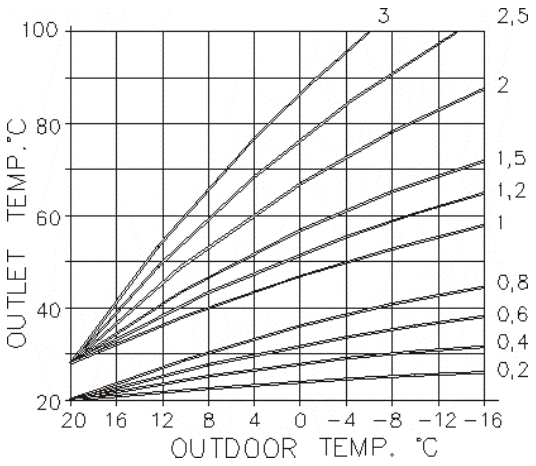
1.4. Heating curves

1.4.1. Availability of heating curves

Use of heating curves, temperature compensation, is limited to boilers with option **O** and **V** and Thermo Blok PTV boilers.

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.



Factory defined curves

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.

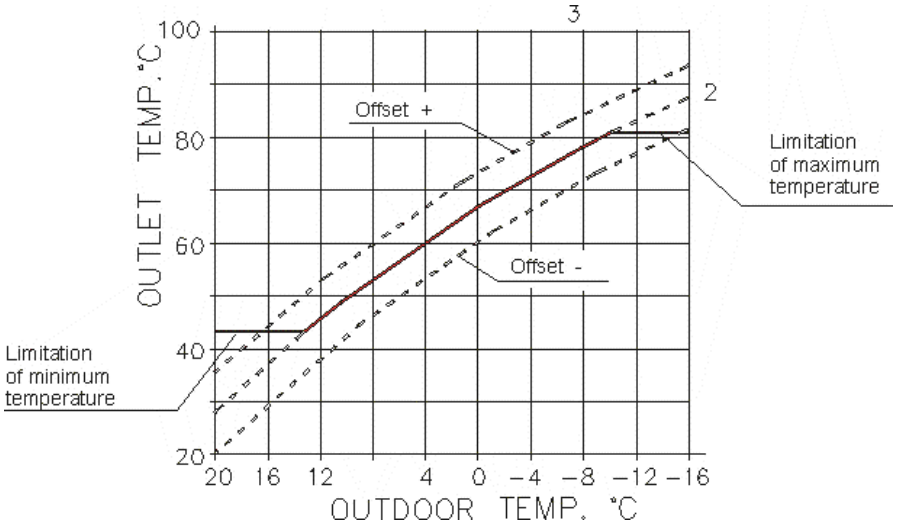
Experience has shown the following (for the average building quality):
when the temperature of water for heating changes from 5 to 7°C that will change the room temperature by approximately 2°C.

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
Factory settings	**1,5**	**0**
Room temperature is too low if the external temperature is **above + 5ºC**	Change with the first lower curve	Add with offset + 6ºC
Room temperature is too low if the external temperature is **between + 5ºC and - 5ºC**	Leave the curve 1,5	Add with offset + 3ºC
Room temperature is too low if the external temperature is **below - 5ºC**	Change with the first higher curve	Leave offset 0ºC
Room temperature is too high if the external temperature is **above + 5ºC**	Change with the first higher curve	Lower with offset - 6ºC
Room temperature is too high if the external temperature is **between + 5ºC - 5ºC**	Leave the curve 1,5	Lower with offset - 3ºC
Room temperature is too high if the external temperature is **below - 5ºC**	Change with the first lower curve	Leave offset 0ºC



Sample of modified curve

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 90ºC, and we suggest lowering it at approximately 80ºC. Limitation of the maximum temperature of water in the boiler is also used in central heating and domestic water preparation system, and because of that it is not advisable to lower that temperature too much because the domestic water will warm up slowly on higher temperatures.

1.5. Functionality of hot domestic water

1.5.1. Availability

It is possible to prepare hot water in separate water storage with heat exchanger by using Thermo Blok PTV boilers, or Thermo Extra boilers with optional **V control panel**.

1.5.2. Description

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

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

Circulation pump for domestic water conditioning supplies container 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 floor or radiators 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 (stand by).

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

Circulation pump for domestic water conditioning is switched on as late as the water temperature in 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 lasts for at least 30 min.

1.6. Frost protection

1.6.1. Avaliability

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

1.6.2. Domestic water

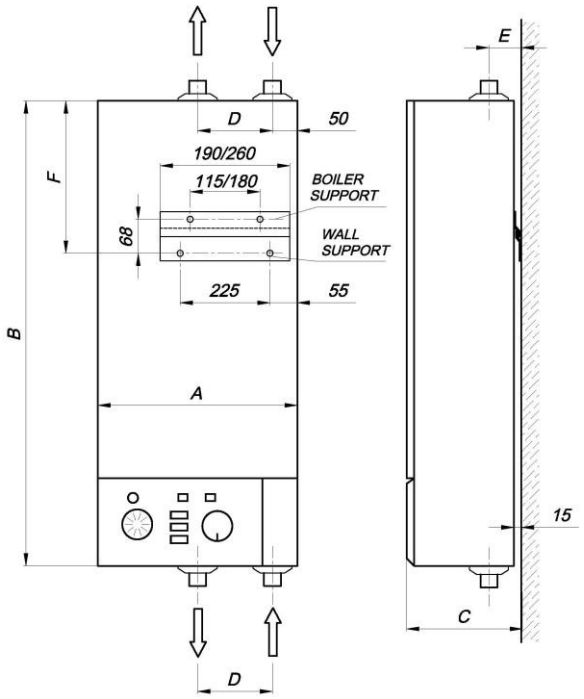
If the boiler is on for supply and only warm water conditioning is on or only heating or both, the protection from freezing of water in warm water container switches on automatically when the temperature sensor of warm water container reads the value below 7°C, signaling switching on by blinking display,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

1.6.3. Central heating

If the boiler is on for supply and heating or both (heating and warm water conditioning) are off, the protection from freezing 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 signaled by the blinking display, as well as by the LED diode of the heater and the boiler.
In this case, domestic water conditioning has priority.
In order for the freezing protection system of central heating to operate, the room thermostat should be in the position of freezing protection, too (otherwise, the circulation pump of central heating would not operate).

2. Boiler specifications

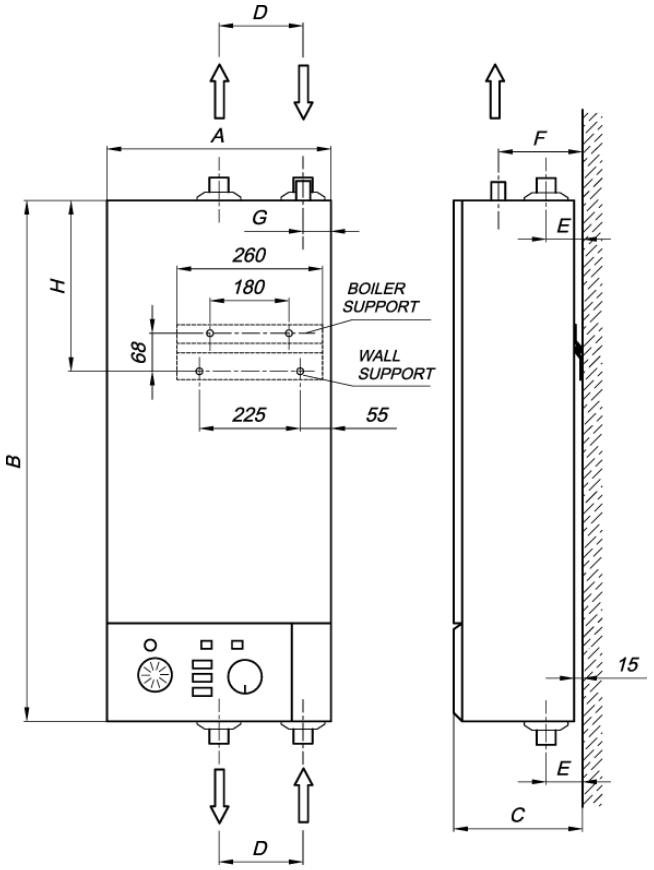
2.1 Dimensions *THERMO Blok*



TECHNICAL DATA FOR THERMO BLOK BOILERS

Power kW	Capacity Lit.	Expansion vessel L/bar	Dimensions mm	Weight kg	Maximum operating pressure MPa (bar)	Pipes BSP male	Power supply
4,5	6	8 / 0,8	A 330 B 930 C 290 D 100 E 65 F 320	40	Maximum is 3 Bar for the models up to the 24kW output Minimum working pressure is 0.8 Bar	3/4”	230 V ~ 50/60 Hz 400 V 3N ~ 50/60 Hz
6							
9							
12							400V 3N ~ 50/60 Hz
14							
16							
18	10	10 / 0,8	A 400 B 930 C 290 D 150 E 65 F 305	46		1”	
20							
22							
24							
28	22	12 / 0,8	A 474 B 930 C 290 D 226 E 65 F 305	53			
32							
36							
40							

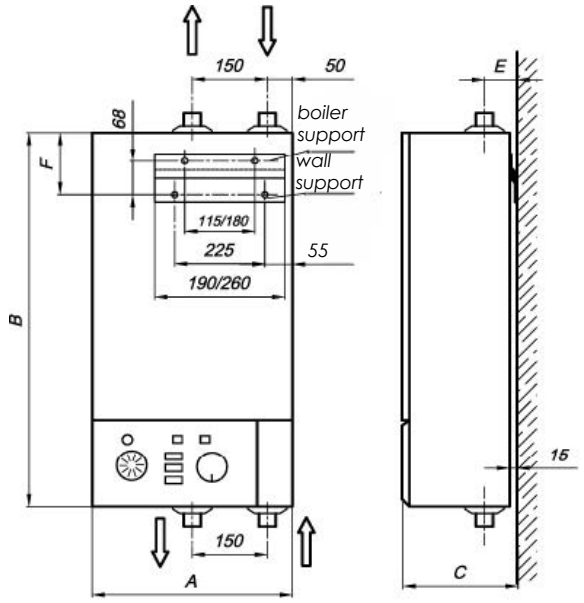
Thermo Blok PTV



TECHNICAL DATA FOR THERMO BLOK PTV BOILERS

Power kW	Capacity L.	Expansion vessel L/bar	Dimensions mm	Weight kg	Maximum operating pressure MPa (bar)	Pipes BSP male	Power supply
4,5	10	8 / 0,8	A 400 B 930 C 290 D 150 E 65 F 150 G 50 H 305	48	0.25 (2.5)	3/4” DHW cylinder 1” heating	230 V ~ 50/60 Hz 400 V 3N ~ 50/60 Hz
6							
9							
12							400V 3N ~ 50/60 Hz
15							
18		10 / 0,8					
22							
24							
28	22	12 / 0,8	A 480 B 930 C 290 D 226 E 65 F 150 G 50 H 305	55			
32							
36							
40							

Thermo Extra 4.5 – 24 kW

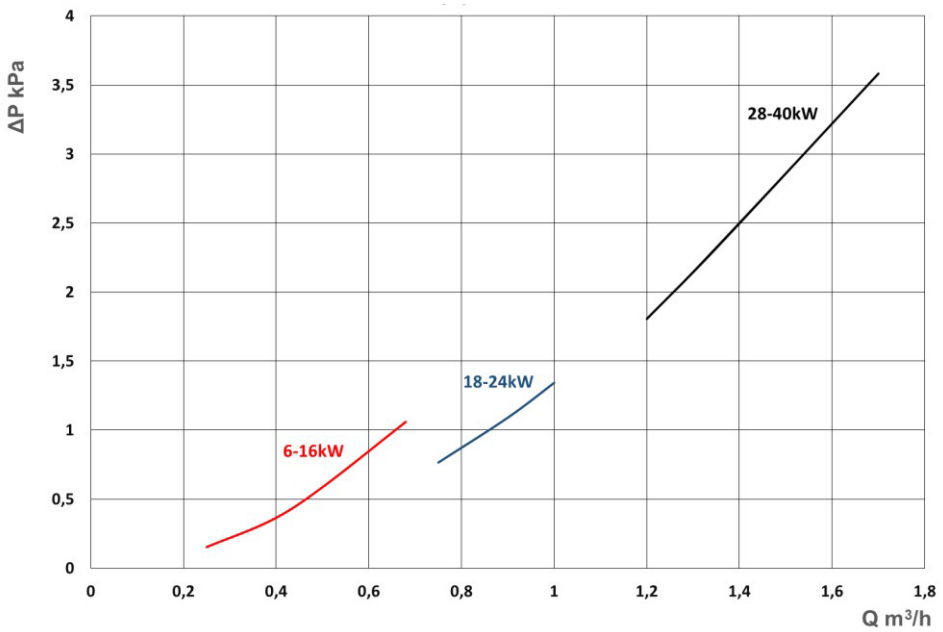


TECHNICAL DATA FOR THERMO EXTRA (4.5-24 kW) BOILERS

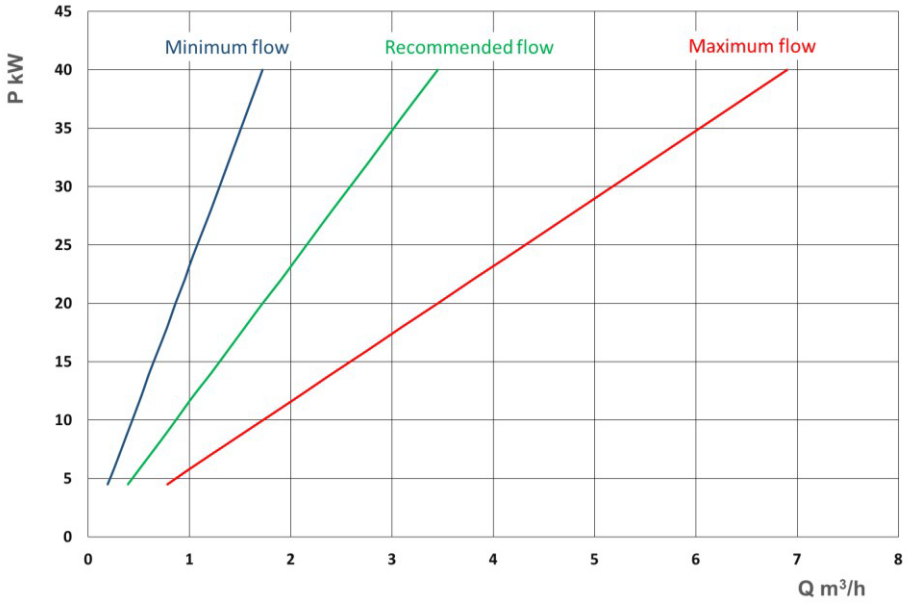
Power kW	Capacity Lit.	Dimensions mm	Weight kg	Maximum operating pressure MPa (bar)	Pipes BSP male	Power supply
4,5	6	A 330 B 750 C 230 D 100 E 57 F 126	26	0.25 (2.5)	3/4”	230 V ~ 50/60 Hz 400 V 3N ~ 50/60 Hz
6						
9						
12						400 V 3N ~ 50/60 Hz
14						
16						
18	10	A 400 B 750 C 230 D 150 E 57 F 126	32		1”	
22						
24						

2.2 Hydraulic pressure drop and recommended

flows 2.2.1 Pressure drop for the boilers



2.2.2 Recommended flows for the boilers up to 40kW



2.3 Expansion Vessel Characteristics (Thermo Blok and Thermo Blok PTV Boilers)

Volume of Expansion Vessel L	Maximum Expansion Vessel Pressure MPa (bar)	Filling Pressure MPa (bar)	Maximum Pressure In the Heating System MPa (bar)	Height Of the Central Heating System m	Effective Capacity Of Expansion Vessel L	Adsorption Capacity %	Maximum Amount of Water in the System L	Maximum Power of Boiler kW
6	0.4 (4)	0.08 (0.8)	0.3 (3)	10	3.0	50%	86	12
8					4.0		114	16
10					5.0		143	20
12					6.0		172	25

Values are related to working temperature range from 10°C to 90°C.

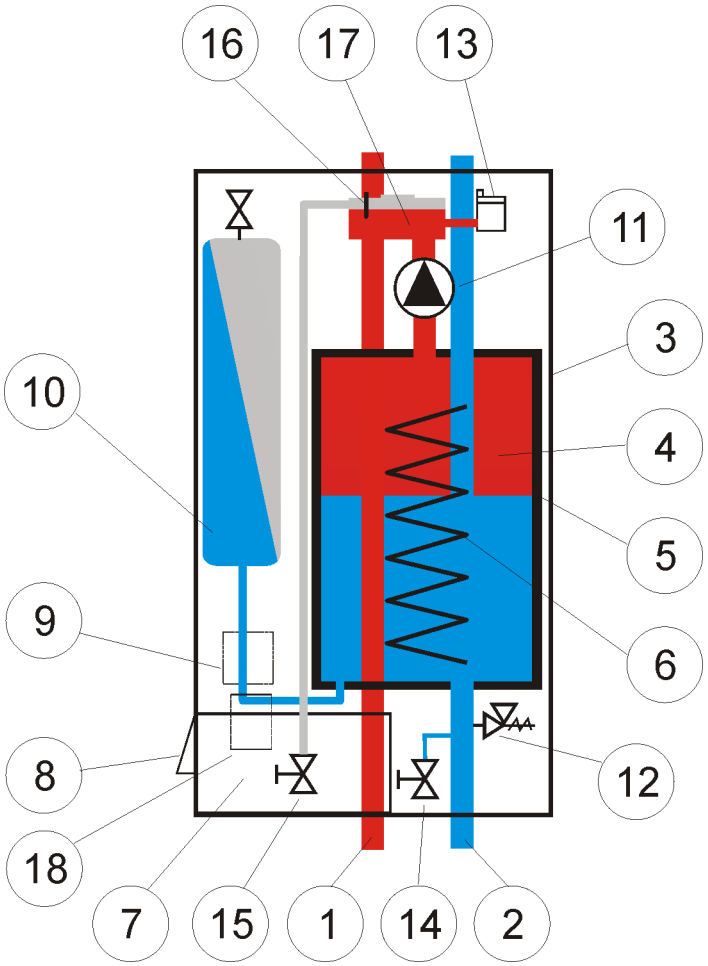
2.4. Power supply characteristics 230V/400V

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							
4,5 kW	6,50 A	10 A	10 kA	15 kA	5 x 2,5 mm²	B10-3p	0,03A
6 kW	8,70 A	10 A				B10-3p	
9 kW	13,04 A	16 A				B16-3p	
12 kW	17,39 A	25 A			5 x 4 mm²	B25-3p	
14 kW	20,29 A						
16 kW	23,19 A	32 A				B32-3p	
18 kW	26,09 A				5 x 6 mm²		
20 kW	28,99 A	40 A				B40-3p	
22 kW	31,88 A						
24 kW	34,78 A				5 x 10 mm²		
28 kW	40,58 A	50 A			5 x 10 mm²	B50-3p	
32 kW	46,38 A						
36 kW	52,17 A	63 A				B63-3p	
40 kW	57,97 A						
230V N ~ 50/60 Hz							
4,5 kW	19,2 A	25 A	10 kA	15 kA	3 x 4 mm²	B25-1p	0,03A
6 kW	26,1 A	32 A	10 kA	15 kA	3 x 6 mm²	B32-1p	
9 kW	39,2 A	50 A	10 kA	15 kA	3 x 10 mm²	B50-1p	

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

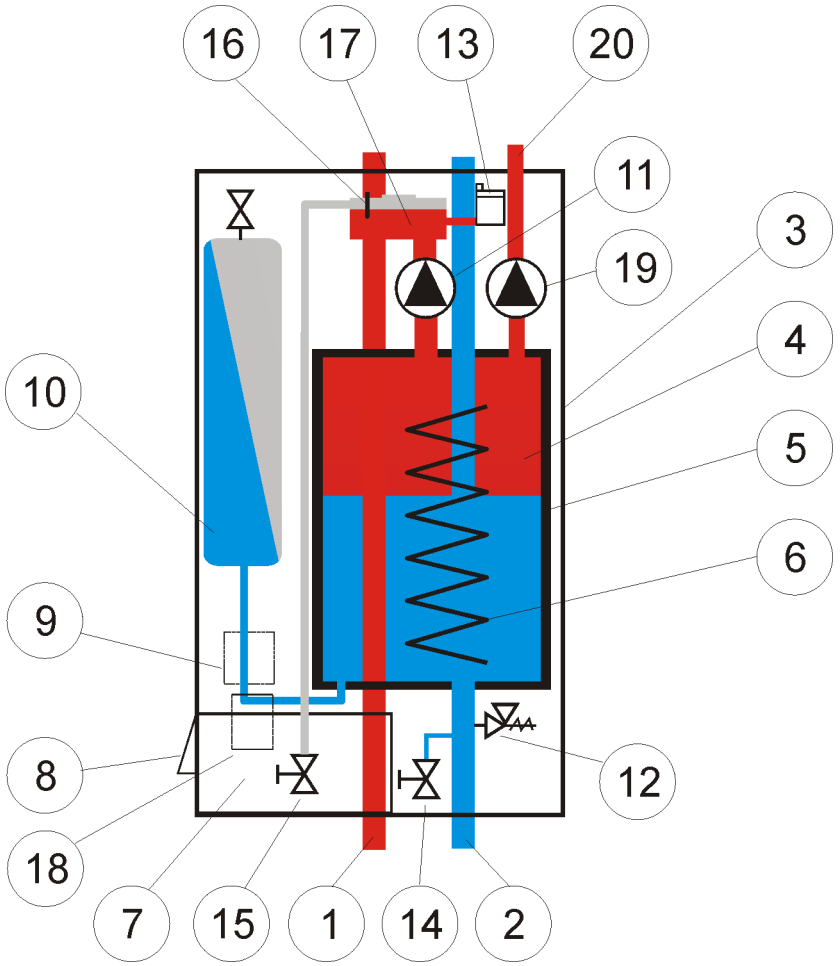
2.5. Function elements of Thermo boilers

Thermo Blok



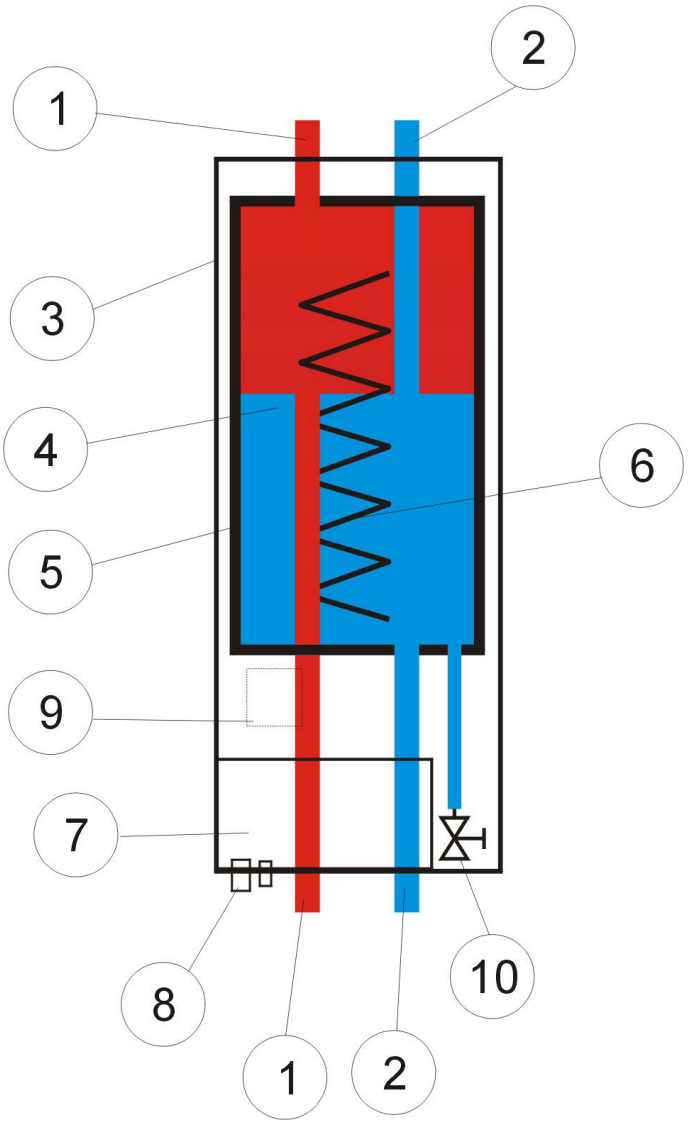
1. Primary flow
2. Return flow
3. External boiler jacket
4. Boiler
5. Heat insulation
6. Electrical heaters
7. Control panel
8. Inducers for el. connections
9. Contactors
10. Expansion vessel
11. Circulation pump
12. Safety valve on 2,5 bars
13. Automatic venting pot
14. Charge and discharge valve
15. Boiler venting valve
16. Air-indicator
17. Splitter
18. Miniature circuit breaker (MCB)

Thermo Blok PTV



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. Expansion vessel
11. Circulation pump
12. Safety valve on 2,5 bars
13. Automatic venting valve
14. Charge and discharge valve
15. Manual venting valve
16. Air-indicator
17. Splitter
18. Miniature circuit breaker (MCB)
19. Pump for domestic water cylinder
20. Primary flow for domestic water cylinder

Thermo Extra

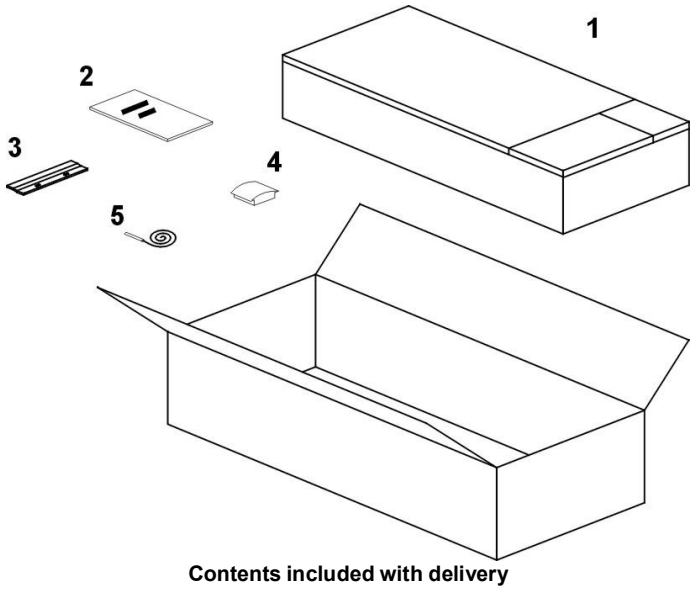


1. Primary flow
2. Return flow
3. External boiler jacket
4. Boiler
5. Heat insulation
6. Electrical heaters
7. Control panel
8. Inducers for el. connections
9. Contactors
14. Charge and discharge valve

3. General requirements

3.1 Contents included in delivery

Thermo Blok and Thermo Blok PTV 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.



Contents included with delivery

Item	Quantity	Description
1	1	Thermo Extra / Thermo Blok / Thermo Blok PTV boiler
2	1	Instructions for installation Instructions for use Electrical drawing Pump's manual (Thermo Blok and Thermo Blok-PTV)
3	1	Hanging bracket
4	1	External temperature sensor (optional)
5	1	Water cylinder temperature sensor (optional)

Table of contents included with delivery

Note:

Item 4 is only delivered for boilers with option O, V and Thermo Blok-PTV.
Item 5 is only delivered for boilers with option V and Thermo Blok PTV

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.

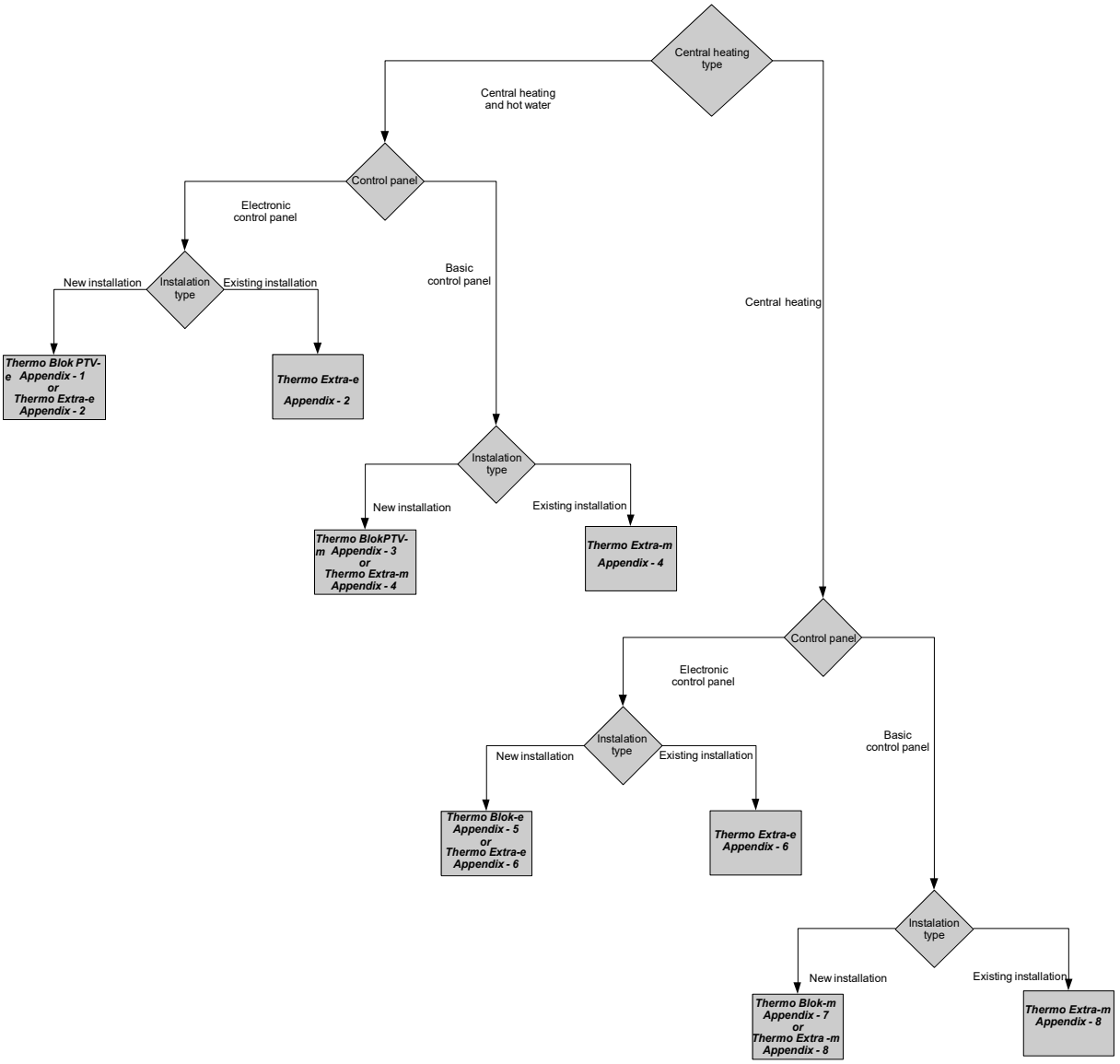
If a safety valve (0.25 MPa) 2.5 bar is not located in the existing installation, a safety valve must be installed.

If boiler is not connected to room thermostat or boiler is out of function during winter time, there is a danger of installation freeze. In this case the 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 central heating installation is 0.15 Mpa (1.5 bar), maximum pressure is 0.25 Mpa (2.5 bar) and minimum 0.08 Mpa (0.8 bar).

3.3. Recommendations for various installation types

Following flow chart is provided in order to help installers choosing the right type of boiler for desired installation type. At the end of each tree is the number of corresponding appendix. Each appendix consists of the following: the hydraulic drawing, a typical electrical drawing, the description of connection plate, the description of control panel, and the description of the complete central heating system.



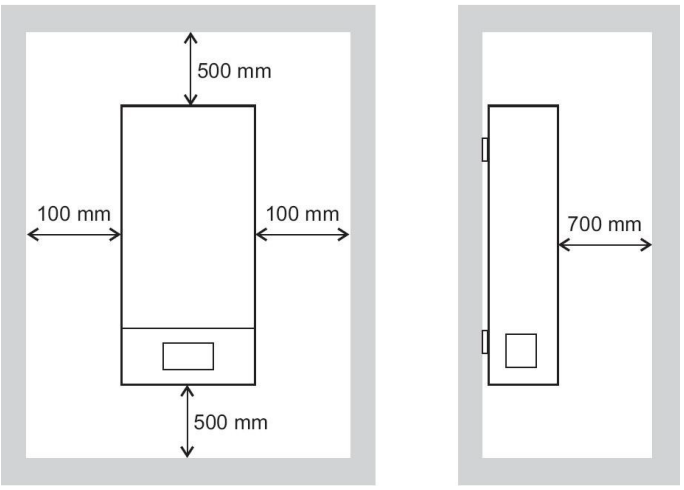
Note:
These installation samples should not be used as the detailed installation plan. Before installation observe the local regulations.

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, although particular attention is drawn to the local regulations in respect to the installation of a boiler in 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.

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 left bottom side of boilers must be accessible
- Bottom part of boiler must be accessible to allow change of heater
- Control panel on 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 fixing wiring the means for disconnection (MCB) must be incorporated in fixed wiring in accordance with the local wiring rules.



The home 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.

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

3.5. System requirements

3.5.1. 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.

3.5.2. 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.

3.5.3. 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 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.

3.5.4. Pressure relief valve

A pressure relief valve is provided with the boiler. This safety device is required on all sealed C.H. systems and is preset at 2,5 bar and provided with a 15 mm compression connection for a discharge pipe, which must be of no less than 15 mm in diameter. The pressure relief valve must not be used for draining purposes.

3.5.5. Pressure gauge

This is factory fitted to the boiler and indicates the primary circuit pressure to facilitate filling and testing.

3.5.6. Expansion vessel

Thermo Blok and Thermo Blok PTV boilers incorporate an expansion vessel. Refer to chapter **2.1** for more information about incorporated expansion vessel.

If the nominal capacity of the built in expansion vessel is not sufficient for the heating system (for instance in the case of modernization of old open systems) an additional expansion vessel can be installed externally to the boiler. It should be fitted in the return pipe as close as possible to the boiler.

3.5.7. Circulating pump

Circulation pump is included in Thermo Blok and Thermo Blok PTV boilers.

3.5.8. Venting

The boiler is fitted with an automatic and manual air vent. Additionally boiler is fitted with the air detector that will stop boiler in the case of air presence.

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 load as close to body as possible. Do not twist – reposition your feet. If 2 persons 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 good grip to protect against sharp edges and ensure 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.

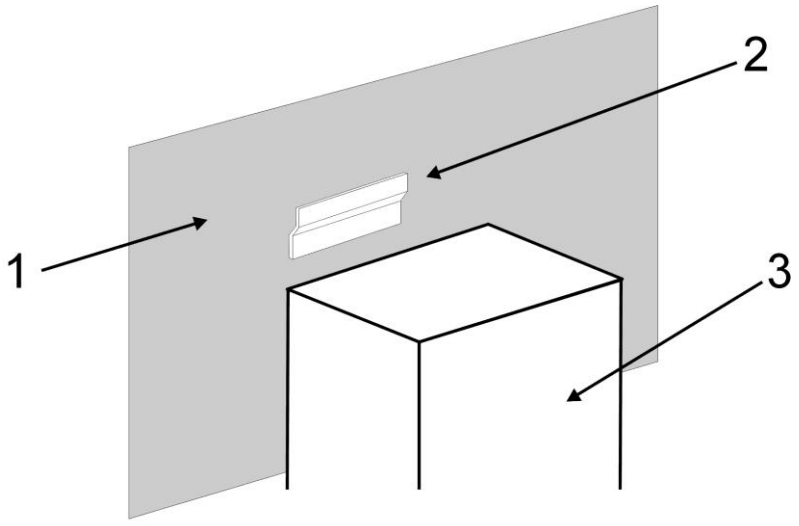
4.2. Select position for boiler

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 boiler to be submerged into water
- There is no chance for boiler to be poured with significant amount of water
- Normal level of air circulation can be maintained
- All necessary pipe work 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).

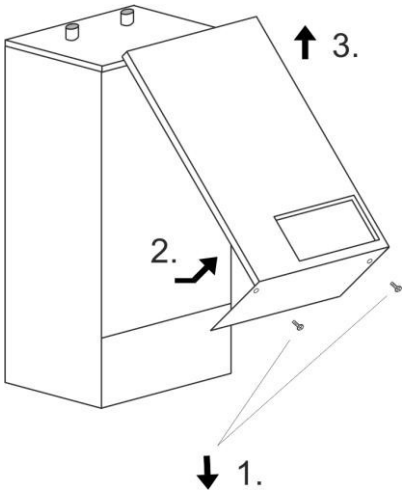


Wall mounting

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 top case



F Removing front case

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

4.5. Pipe work connection

Note:
Observe chapter 3.5. for the system requirements before proceeding.
System flushing is necessary in order to prevent damage to appliance.

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

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



Thermo Extra and Thermo Blok Thermo Blok PTV

Flow and return on Thermo Extra, Thermo Blok and Thermo Blok PTV boilers

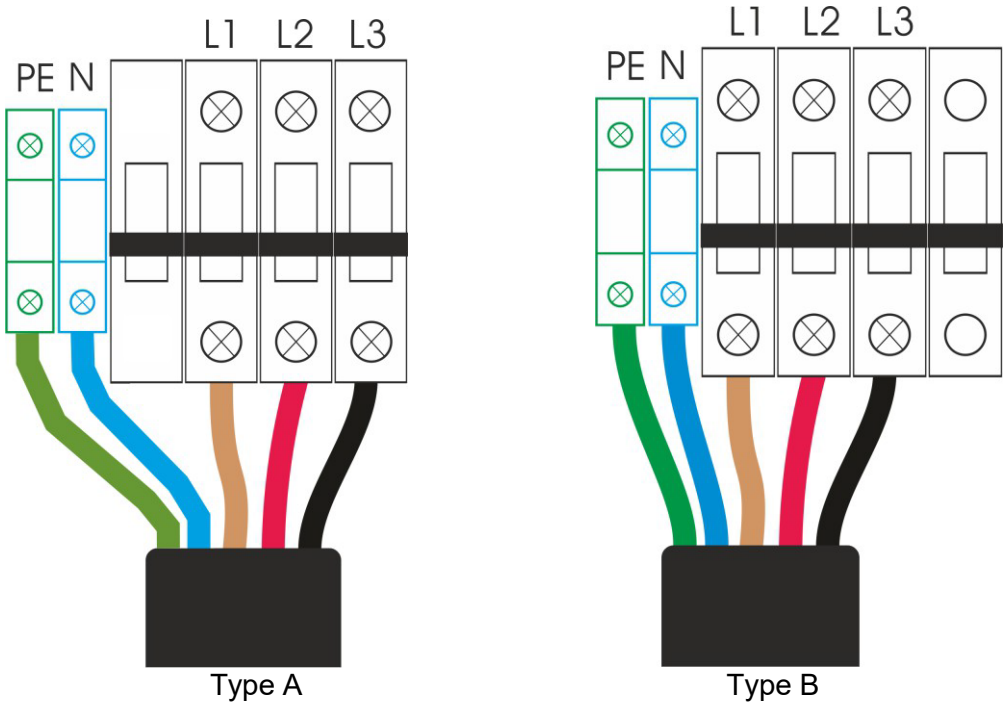
4.6. Power supply connection

Note:
Before working on the boiler, turn off the power (e.g. MCB, switches) and secure against accidental switching on. 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):



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

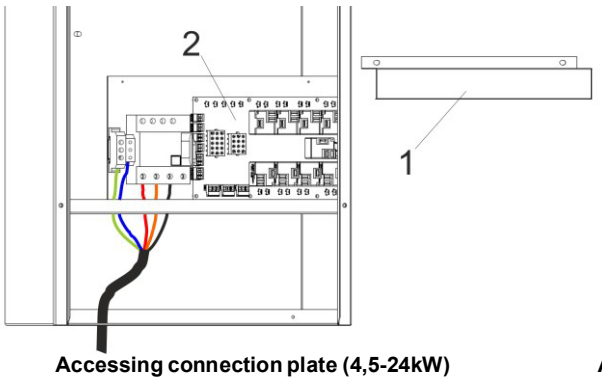
Note:
The power cable of the intersection from Ø6 mm to Ø21 mm must be connected with the bottom of the boiler, with the help of a special introducetor (located on the boiler).
All wires inside the electrical connection place must be tighted.

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.

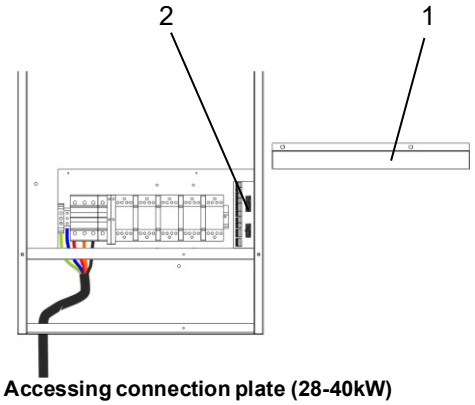
4.7. Connecting temperature sensors or external electrical controls

4.7.1. Accessing connection plate

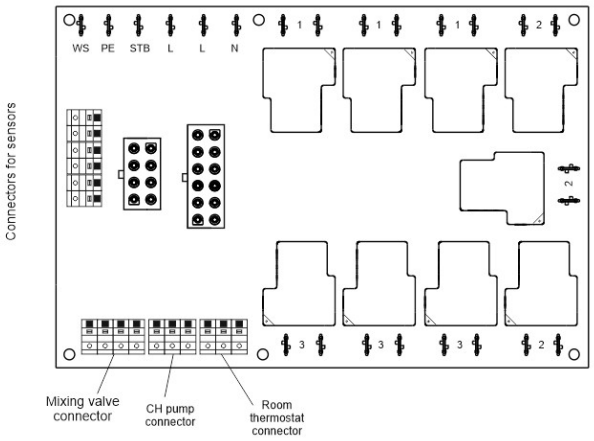
In order to access connection plate (2) power connection protection cover (1) must be removed by unwinding two M4 screws and pulling protection cover out. After connecting the power cable, protective cover (1) must be put in place and tightened.



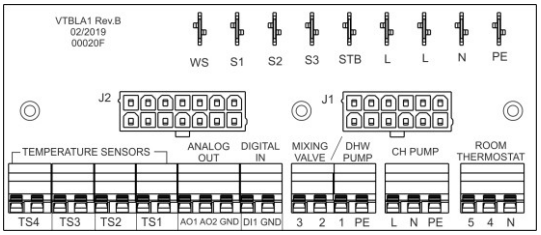
Accessing connection plate (4,5-24kW)



Accessing connection plate (28-40kW)



Connection board with relays (4,5-24kW)



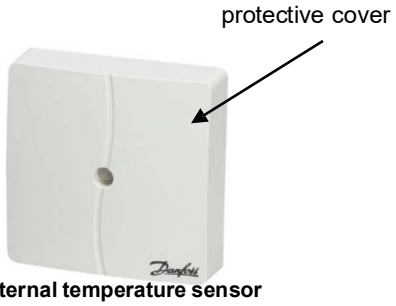
Connection plate (28-40kW)

4.7.2. Connecting external temperature sensor

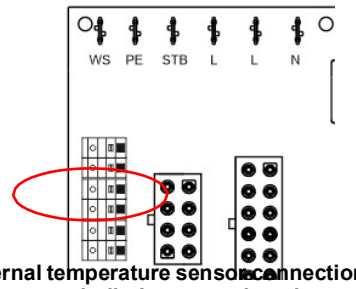
This is applicable only to boilers with option O, V and Thermo Blok PTV boilers.

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).

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



External temperature sensor



External temperature sensor connection point on boiler's connection plate

Note:

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

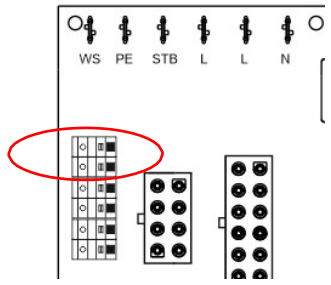
4.7.3. Connecting domestic hot water temperature sensor

This is applicable only to Thermo Extra boilers with option V and Thermo Blok PTV boilers.

Domestic hot water temperature sensor (delivered with the boiler) must be fitted in such manner that reading of correct cylinder temperature is ensured. Water cylinder usually has a spot provided for inserting temperature sensor. If this is not the case temperature sensor must have contact with metal part of the cylinder (under the insulation).



Water Cylinder temperature sensor



Water cylinder temperature sensor connection point on boiler's connection plate

Note:
For connecting water cylinder temperature sensor, two-wire cable of diameter from 0,6mm^2 to 0,75 mm^{2}can be used

4.7.4. Connecting room thermostat and time switch

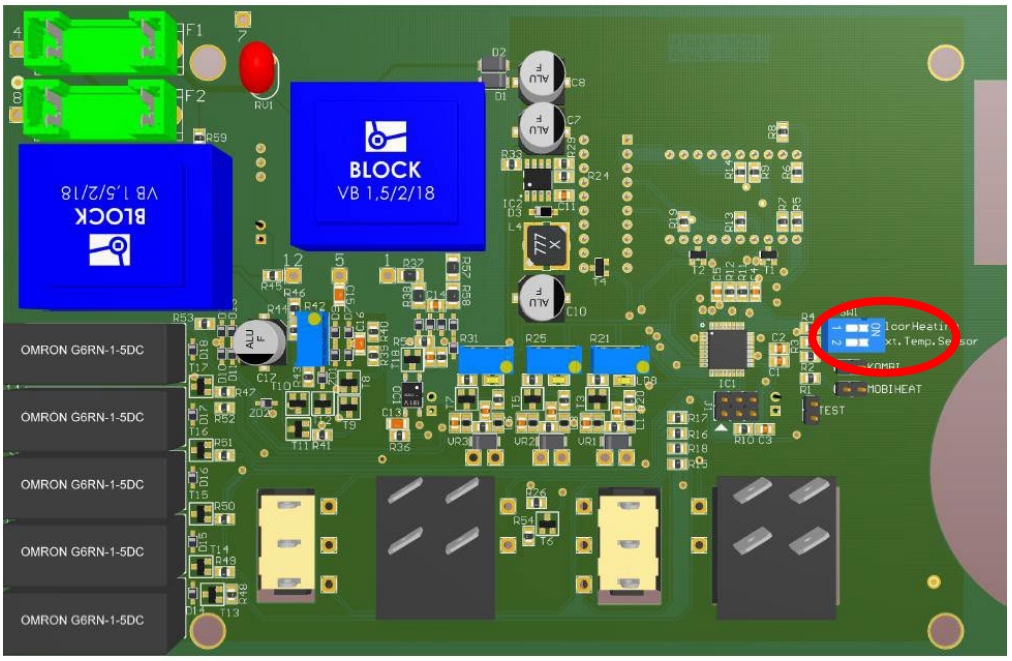
The boilers terminals 3, 4 and L N PE (power supply for control unit) are for connecting room thermostat or other external control unit (like Danfoss TP9). Terminals 4 and L (power supply for control unit) are linked together. If external control unit is used this link must be removed.

Note:
For more details see selected appendix from chapter 3.3.

4.8. Selecting set of heating curves

This is applicable only to boilers with option O, V and Thermo Blok PTV boilers.

Selection of heating type (heating curve subset) or disabling external temperature compensation can be made by using a dip switch located on the back side of the control panel, as shown on the picture below.



Position of dip switch on the back side

ON / OFF 1 2	**Function**
Pin 1 – ON	Set heating type to under floor, curves from 0.1 to 0.9 are active, minimum boiler temperature is set at 15ºC, maximum boiler temperature is set at 45ºC
Pin 1 – OFF (Factory settings)	Set heating type to radiator, curves from 1 to 3 are active, minimum boiler temperature is set at 25ºC, maximum boiler temperature is set at 90ºC
Pin 2 – OFF	Disable outdoor temperature compensation, the user must manually select temperature in
Pin 2 – ON (Factory settings)	Enable outdoor temperature compensation, default curve for radiator heating is 1,5 and 0,6 for under floor heating

WARNING
BEFORE MAKING CHANGES WITH DIP SWITCH DISCONNECT POWER FROM BOILER AND CONTROL PANEL, OTHERWISE DAMAGE TO CONTROL PANEL CAN BE MADE

4.9 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

For single phase system:

- Check if power cable is tightened on MCB terminals
- Check the presence of phase on MCB input terminals inside boiler
- Measure exact voltage between L and N lines, if it is10% higher than nominal voltage on the appliance, the appliance itself can be damaged.

For three phase system:

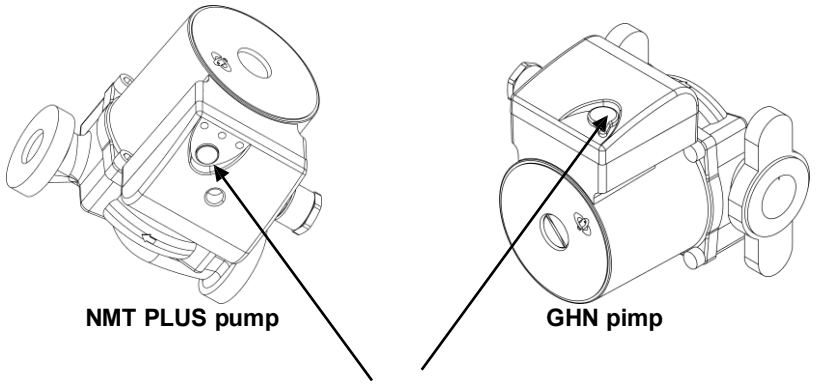
- Check if power cable is tightened on MCB terminals
- Check the presence of each phase on MCB input terminals inside boiler
- Measure exact voltage between L1 – L2, L1 – L3, L2 – L3, L1 –N. If there is no voltage between any combinations of phases one phase is missing and the heating elements inside 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

For all systems:

- Check if fixed wiring system is used and that MCB 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. Changing the speed of pump for central heating

For Thermo Blok and Thermo Blok PTV: open the cover of boiler as described in chapter 4.4. and locate the central heating pump; use chapter 2.4. for assistance. Move speed slider (1) to desired mark.



Selecting pump speed

5.4. Working with standard control panels (option E, O)

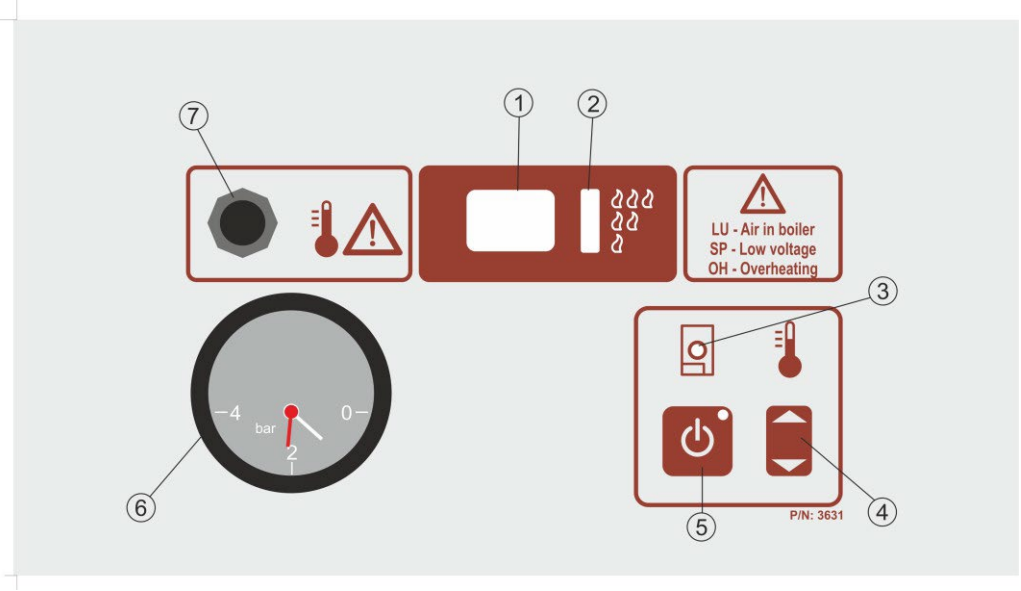


Figure 1 - Standard electronic control panel

1. Multipurpose – temperature indicator (temperature of boiler, adjustment of temperature)
2. Signalization of operation degree of heaters (1, 2, 3)
3. Signalization of boiler operation
4. Adjustment of temperature in boiler
5. Switch for central heating switching on and off
6. Pressure indicator
7. Thermal fuse (STB)

Switching on of central heating

By switching the switch (5), the central heating system is switched on. Upon switching on the desired water temperature in boiler is displayed for 5 seconds, signalization of boiler operation is twinkling (3). After 5 seconds the real temperature in the boiler is displayed (1); if the current temperature in the boiler meets the desired one, the signalization lamp of the boiler operation (3) is switched off.

Adjustment of desired temperature of central heating

By pressing the key for temperature adjustment (4) the desired temperature in the boiler appears, the signalization lamp of the boiler operation (3) is twinkling. By repeated pressing upwards or downwards it is possible to increase or decrease the desired water temperature. When the temperature is adjusted it is sufficient to wait for 5 seconds (signalization lamp of the boiler operation (3) does not twinkle) in order for the boiler to memorize new temperature.

Air in the boiler ‘’LU’’

If air appears in the boiler, the signalization of air in the boiler ‘’LU’’ is shown on display (1) and the boiler stops the operation. In this way the boiler is protected against burning through because of appearance of air. To continue the operation, the boiler should be vented. If the boiler is correctly vented, the operation of boiler continues automatically.

Voltage drop ‘’SP’’

If the voltage in the network line drops below 175V by phase, the signalization of under voltage protection ‘’SP’’ is shown on display (1), the boiler automatically switches off in order to protect electronics and contactors inside the boiler. The boiler will automatically continue the operation when the network voltage reaches values above 185V.

Cutout thermostat – Overheating "OH"
Cutout thermostat (safety thermostat) (1) protects the boiler against rapid increase of temperature above 110°C. The fuse turns off the boiler's functions and ejects the MCB.
To continue the operation, it is necessary to take off the protection cover from the cutout thermostat and press the red key, after which the MCB should be switched on again.

NOTE:
If the room thermostat is on, check if it is set at the necessary room temperature and if supply batteries are in order, otherwise the boiler will not operate.



Red dot in lower right corner of display is showing - boiler is off on control panel but control power is connected

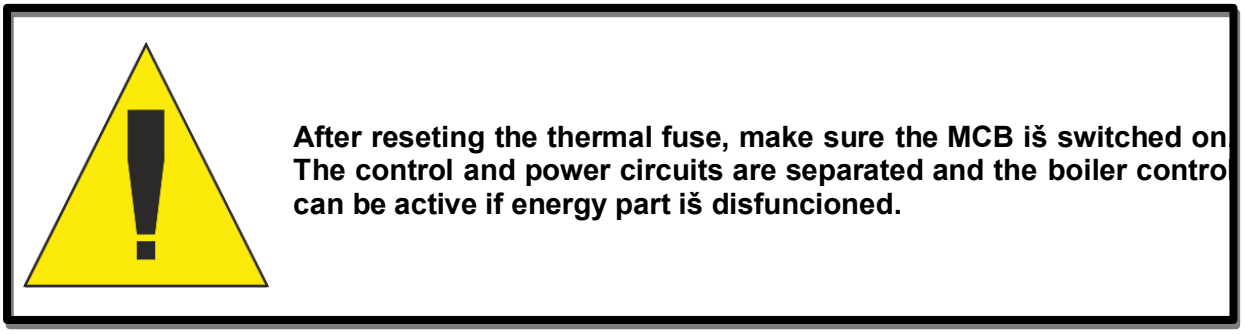


Display is showing real temperature in boiler - red dot is illuminate

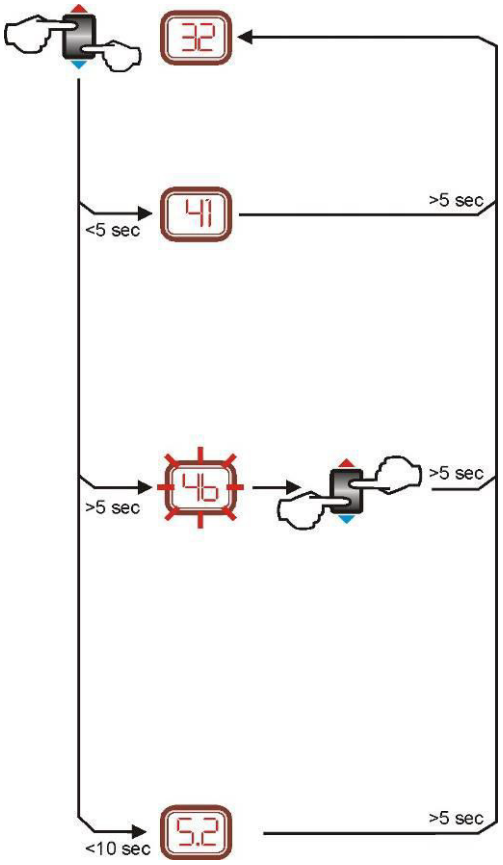


Display show settings parameter during programming - without red dot

Clarification of LED display layout



5.4.1. Heating functions



Display of desired temperature in the boiler

If the key (4) is held pressed less than 5 s the LED display will show the desired temperature in the boiler. The value is displayed for 5 seconds, after which the display normally shows the real temperature of water in the boiler.

Setting the desired temperature in the boiler

By pressing the key (4) user can enter the boiler temperature menu.

The desired boiler temperature is blinking.

By pressing the key (4) UP or DOWN, the desired boiler temperature can be set in steps of 1°C.

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

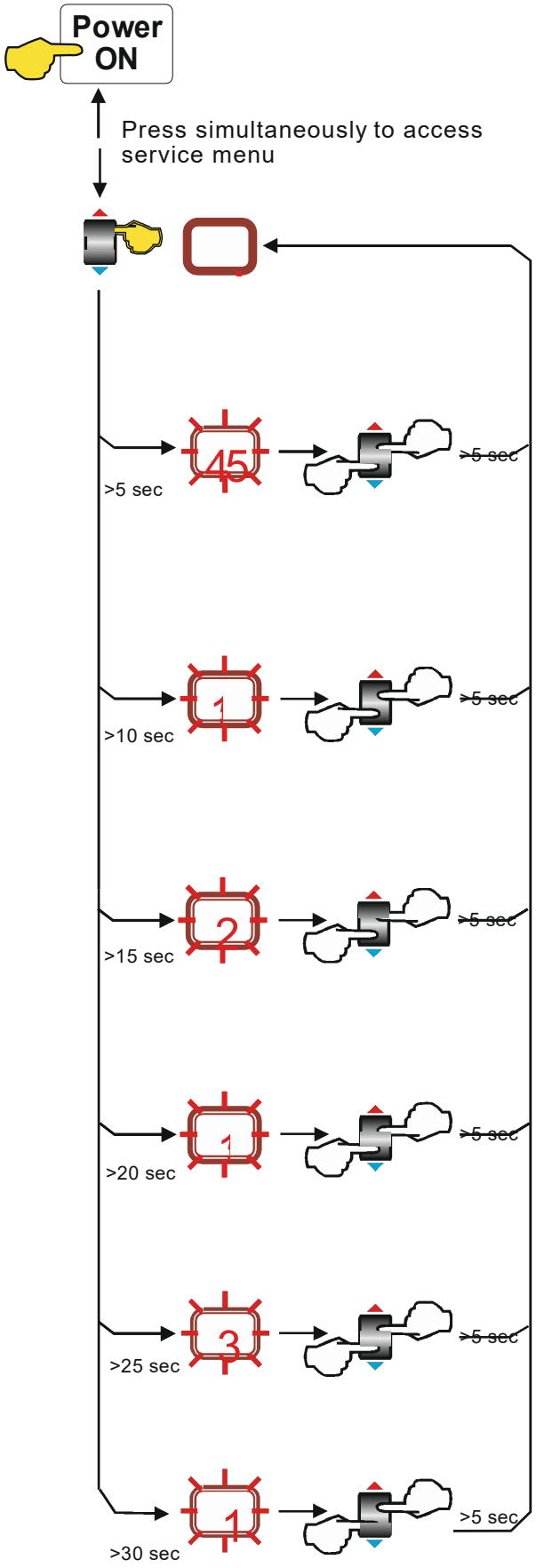
Possible adjustment is from 20°C up to 90°C for radiator heating.

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

Reset to factory defaults

By pressing the key (4) longer than 15 seconds, all parameters will return to the factory default values and controller will be reset and show software version.

5.4.2. Access to special service menu



Access to special service menu

To access in special service menu, press simultaneously key (4) during switching ON main switch of boiler.

Limiting maximum boiler temperature

By pressing the key (4) user can limit maximum boiler temperature.

Factory defined maximum temperature starts to blink. By pressing up or down user can set new maximum temperature. If the key is depressed for more than 5s, value on the display will be memorized and becomes active.

Radiator heating: Adjustment range 60°C-90°C, factory default 80°C

Underfloor heating: Adjustment range 30°C-50°C, factory default 80°C

Setting the minimal boiler temperature

By pressing the key (4) user can set minimal boiler temperature.

Minimal boiler temperature starts blinking.

By pressing the key user can select the desired minimal boiler temperature. Temperature changes in steps of 1°C. If the key is depressed for more than 5s, value on the display will be memorized and becomes active.

Radiator heating: Adjustment range 20°C-45°C, factory default 45°C

Underfloor heating: Adjustment range 15°C-30°C, factory default 30°C

Setting the heating pump delay

By pressing key (4) user can change pump delay time between 0 - 15 min. Factory settings is 2.

Selecting the time delay between steps for power regulation

By pressing the key (4) user can change the time delay between step for power regulation in the range from 5 to 60 seconds. Default value depends on the number of stages for power regulation – each stage will add 5 seconds. 3 stages will have 3*5=15 seconds between successive stages turn-on. Turn of delay is fixed to 1 second.

Selecting the number of steps for power regulation

By pressing the key (4) servicer can change the number of steps for power regulation.

By pressing the key it is possible to select 1 to 3 steps for power regulation. Default settings**:** 3 power levels. Change in the number of stages will cause time delay parameter to be changed (see above) !

Selecting the number of pumps for controlling

By pressing the key (4) servicer can change the number of pumps, one or two – **only for option control panel "Z"**

5.5 Control panel for Thermo Blok-PTV



Figure 2 – Standard control panel for Thermo Blok-PTV

1. Multipurpose – temperature indicator (temperature of boiler, sanitary water, adjustment of temperature)
2. Signalization of operation degree of heaters (1., 2., 3.)
3. Signalization of boiler operation (green light
4. Adjustment of temperature in boiler
5. Push button for central heating switching on and off
6. Sanitary water temperature adjustment
7. Push button for switching on and off the sanitary water preparation
8. Signalization of sanitary water preparation and consumption
9. Indicator of pressure in a boiler
10. Thermal fuse

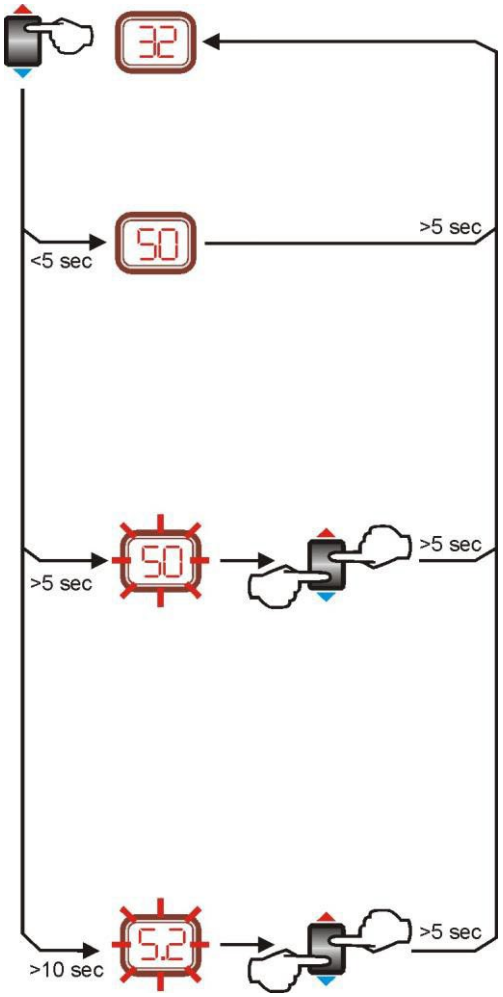
Switching on of central heating
By pressing the push button (5), the central heating system is switched on. Upon pressing on the desired water temperature in boiler is displayed for 5 seconds, signalization of central heating operation (3) is twinkling. After 5 seconds the real temperature in the boiler is displayed (1); if the current temperature in the boiler meets the desired one, the signalization lamp of the operation mode (3) is switched off.

Adjustment of desired temperature of central heating
By pressing the push button for temperature adjustment (4) the desired temperature in the boiler appears, the signalization lamp of the boiler operation (3) is twinkling. By repeated pressing upwards or downwards it is possible to increase or decrease the desired water temperature. When the temperature is adjusted it is sufficient to wait for 5 seconds (signalization lamp of the boiler operation (3) does not twinkle) in order for the boiler to memorize new temperature.

Switching on of domestic water heating
By pressing the push button (7), the DHW system is switched on. Upon pressing on the desired water temperature in boiler is displayed for 5 seconds, signalization of DHW operation (8) is twinkling. After 5 seconds the real temperature in the boiler is displayed (1); if the current temperature in the domestic water container meets the desired one, the signalization lamp of the operation mode (8) is switched off.

Adjustment of desired temperature of central heating
By pressing the push button for temperature adjustment (6) the desired temperature in the boiler appears, the signalization lamp of the boiler operation (8) is twinkling. By repeated pressing upwards or downwards it is possible to increase or decrease the desired water temperature. When the temperature is adjusted it is sufficient to wait for 5 seconds (signalization lamp of the boiler operation (8) does not twinkle) in order for the boiler to memorize new temperature.

5.5.1. Domestic water functions



Display of desired temperature of domestic water

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

Setting the desired temperature in domestic water storage

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

The desired water temperature in domestic water storage is blinking.

By pressing the key (6) the value of desired domestic water temperature in domestic water storage is changing in steps of 1°C. If the key is held pressed less than 5 s the value from the display becomes the desired domestic water temperature.

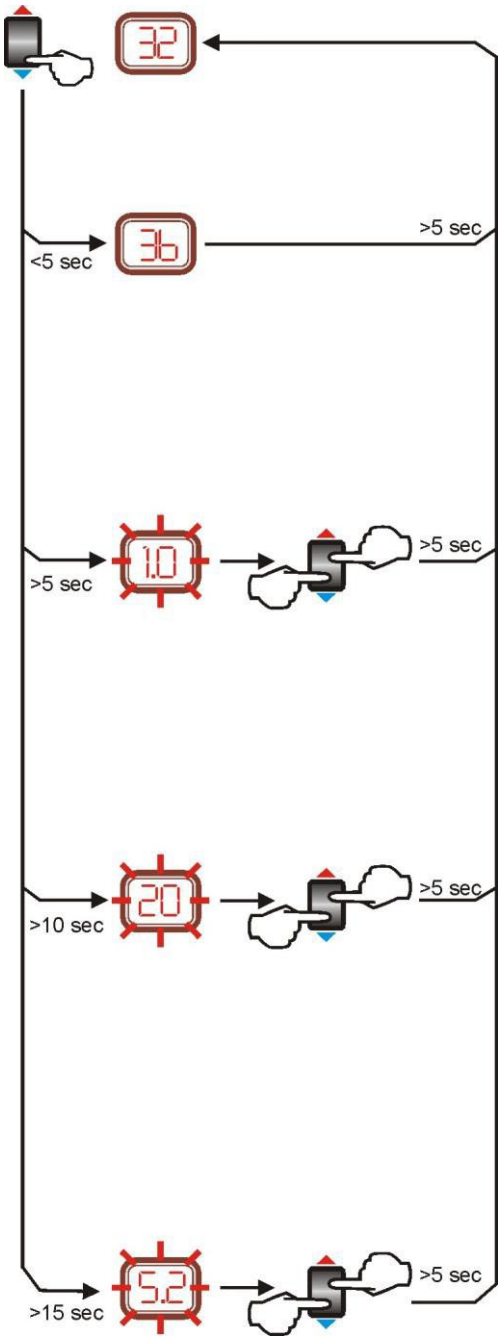
Possible adjustment is from 10°C up to 65°C.

Factory adjustment is 50°C.

Displaying software version and factory reset

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

Continuation...



Display of current temperature in the domestic water storage

By pressing the key down (6) user can select the display of current temperature in the domestic water storage. The value is displayed for 5 s, after which display returns to indication of the actual temperature of water in the boiler..

Setting additional working time of domestic water pump

By pressing the key (6) user can setup additional working time of domestic water pump.

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

By pressing the key the time is changing from 0,1 min up to 19 min. In increment of 0,1. If the key is depressed for more than 5s, value on the display will be memorized and becomes active.

Factory default: 1 min.

Setting standby boiler temperature

By pressing the key (6) user can setup stand by boiler temperature

Display will show current standby boiler temperature.

Pressing the key (6) will change standby temperature by 1°C. If the key is depressed for more than 5s, value on the display will be memorized and becomes active.

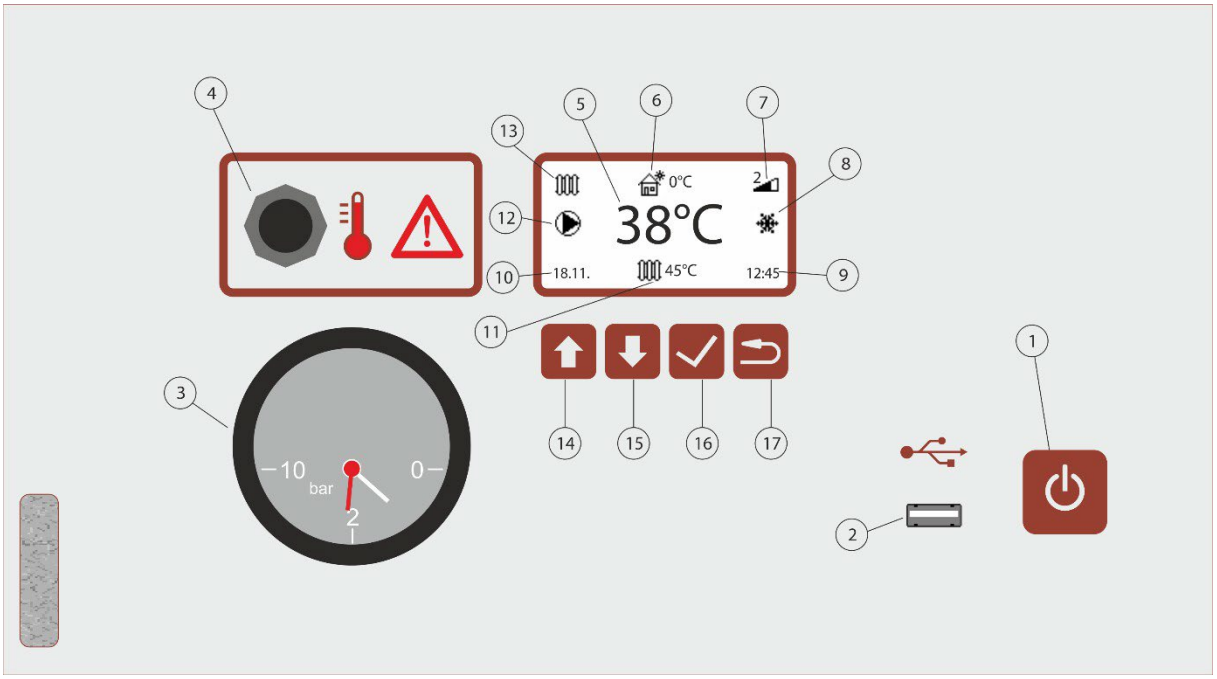
Adjustment range: 10°C - 50°C

Factory default: 15°C

Reset to factory defaults

By pressing the key (6) longer than 15 seconds, all parameters will return to the factory default values and controller will be reset.

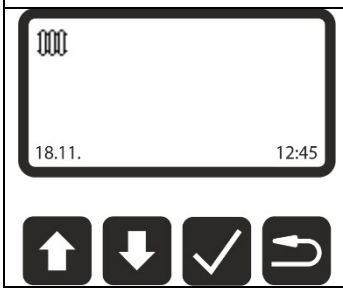
5.6. Graphic control panel after 28kW (all options)



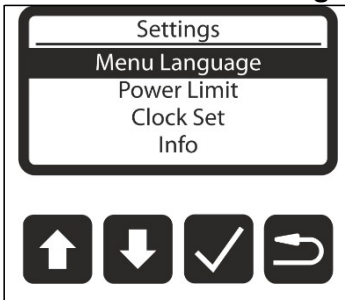
Number	Description
1	ON / OFF switch
2	USB port for service access
3	Pressure gauge
4	Cutout thermostat with manual deactivation
5	Current temperature in boiler
6	External temperature, visible only if external temperature sensor is installed and enabled
7	Number of active heating steps
8	Boiler is running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

13	Enabled modes - Radiator heating - Underfloor heating - Radiator and domestic hot water heating - Underfloor and domestic hot water heating
14	Multifunction key • Home screen with heating curves disabled, used to change desired temperature • Home screen with heating curves enabled, used to offset current curve • Inside menu, used for menu navigation and changing values
15	Multifunction key • Home screen with heating curves disabled, used to change desired temperature • Home screen with heating curves enabled, used to change desired temperature • Inside menu, used for menu navigation and changing values
16	Multifunction key • Home screen, press 5 seconds for user menu • Inside menu, used for selecting menu items and confirming values
17	Escape key

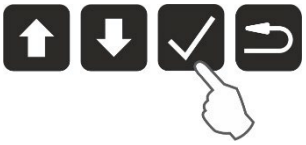
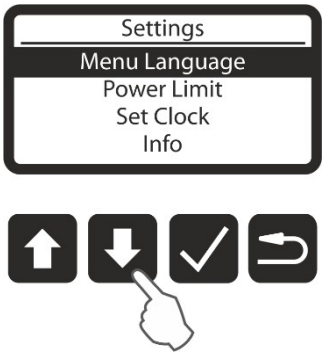
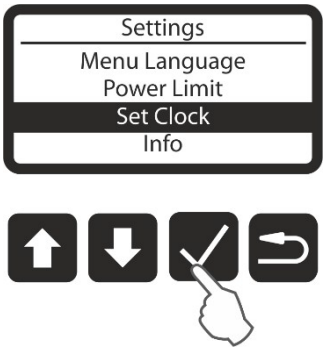
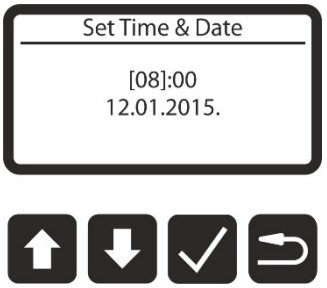
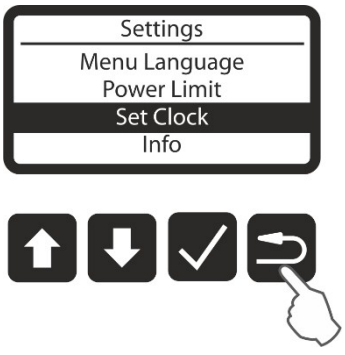
5.6.1. Control panel display

	Active mode
	Stand-by mode

5.6.2. Entering and navigating user menu

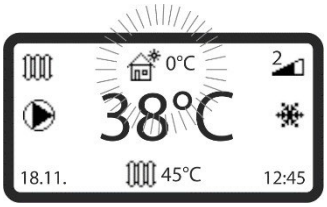
	Press and hold ✓ for 5 seconds to enter user menu. Press ↓ and ↑ to navigate through options and set desired value. Press ✓ to select option and confirm values. Press ↩ to exit either from menu or option inside menu.

5.6.3. Example how to change date and time

	Press and hold ✓ for 5 seconds to enter user menu.
	Press ↓ in order to navigate to “Clock Set” menu option.
	Press ✓ to enter “Clock Set” option.
	Press and ↑ to change value. Press for next value. When time and date are set press ↩ for returning to user menu.
	Press ↩ for exiting user menu.

5.6.4. Temporary override heating curves (Turbo Mode)

Available only with external temperature sensor enabled.

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

5.6.5. Offsetting Heating curve

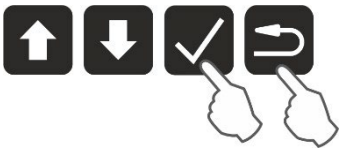
Available only with external temperature sensor enabled.

	Press to enter mode.
	Press and to set desired curve offset. Press to accept selected value, or to exit without change.

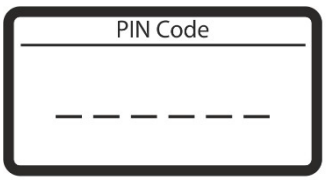
5.6.6. User menu options

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

5.6.7. Entering and navigating service menu



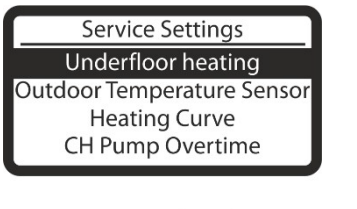
Press and hold ✓ and ⮌ simultaneously for 5 seconds to enter service menu.



Enter service PIN by pressing combination of keys ⮟, ⮝, ✓ and ⮌. Service PIN is available for

Number related to each key:

- 1
- 2
- 3
- 4



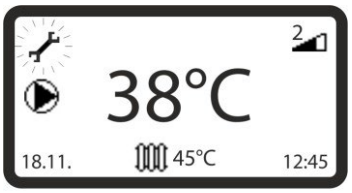
Press ⮟ and ⮝ to navigate through options and set desired value.



Press ✓ to select option and confirm values.

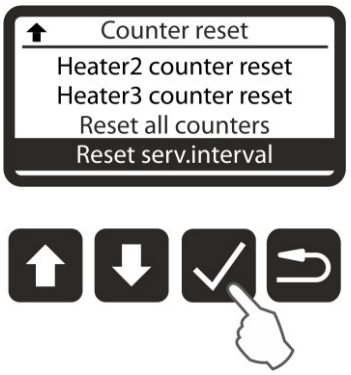
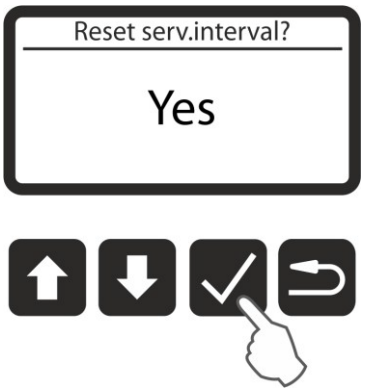
Press ⮌ to exit either from menu or option inside menu.

5.6.8. Reset service interval





When time for service declared by manufacturer expires, service symbol will blink.

	Navigate to “Reset serv.interval” and press to reset option.
	Choose “Yes” and press to reset service interval to default value.

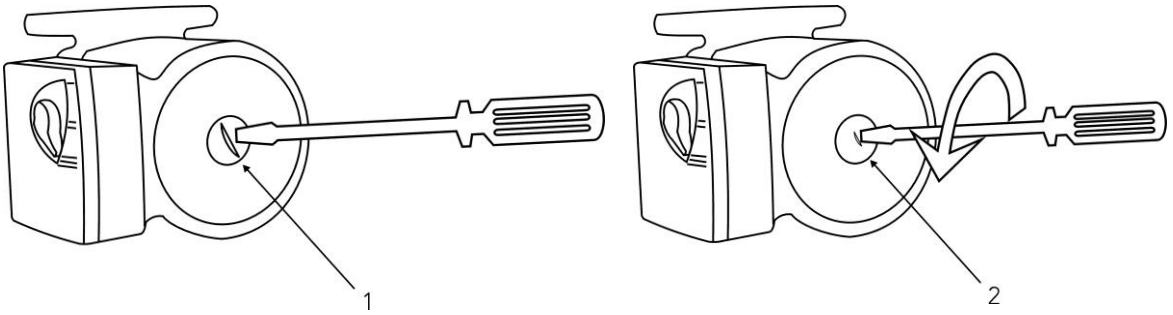
5.6.9. Service menu options

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**	All control panels
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**	Options O, V
Heating Curve	Select heating curve for underfloor or radiator heating. **Default for radiator heating: 1.5** **Default for underfloor heating: 0.6**	Options O, V
CH Pump Overtime	Set time in seconds central heating pump will run after room temperature has been reached. **Default: 60 seconds**	All control panels

Stand-by Temperature	Minimal temperature that will be maintained inside boiler when in standby. **Default: 15 °C**	All control panels
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**	All control panels
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**	All control panels
Stage turn-on delay	Time delay between power steps activation.	All control panels
Set Date&Time	Set time and date	All control panels
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.	All control panels
Reset Counters	Reset counters for heating groups. Counter information is displayed in *User Menu -> Info*	All control panels
Reset service interval *(Service Menu -> Reset Counters -> Reset serv.interval)*	Reset service interval to factory defaults. **Default:** - 12 months (home used boilers) - 6 months (industrial used boilers)	All control panels
Apply Factory Settings	- Reset control panel to factory settings	All control panels
Cascade mode	Without central heating pump. Maximum power signal.	All control panels

5.7. Starting the pump manually – only for non-electronic pumps.

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



When the pump starts the operation the temperature of water in the boiler and the temperature of sanitary water should be selected. The optimal temperature for central heating is between 50 and 60°C.

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

6. Maintenance

6.1. 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 safety thermostat before every heating season by heating up the sensor with heating fan or lighter over 110°C must actuate overheating protection by switching off the main MCB.

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

If the boiler is not connected to the room thermostat or if the boiler is out of function during the winter time, there is a danger of installation freezing.
In this case the system should be filled with antifreeze liquid for central heating, and if this is not possible water should be drained out.

6.2. 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).

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 burning - **contact authorized service personnel to resolve the problem**
- 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 in order to turn off the lamp “air in boiler”
- 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 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	- **contact authorized service personnel to resolve the problem**
- 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**

7.2. Only for graphic control panel

MALFUNCTION	***CAUSE***	***ELIMINATION***
 Air in Boiler	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. When boiler is properly vented 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. 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	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	Boiler's temperature sensor is not properly connected or 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	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	Outdoor temperature sensor is not properly connected or 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**
 Overheating	Safety thermostat is activated.	- Wait until temperature inside the boiler drops below at least 90ºC, reset safety thermostat and switch on miniature circuit breaker –F11 inside the boiler.

		- **contact authorized service personnel**
	Blinking of service symbol indicates that time for service declared by manufacturer has expired.	- make service on the boiler - reset service interval after performing the boiler service - **contact authorized service personnel**

Possible malfunctions – graphic control panel