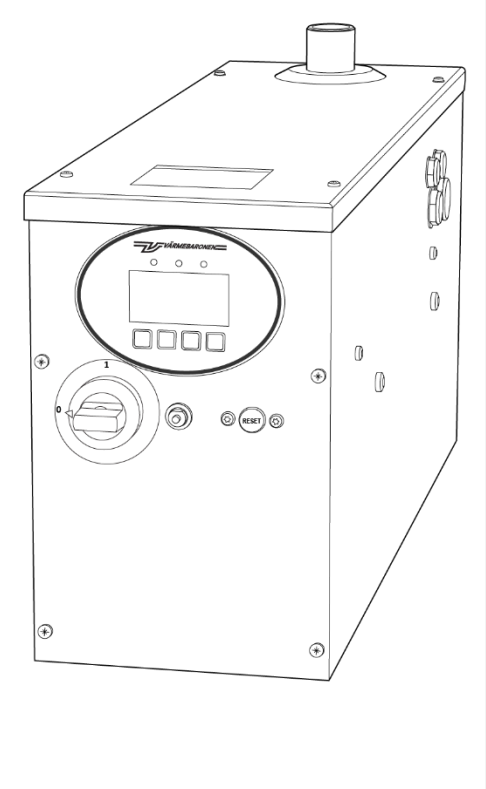
MANUAL

Use and Installation



Electric flow heater – 7-stage
EK 15 E

Contents

1. About the manual

This manual consists of two parts, a User Manual and an Installation Manual.

1.1. About the User Manual

The User Manual is aimed at those who have purchased a boiler made by Värmebaronen. Here you will find descriptions of boiler functions, user instructions and maintenance advice.

1.2. About the Installation Manual

The Installation Manual is aimed at qualified installation engineers. Here you will find technical information as well as instructions relating to installation and service.

NOTE! Installation and service may only be carried out by a qualified installation engineer!

1.3. Explanation of symbols

Warning! Risk of injury, death or product damage!

Warning! Risk of electrical injury and death!

Important information and user tips!

1.4. Disclaimer

Värmebaronen AB reserves the right to change the specification without prior notice, in accordance with its policy of continuous improvement and development.
Illustrations may differ from the actual product.
Värmebaronen makes reservations for any proofreading or printing errors.

2. User manual

2.1. Safety

- Please read through the User Manual carefully before using the boiler!
- Installation, service and other measures may only be carried out by a qualified installation engineer.
- Intervention that requires tools must be performed by a qualified installation engineer.
- Always contact your installation engineer for service!
- The boiler is not permitted to be modified, changed or converted in any way.
- Never place any combustible material on the boiler!
- Keep the manual easily accessible and close to the boiler!
- The boiler must not be operated people with physical or mental impairments or by children.
- The boiler must not be operated by people who lack knowledge of the boiler.
- Children must not play with the boiler or the boiler's connected accessories.

2.2. Installation information

Boiler	Responsible installer
Boiler's serial number:	Name:
Installation date:	Telephone number:

Does the system contain anti-freeze?

☐ YES Type of glycol:

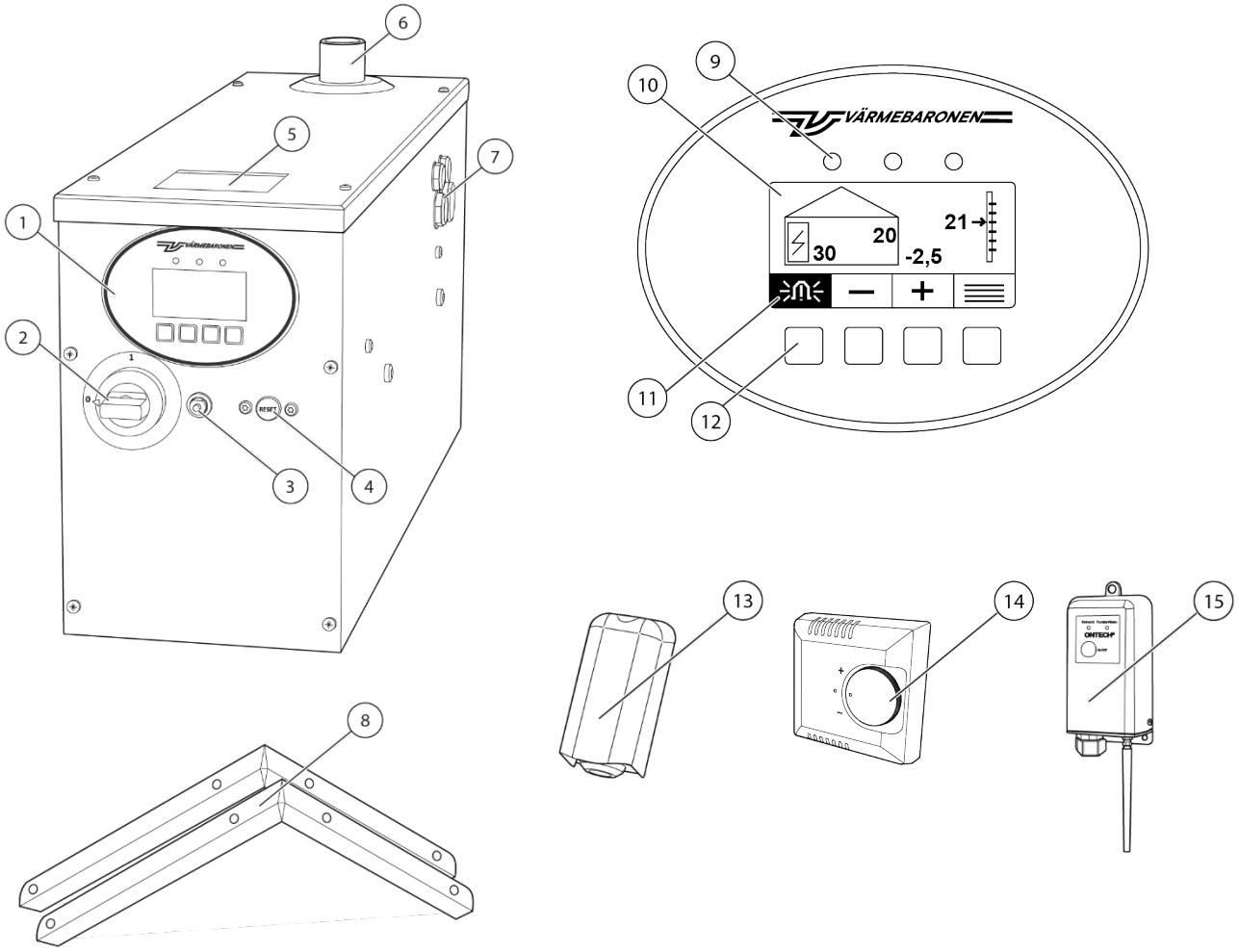
☐ NO

Settings

Number of power stages	☐	Delivery setting: 7
Main fuse	☐	Delivery setting: 25
Power when switched on	☐	Delivery setting: 2

Other notes

2.3. Overview



1. Control panel
2. Power switch
3. Circuit breaker
4. Overheating protection
5. Design label
6. Flow and safety line, R25 ext.
7. Cable openings, right and left side.
8. Brackets for wall mounting
9. Indicator lights
10. Display
11. Button function
12. Button
13. Optional outdoor sensor
14. Optional room unit
15. Optional remote control

General description

Display

The display is located on the control panel. The display shows the status of the boiler and provides you with access to the boiler's menus.
Read more about menus and settings on pages 6–8.

Optional remote control

With remote control, you can regulate the desired room temperature remotely via a computer, mobile phone or tablet.

Indicator lights
The boiler's display has three indicator lights: one green, one yellow and one red. Read more about the functions of the indicator lights on page 13.

Buttons
Buttons for navigating the boiler's menus.

Button function
The buttons have different functions in different menus. The button function box on the display shows the button's function in the menu you have selected.

Control panel
In the control panel, you can see the status of the boiler and change the boiler settings. Read more about boiler's settings on pages 6–12.

Boiler tank and immersion heaters
The immersion heaters in the boiler tank heat the water in the boiler.

Optional room unit
The room unit measures the indoor temperature so that the boiler can maintain the desired temperature as efficiently as possible. You can increase and decrease the room temperature and see if any alarms have been triggered directly on the room unit. The room unit is not included in the boiler's standard equipment. Contact your installation engineer if you would like to supplement your boiler with a room unit.

Power switch
Use the power switch to turn off or start up the boiler.

Activate the ECO function if you are going to take the boiler out of operation. In this case, the boiler will maintain a minimum temperature of 10°C. Read more about the ECO function on page 8.

Rating plate
The rating plate shows the boiler's type and serial number. Always provide the information on the rating plate when contacting your installation engineer. The rating plate is located at the front edge of the cover.

Optional outdoor sensor
The outdoor sensor measures and sends information about the outdoor temperature to the boiler.

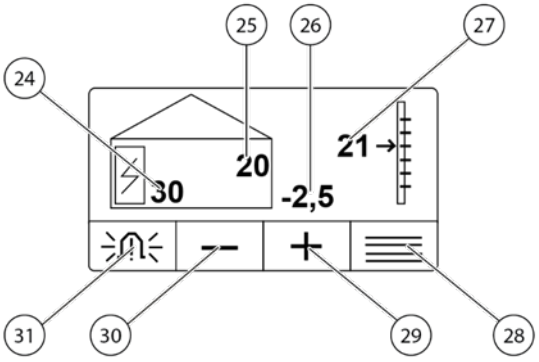
Overheating protection
The overheating protection is a mechanical safety feature that is triggered if the boiler temperature exceeds 100°C. If the overheating protection is triggered, you can reset it manually. Read more about resetting the overheating protection on page 9.

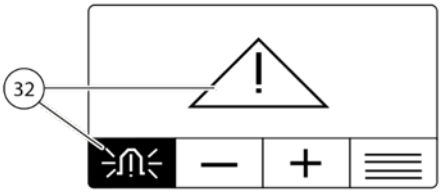
2.4. Functions and settings

Activate the ECO function if you are going to take the boiler out of operation. In this case, the boiler will maintain a minimum temperature of 10°C. Read more about the ECO function on page 8.

2.4.1. Display

The display shows the status of the boiler and provides you with access to the boiler's menus. The appearance of the display may differ depending on how the boiler is set up.





24. Boiler temperature
25. Room temperature (optional)
26. Outdoor temperature (optional)
27. Desired boiler temperature or Heating curve level (optional)
28. Open the menu
29. Increase boiler temperature
30. Lower boiler temperature
31. Active limitation
32. Active alarms or warnings

Navigating the menu

1. Use the menu button to open the menu.

2. Use the arrows to navigate the menu.

3. Select icon

- Heating curve (optional)

- Current temperatures

- Installation engineer settings

- Operating status

- Alarms, warnings, limitations and log list

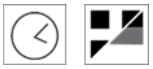
- ECO function

- Time and date

- Language selection

- Product information

After 15 minutes of inactivity, the display reverts to the home screen.

Basic settings 

The installation engineer sets the language, time and date at the time of installation. In the event of a power failure lasting longer than 3–4 days, you or the installation engineer may need to set the basic settings again.

ECO function 

The ECO function is used when the boiler is not in use. The ECO function activates the boiler's circulation pump every other day to prevent the pump from seizing.

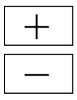
If the temperature in the boiler drops to 10°C, the boiler starts up and tries to maintain a temperature of at least 10°C in the boiler and pipe system. If the temperature drops below 3°C in the boiler, the boiler switches itself off completely.

Activating and deactivating the ECO function

1. Press the menu button.

2. Use the arrows to navigate the menu.

3. Select the ECO function symbol.



4. Use the plus and minus buttons to switch between AUTO and ECO.
   - To activate the ECO function, select ECO.
   - To deactivate the ECO function, select AUTO.

5. Confirm your selection.

   You are now back in the main menu.

2.4.2. Temperature-regulating functions

Fixed boiler temperature

With the Fixed boiler temperature function, the boiler works to maintain the selected boiler temperature regardless of outdoor or indoor temperatures.

Heating curve (optional)

Read more about the heating curve on pages 11–12.

2.4.3. Safety functions

Load guard

The load guard protects the main fuses against overload. For measuring up to 50 A main fuse. Current transformers are included.

Over-temperature protection

The over-temperature protection is a digital safety feature. The boiler activates the over-temperature protection before the mechanical overheating protection is triggered.

If the over-temperature protection is activated, you can reset the warning yourself. Read about how to reset warnings on page 14. If the over-temperature protection is triggered repeatedly, you must contact your installation engineer for troubleshooting and remedial actions.

Overheating protection

The overheating protection is a mechanical safety feature that is triggered if the boiler temperature exceeds 100°C.
If the overheating protection is triggered, you can reset it manually.

If the overheating protection is triggered repeatedly, contact your installation engineer for troubleshooting and remedial actions.

Reset the overheating protection

1. Wait until the boiler has cooled down to 80°C or a lower temperature.
2. Loosen the rubber cover in the hole for resetting.
3. Using a screwdriver, push firmly inwards into the hole until you hear a click.
4. Refit the rubber cover.

The boiler starts when the alarm has been acknowledged (see page 14), or the boiler is restarted.

Frost guard

If the temperature in the boiler drops below 10°C while the boiler is in operation or while it is set to ECO function, the boiler will start and try to maintain at least 10°C. If the boiler is unable to maintain at least 3°C, the boiler will shut down completely.

If it is not possible to circulate the water in the pipe system, for example if an ice plug has formed, you must turn off the boiler immediately and contact your installation engineer for troubleshooting and remedial actions.

Anti-freeze

If the boiler or system is in a low-temperature environment, the installation engineer can add anti-freeze and turn off the freeze-protection functions.

2.4.4. Alarms, warnings and limitations

The boiler can activate three types of safety messages: alarm, warning and limitation.

You can acknowledge alarms and warnings and turn off the warning signal by pressing the button below the warning bell and following the instructions.

Alarm

You should always contact your installation engineer when the boiler has activated an alarm. The boiler will not start until the installation engineer has rectified the cause of the alarm.
When an alarm has been activated, the boiler will perform the following actions:

- The boiler stops operating.
- The display shows a warning triangle and a warning bell with a black background.
- Red indicator light flashes.

Warnings

The boiler will start up again if the reason for the warning ceases, but the warning will remain on the display until you have acknowledged the warning.
When a warning has been activated, the boiler will perform the following actions:

- The boiler temporarily stops operating.
- Yellow indicator light flashes.
- The display shows a warning triangle and a warning bell with a black background.

Limitations

When the boiler reaches a set value, the boiler activates a limitation and temporarily stops heating. Limitations do not require any action to be taken.

- Green indicator light flashes.
- The display shows a warning bell with a light background.

Press the button below the alarm bell to see which limitation the boiler has activated.

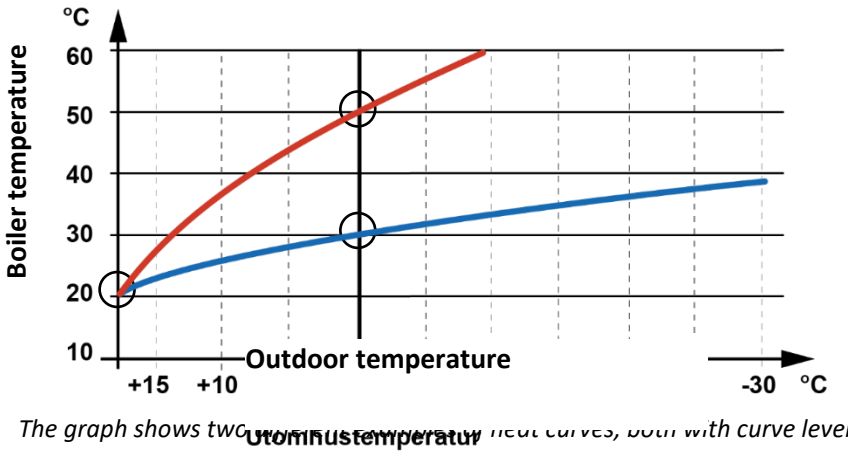
Activity log

The boiler saves operational information in an activity log. The installation engineer can use this information for troubleshooting and to make adjustments.

2.5. Optional features

Heating curve (optional)

The heating curve function can only be used if an outdoor sensor (optional) is connected.The heating curve controls the boiler temperature in relation to the outdoor temperature. The lower the temperature outside, the more the boiler's temperature increases in relation to the outdoor temperature. The installation engineer sets a heating curve that is adapted to the heating surface's insulation and the design of the heating system.
If you have installed a room unit (optional), the boiler adds the measurement value from the room unit to the heating curve.



The graph shows two [illegible] heat curves, both with curve level 20. The red curve has a curve slope of 50 and the blue curve has a curve slope of 30. When the outdoor temperature is 0 °C, the red curve gives a boiler temperature of 50 °C and the blue curve gives a boiler temperature of 30 °C.

Initial values when selecting heating curve (optional)

Design values
Select a curve that provides the preferred supply line temperature.

Unknown values – Underfloor heating system

- For timber joist floors: Start from the lowest temperature that normally occurs in the location and select the heating curve that gives a flow temperature of 40°C.
- For concrete slab floors: Start from the lowest temperature that normally occurs in the location and select the heating curve that gives a flow temperature of 30°C.

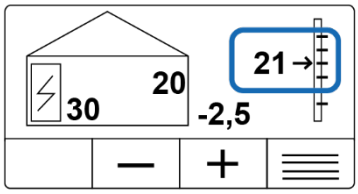
Unknown values – Radiator system

- For low temperature systems: Start from the lowest temperature that normally occurs in the location and select the heating curve that gives a flow temperature of 55°C.
- For high temperature systems: Start from the lowest temperature that normally occurs in the location and select the heating curve that gives a flow temperature of 70°C.

Adjust the heating curve level (optional)

If you are unhappy with the indoor temperature, you should first adjust the heating curve level between 5 and 30.

You can change the heating curve level by using the plus and minus buttons on the boiler's display. The display is located on the control panel.



Wait at least 24 hours between adjustments so that temperature has time to stabilise.

If you are unhappy with the indoor temperature after adjusting the heating curve level, you can also adjust the heating curve's slope.

Adjust the heating curve slope (optional)

1. Press the menu button.
2. The heating curve is selected.
3. Press the Confirm button.
4. Use the right arrows to select the Heating curve slope icon.

   - Heating curve slope – can be adjusted between 21 and 60.

5. Confirm.
6. Increase or decrease the value using the plus and minus buttons.
7. Confirm.

   Press Return to go back to the menu.

9.

2.6. Troubleshooting

Provide details of any error code when contacting your supplier.

What has happened?	What does it mean?	What should I do?
Green indicator light is on.	The boiler is working normally.	No action is required.
Yellow indicator light flashes.	The boiler has activated a warning. If the cause of the condition ceases, the boiler will start up again, but the warning will remain on the display until you have acknowledged the warning.	Make a note of the warning issued by the boiler. Acknowledge the warning. If the boiler does not start again, contact your installation engineer and notify them of the error code indicated by the boiler for troubleshooting and remedial actions. Read more about acknowledging warnings on page 14.
Yellow indicator light is on.	You have acknowledged the warning, but the fault persists.	If the light does not turn off within 24 hours or the warning is repeated, contact your installation engineer for troubleshooting and remedial actions.
Red indicator light flashes.	The boiler has activated an alarm and turned itself off.	Make a note of the alarm issued by the boiler. Acknowledge the alarm. The boiler turns off the alarm signal. Contact your installation engineer for troubleshooting and remedial actions. Notify the installation engineer of the error code indicated by the boiler. Read more about acknowledging alarms on page 14.
Red indicator light is on.	The boiler has activated an alarm and turned itself off. You have acknowledged the alarm.	Contact your installation engineer for troubleshooting and remedial actions. Notify the installation engineer of the error code indicated by the boiler.
The boiler does not start.	The boiler has stopped because it has triggered an alarm or warning.	Check the indicator lights and see above. Refer to page 5 for the location of the indicator lights on the control panel.
The display shows a warning bell with a white background. 	The boiler has activated a limitation.	No action is required. Press the button below the warning bell to see which limitation has been activated.
The display shows a triangle and the warning bell with a black background.  	The boiler has activated an alarm or a warning.	Check the indicator lights and see above. Refer to page 5 for the location of the indicator lights on the control panel.
The overheating protection has been triggered. The red light is flashing and the warning bell icon with the black background is on.	The boiler temperature has exceeded 100°C and the boiler has shut down.	Reset the overheating protection or contact your installation engineer. Read how to reset the overheating protection on page 9.

2.6.1. Acknowledging an alarm, warning or limitation

1. Press the button furthest to the left.
2. Press the button second-furthest to the left.
3. Check the alarm, warning or limitation code shown on the display.
4. Contact your installation engineer for troubleshooting and remedial actions.

If you find that the boiler is malfunctioning, contact your installation engineer for possible troubleshooting and remedial actions.

3. Installation Manual

3.1. Safety

- The boiler must not be used for direct heating of drinking water.
- The boiler may only be installed indoors.
- The ambient temperature must not exceed 30°C.
- In cases where the instructions in this manual violate national regulations, the latter must be followed.
- Images showing examples of pipe systems are system principles. Design the pipe system in accordance with current regulations and standards.
- Do not drill into the boiler's cladding panels. Drill shavings can damage the boiler's electronics.

3.2. Installation

3.2.1. Installation overview

1. Prepare accessories and installation materials that are not included in the boiler delivery.
2. Install the boiler.
3. Install the pipe system.
4. Fill with water.
5. Install the electricity.
6. Press the WIZ button to start the installation wizard.
7. Test the boiler in accordance with the Installation engineer's checklist on pages 27–28.
8. Demonstrate the boiler to the customer.
9. Fill in the installation engineer's notes for the user.
10. Register the boiler and the warranty.

3.2.2. Preparations

In addition to the boiler, you will need:

- Circulation pump.
- Open or closed expansion tank
- Automatic vent valve (in case of closed expansion tank)
- Shut-off valves
- Safety valve (in case of closed expansion tank)
- Installation materials for electrical and pipe systems

Option

- Outdoor sensor
- Room device

Water quality

If the water's values deviate from the recommended values, you must adjust the values or use an alternative water source.

If the water deviates from the recommended levels, it can cause corrosion or lime deposits, which will shorten the service life of the boiler by several years.

Hard water can give rise to lime deposits. Very soft water may cause corrosion.

Recommended water values

Subject	Recommended value	Risk in the event of deviating value
pH value	Between 7.5 pH and 8.5 pH	Lower values can result in corrosion damage.
Alkalinity	At least 60 mg/l	Corrosion.
Carbonic acid content	Max. 25 mg/l	Corrosion.
Sulphate content	Max. 100 mg/l	Corrosion. If the sulphate content is higher than the chloride content, copper corrosion may occur.
Chloride levels	Max. 100 mg/l	Corrosion. The aggressiveness of the chloride increases in combination with the presence of lime deposits.

3.2.3. Install the boiler

If you add glycol to the system, the glycol must contain corrosion-inhibiting additives.

From a safety perspective, the boiler is designed to cope with zero flow. As a result, you do not need to install a flow guard or double circulation pumps.

Remember not to block the boiler's cover plate when installing pipes and electricity.

Install the boiler

Install the boiler indoors where the ambient temperature does not exceed 30°C and does not drop below 10°C. Install the boiler horizontally with at least 0.6 metres of free space in front of and above. Install the boiler using the brackets supplied.

Install the outdoor sensor (optional)

Connect the outdoor sensor to the boiler using a cable with a cross section of at least 0.5 mm^2 and a maximum length of 30 metres.

Position the outdoor sensor:

- Halfway up an outside wall.
- In a corner facing north or northwest.
- So that the outdoor sensor is not affected by escaping hot air from vents, doors or windows.
- So that the outdoor sensor is not exposed to the morning sun.

To connect the outdoor sensor to the boiler, see the wiring diagram on page 20.

Install the room unit (optional):
Follow the instructions that are attached to the room unit. To connect the room unit to the boiler, see the wiring diagram on page 20.

3.2.4. Install the pipe system

- Select the opening pressure of the safety valve according to the system component that tolerates the lowest pressure.
- Always install shut-off valves on the boiler's flow and return line.
- Install the circulation pump on the return line so that the circulation pump presses the flow through the boiler.
- When choosing the size of the expansion tank, bear in mind the change in the water volume during heating and cooling.
- Always add oxygen-consuming agents if there is a risk that the water may become oxygenated. Oxygenation can occur in the event the system is leaking or is refilled frequently. If you do not add oxygen-consuming agents, the immersion heaters can be destroyed by corrosion.
- The boiler can cope with zero flow from a safety perspective, but the boiler should have an even and constant flow. A flow rate that is too high or too low can increase wear and tear and cause damage to immersion heaters and other components, cause incorrect or uneven flow temperatures, and cause vibrations and noise. See recommended flows in the technical specification on page 32.
- The boiler has built-in overheating protection and built-in over-temperature protection. Read more on page 9.

System principles

System principle – closed expansion tank

- Install the safety pipe directly on the flow line after the boiler connection.
- Always install automatic venting in systems with a closed expansion tank, as the immersion heaters may otherwise sustain damage.
- Always install a safety valve in systems with a closed expansion tank. Install the safety valve on the safety pipe after venting.
- Install the closed expansion tank on the return line.

To avoid damage in the event of any blockage in the expansion system, the boiler should be fitted with a safety valve.

System principle – open expansion tank

- The boiler's safety pipe must be connected in a non-isolatable, uninterruptible rise to the expansion tank.
- Protect the safety pipe and expansion tank from frost.
- Install the open expansion tank at least 2.5 metres above the highest point in the system.

According to Swedish Standard EN12828, the following system requirements must be satisfied:

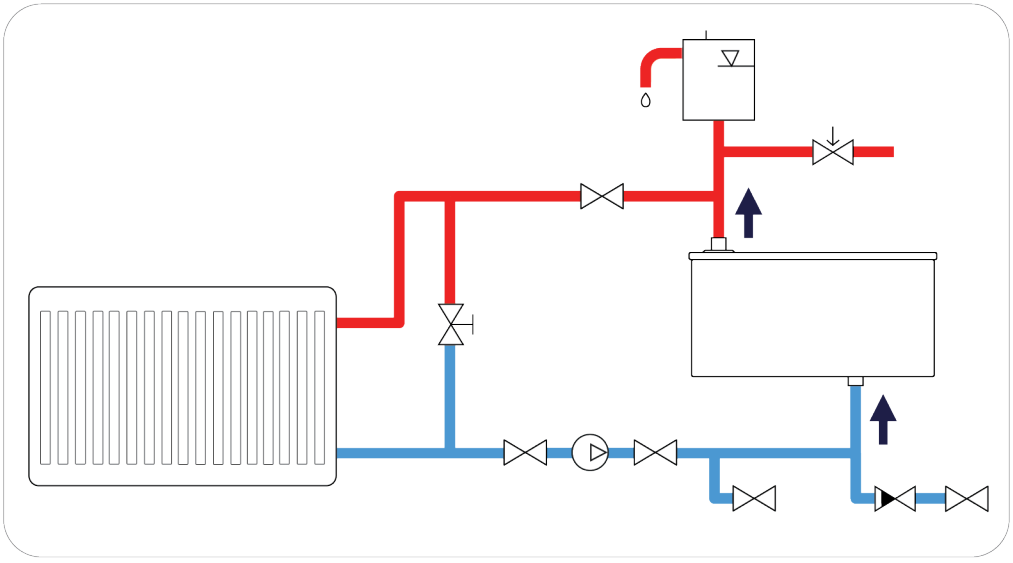
- Qualified personnel must always check the system after the installation or replacement of the boiler/expansion tank and before the user takes the system into use
- The safety valve, as well as the safety, inlet and outlet lines, must be dimensioned in accordance with the valve manufacturer's instructions and in line with the applicable standards.
- Steam or liquid flowing out of the safety valve must be led away safely.
- Safety, inlet and outlet pipes must be installed in such a way that they are stable and cannot freeze.
- Outlet pipes must be installed in such a way that water does not accumulate in the pipe.
- If the boiler is located higher than the consumer, a float switch or a low-pressure guard must be installed.

System principles – Examples

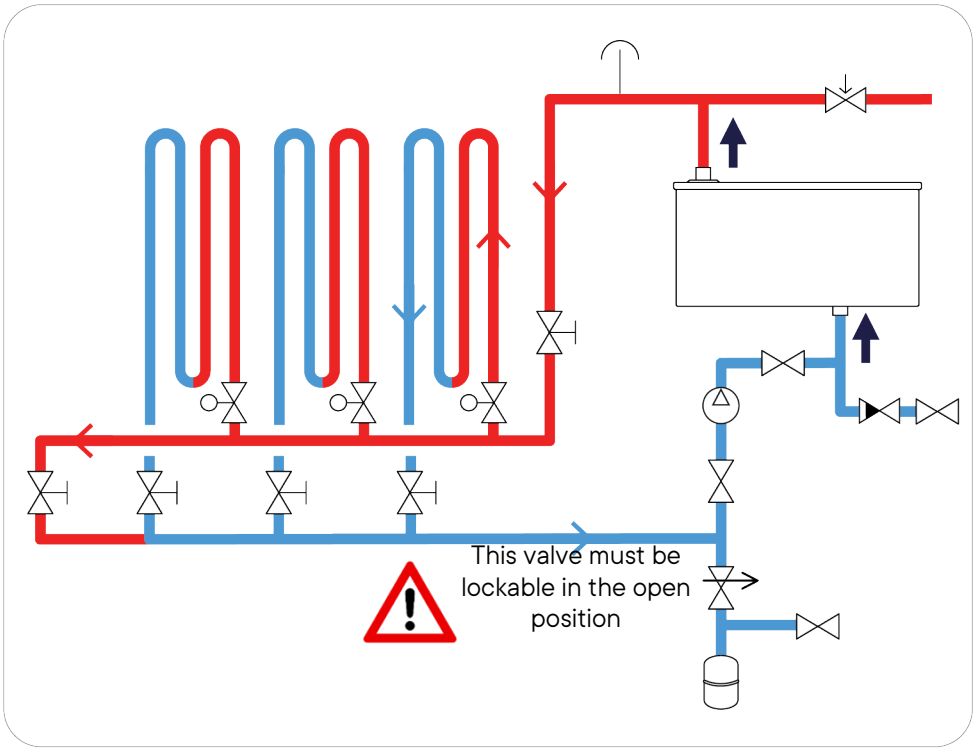
Key to symbols

	Stop valve		Automatic vent
	Safety valve		Expansion tank
	Non return valves		Open expansion tank
	Adjustment valve		Circulation pump
	Air control actuator		Flow direction

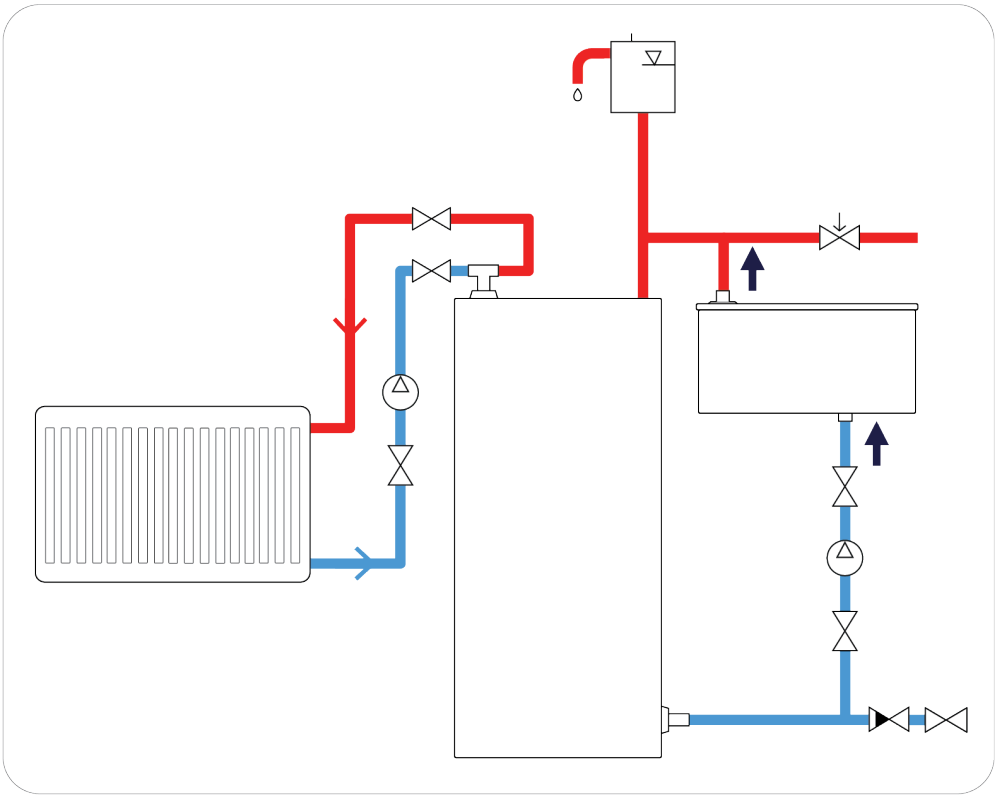
SystemprincipleOpen expansion tank with radiator



System principle – Closed expansion tank with underfloor heating



System principle – Open expansion tank with boiler

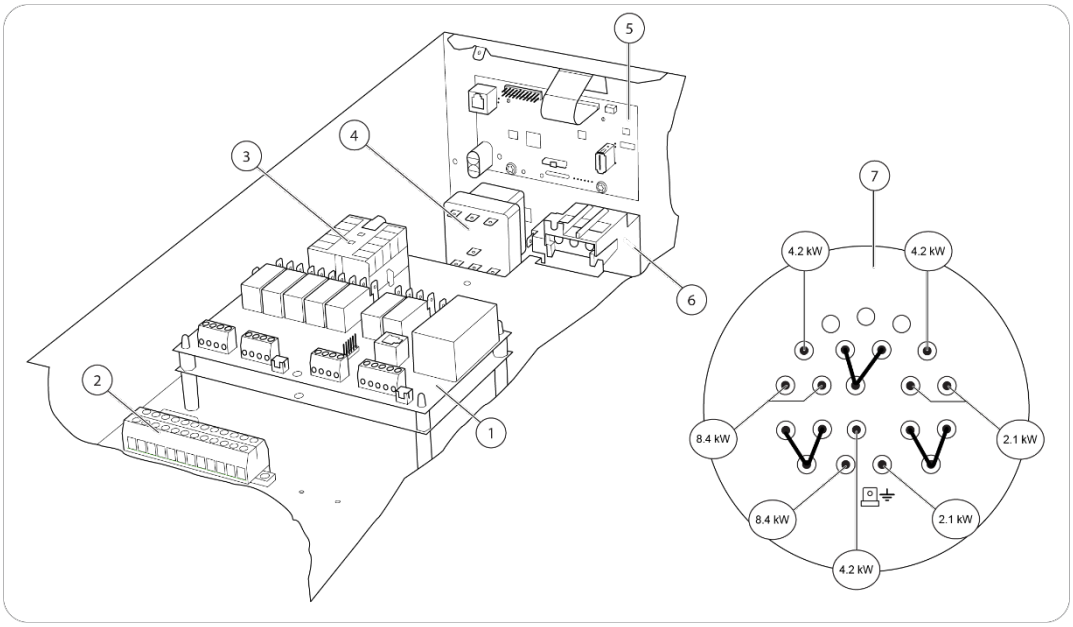


3.2.5. Install the electricity

Electrical installation or alteration to electrical installation may only be carried out by qualified personnel.

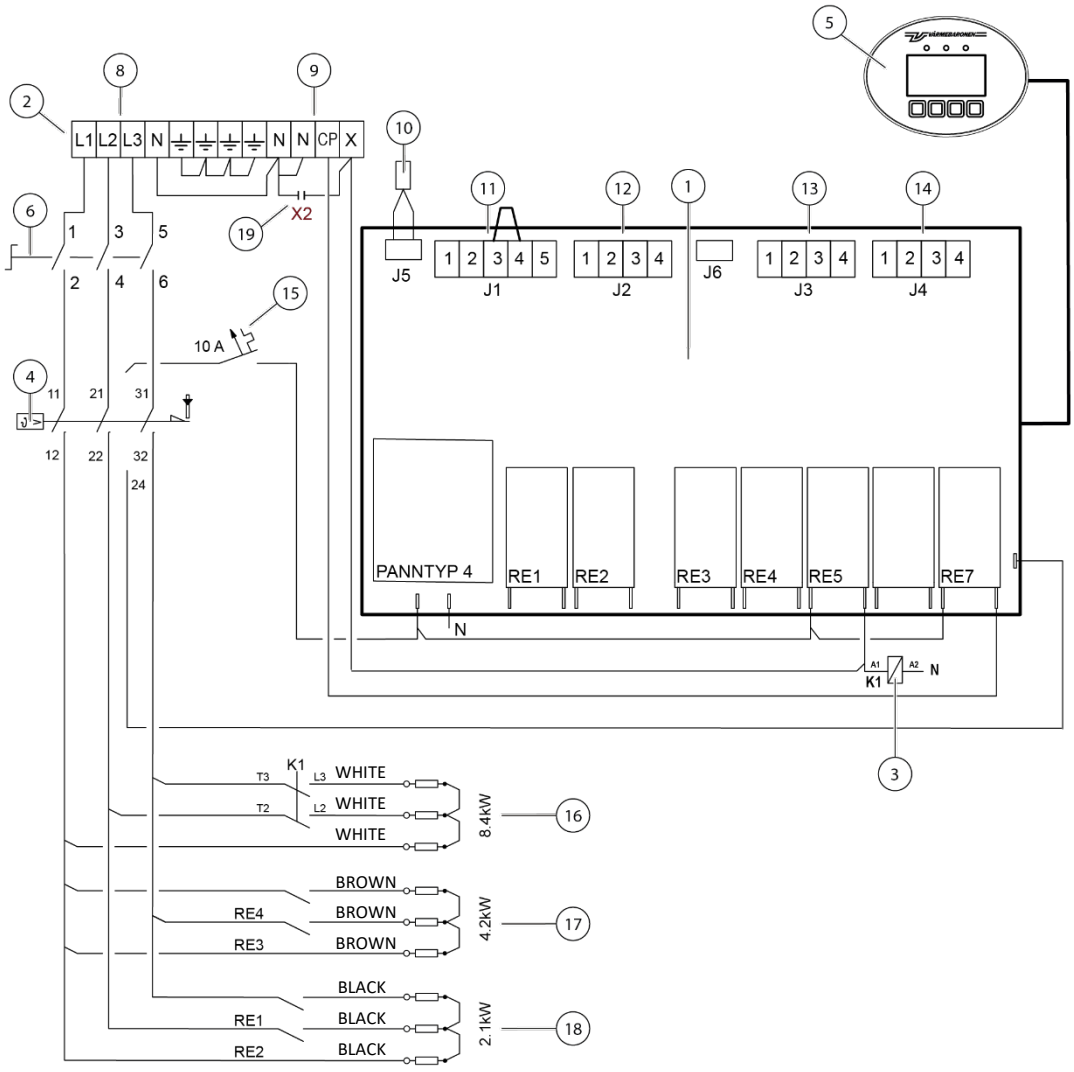
Always shut off the power before carrying out work on the boiler.

Overview and wiring diagram



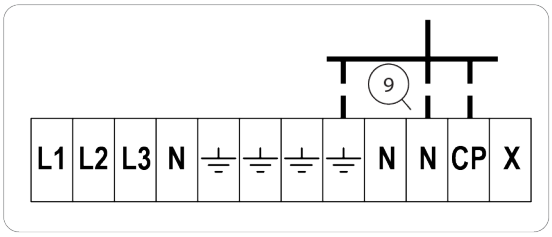
1. Circuit board, power
2. Terminal block
3. Contactor
4. Overheating protection
5. Circuit board, panel
6. Main switch
7. Cartridge head

Always shut off the power before carrying out work on the boiler.



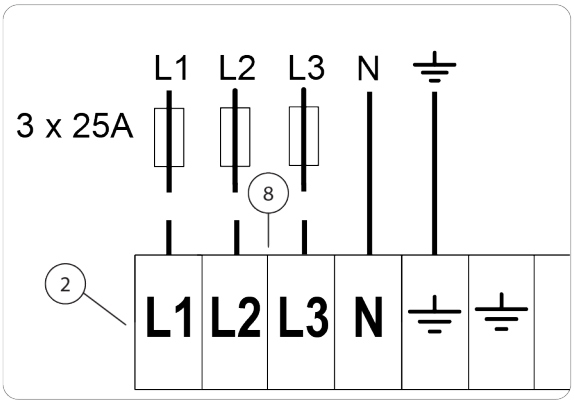
8. Connection 400V3N~
9. Circulation pump connection 230V~
10. Boiler temperature sensor
11. Connection for blocking or voltage control
12. Connection, outdoor sensor and alternative temperature (optional)
13. Optional room unit connection
14. Connection, current transformer for load guard
15. Circuit breaker
16. Heating element output group three, 8.4 kW
17. Heating element output group three, 4.2 kW
18. Heating element output group three, 2.1 kW
19. Anti-interference capacitor

Cable routing



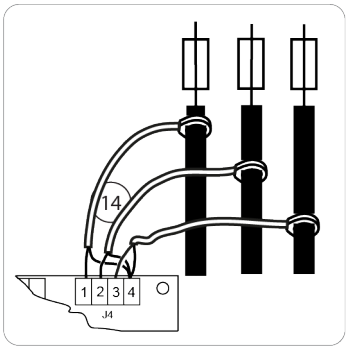
Circulation pump

Circulation pump – Operating voltage 230 V~ and max load 2 A. When the boiler controls the circulation pump, the circulation pump must be marked to indicate this. See number 9 on the wiring diagram on page 20.



Power supply

Read more about power supply in the technical specification on page 32. Connect to terminal block number 2 on the wiring diagram on page 20. Connect with 5-core cable.



Current transformers load guard

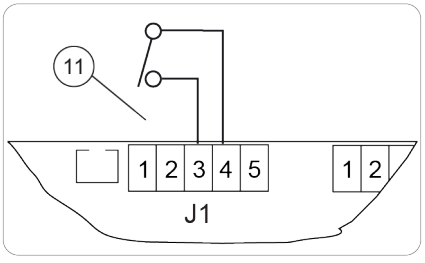
Only connect the current transformers when you are going to use the load guard. The load guard is not phase-sensitive.

Stage limitation

Limit the boiler's power stages in the service menu. Read more about limitation levels on page 32.

External inspection

The boiler output can be blocked by a potential-free contact or be controlled by an external voltage signal, 0–10 VDC. The external control signal controls the boiler's power stages 0–100% of set power. Set power refers to the number of stages the boiler is permitted to use. Read more about limitation levels on page 32.

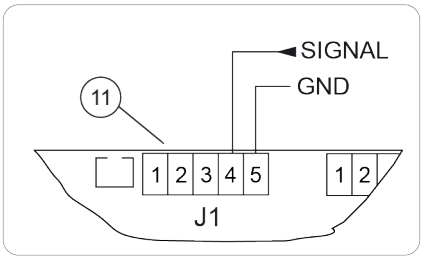


Blockage

Connect a potential-free connector to terminals 3 and 4. Remove the existing jumper between terminals 3–4. An open contact blocks the boiler. See number 11 on the wiring diagram on page 20.

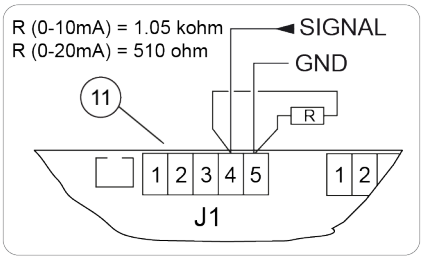
External limitation 0-10 V

Remove the existing jumper between terminals 3 and 4. Connect the control signal to terminals 4 and 5.
Set boiler's setpoint slightly higher than the required temperature as the boiler's temperature control is superior.



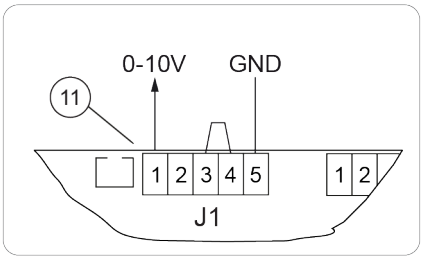
Direct control 0–10 V

The setpoint does not limit the boiler, only the over-temperature limit. Internal stage times control the time between the power stages. Adjust the over-temperature limit in the Advanced Service Level menu.



Power control 0–10 mA / 0–20 mA

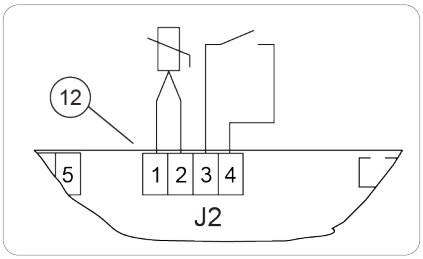
By connecting a resistor with a value as shown in the image to the left, the number of power stages can be controlled with a current signal. Otherwise the same as external limitation and direct control 0–10 V.



Power signal 0-10 V of connected power

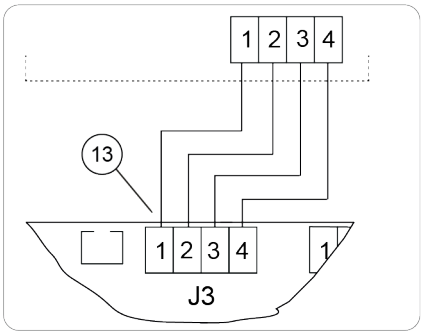
The connected power of the boiler can be read as a 0–10 VDC signal, which corresponds to 0–100% of the installed power.

Option



Outdoor sensor and alternative temperature

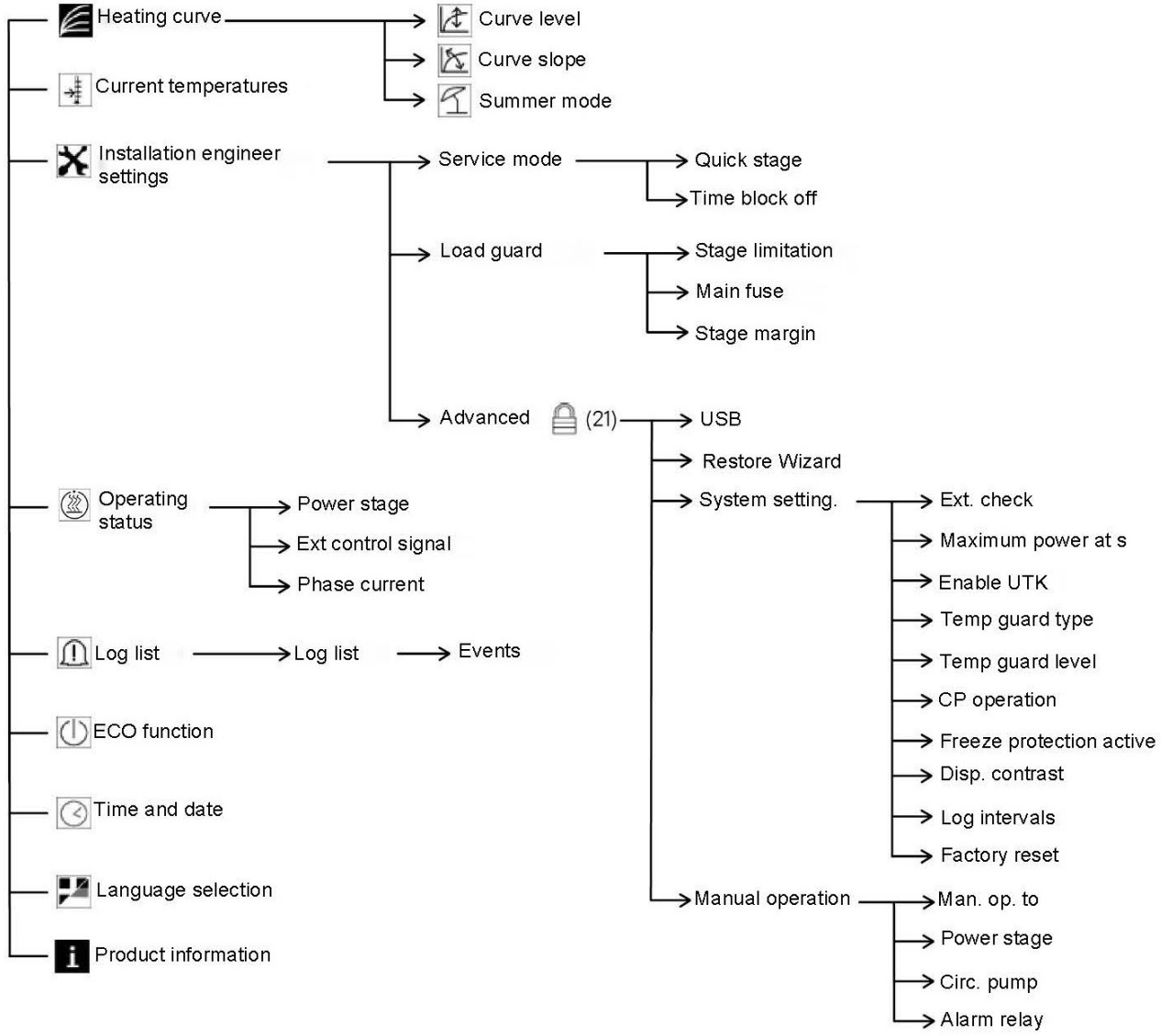
The temperature can be changed with an external potential-free contact function (Alternative temperature). Connection in terminals 3–4. Activated outdoor sensor is a prerequisite. See number 12 on the wiring diagram on page 20. Read more about outdoor sensor and alternative temperature on pages 6 and 23.



Room device

The room unit detects the room temperature and affects the boiler's temperature control to maintain the desired room temperature.
Read more in the information that is supplied with the room unit. See number 13 on the wiring diagram on page 20.

Navigating the menu



Menu functions

On the display	Explanation
Current temperatures (Main menu)	Displays current temperatures for Boiler temperature, Setpoint, Outdoor temperature, Room temperature. Room setpoint and Internal temperature.
Alt. temp (Installation engineer settings)	With the Alt. temp function connected, the user can shift the heating curve level in parallel with an external unit, such as GSM or a remote-controlled ON/OFF switch (optional). Note! If the boiler does not have an outdoor sensor and you activate the Alt. temp function, the boiler will block the power and disable the frost guard.
Advanced (Installation engineer settings)	Only installation engineers should make changes in the Advanced menu. Learn more about unlocking the Advanced menu on page 26.
Load guard (Installation engineer settings)	A connected load guard protects the main fuses from overload by stepping out the boiler output if the current becomes too high at the main fuses. This function does not need to be used.

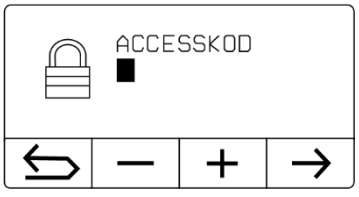
Setpoint (Current temperatures)	Desired flow temperature. If the outdoor sensor is activated, it controls the setpoint. If the outdoor sensor is deactivated, the user sets the setpoint via the panel.
Circ. Pump (Installation engineer settings / Manual operation)	Start and stop function of the circulation pump when manual operation is activated.
CP operation (Installation engineer settings / Advanced)	The circulation pump starts when the first power stage engages and stops 30 minutes after the final power stage has exited.
Dig In alt T (Main menu / Operating status)	1 is displayed if the Alt Temp input is activated. When it is active, the boiler temperature can be raised or lowered by the selected number of degrees (optional).
Disp. contrast	Adjusts the display's contrast. The factory setting is 10. Selectable values range from 10 to 34. The setting should not be changed.
Operating status (Main menu)	Information on current values. Current power, control signal 0–100% and current at main fuse.
ECO function (Main menu)	The ECO function must be switched on when the boiler is not in use. The ECO function activates the boiler's circulation pump every other day and prevents the circulation pump from seizing. Select ECO to activate and AUTO to deactivate the ECO function.
Power stage (Installation engineer settings / Manual operation)	When manual operation is activated, the power stages are controlled manually.
Ext. check (Installation engineer settings / Advanced)	External limitation (delivery setting) limits the boiler output with a 0–10 V control signal. The boiler works towards the specified setpoint with the power allowed via the control signal. 1.4 V 1 step, 2.8 V 2 steps, etc. When selecting Direct control, no consideration is given to the specified setpoint, rather the boiler output is connected in accordance with the control signal (0–10 V).
Factory reset (Installation engineer settings / Advanced)	This function is under development.
Phase current (Main menu / Operating status)	Displays the relevant current in Ampere through the main fuse. Requires the load guard to be connected.
Freeze protection Active (Installation engineer settings / Advanced)	The freeze protection system automatically shuts off the circulation pump and the boiler output, and issues an alarm if the flow temperature is below +3°C. If the water is mixed with corrosion-inhibiting glycol, you can deactivate the Freeze protection. Select YES to activate the Freeze protection and NO to deactivate the Freeze protection.
Main fuse (Installation engineer settings / Load guard)	Size of main fuse is stated in Ampere. Delivery setting 25A
Installation engineer settings (Main menu)	Should only be set by the installation engineer.

Internal temperature (Current temperatures)	The power circuit board's temperature.
Curve slope (Heating curve)	The curve slope regulates how much the flow temperature increases in relation to the outdoor temperature. Selectable values range from 21 to 60. Curve slope 50 corresponds to a flow temperature of 50°C when the outdoor sensor is registering 0°C (optional).
Curve level (Heating curve)	Parallel displacement of the heating curve up or down. Factory setting 20. Selectable settings range from 5 to 30 (optional).
Alarm relay (Installation engineer settings / Manual operation)	When manual operation is activated, the outgoing alarm signal can be activated or deactivated.
Log intervals (Installation engineer settings / Advanced)	This function is under development.
Log list (Main menu)	The log list shows information about triggered alarms, warnings and limitations.
Manual operation (Installation engineer settings / Advanced)	Manual operation is used to test the boiler's functions manually. Deactivates automatically after four minutes without any buttons being pressed.
Max. output start-up (Installation engineer settings / Advanced)	Delay or not of the boiler output after start-up. 1=no delay 2=max. 1/3 allowed immediately, 2/3 after 20 minutes and full power after 40 minutes.
Max. flow (Installation engineer settings / OTC)	The maximum permitted flow temperature. Factory setting 40°C. Adjusted according to the design of the system (optional).
Min. flow (Installation engineer settings / OTC)	The minimum permitted flow temperature. Factory setting 15°C. Adjusted according to the design of the system (optional).
Boiler temperature (Current temperatures)	The current flow temperature
Product information (Main menu)	Displays information about the boiler's software and hardware.
Restore Wizard (Installation engineer settings / Advanced)	Resets the WIZ button in the main menu and sets the parameters again.
Room setpoint (Current temperatures)	Desired room temperature. The user sets the Room setpoint via the room unit (optional).
Room sensor (Installation engineer settings / OTC)	Activate or deactivate the room unit (optional).
Room temperature (Current temperatures)	Displayed if room unit is connected and OTC function is active (optional).
Rapid stepping (Installation engineer settings / Service mode)	Temporarily speeds up the stepping in of the power for testing purposes.
Stage limitation (Installation engineer settings / Load guard)	How many power stages the boiler is allowed to use. The boiler's power is divided into 7 stages.

Stage margin (Installation engineer settings / Load guard)	The size of the power stages in 1/10 Ampere. Preset from the factory (31) and must not be changed.
Language selection (Main menu)	Selectable languages are Swedish and English.
System setting. (Installation engineer settings / Advanced)	Displays the advanced system settings menu.
Temp guard level (Installation engineer settings / Advanced)	Temperature at which the over-temperature protection is activated. Factory setting 10.
Temp guard type (Installation engineer settings / Advanced)	Choice of method for the over-temperature protection function. Select (ABS) for absolute value, the value that is set under Temp guard level. Select REL for the relative value when Temp guard level is added to the setpoint. Factory setting is relative value (REL).
Time and date (Main menu)	Reset if the boiler is disconnected from the power supply for more than 3 to 4 days.
Delay off (Installation engineer settings / Service mode)	Temporarily turns off the time delay of the power after start-up. (For testing purposes).
USB (Installation engineer settings / Advanced)	This function is under development.
Outdoor temperature (Current temperatures)	The current temperature registered by the outdoor sensor (optional).
OTC settings (Installation engineer settings)	Select YES to activate the outdoor sensor and NO to deactivate the outdoor sensor (optional).
Heating curve (Main menu)	The heating curve controls the temperature of the boiler in relation to the outdoor temperature. If an outdoor sensor and a room unit are installed, this adds the indoor measurement value to the boiler (optional).

Unlock Advanced in Installation engineer settings
The code for unlocking Advanced settings is 21.

1. Select Installation engineer settings.
2. Select Advanced.
3. Press the plus button until the number two appears in the black box below the text
4. Move the cursor to the right.
5. Press the plus button until the number 1 appears.
6. Press the right arrow key TWICE. You are now logged into Installation engineer settings/Advanced.



After 15 minutes of inactivity, the boiler will automatically log you out of Installation engineer settings/Advanced.

3.3. After installation

3.3.1. Registration

Fill out the enclosed registration form. Post the copy with the pre-printed address to Värmebaronen and give the other copy to the user.

3.3.2. Installation engineer's checklist

Before starting up the boiler

- ☐ Has the electrical installation been adapted to the local power supply?
- ☐ Are the boiler and heating system filled with water and vented.
- ☐ Is the pressure correct?
- ☐ Are all pipe connections leakproof?
- ☐ Are the valves set to the correct position?
- ☐ Is the vent valve open so that the air can escape?

After starting up the boiler

- ☐ Check that the outdoor sensor displays the correct temperature if an outdoor sensor is installed.
- ☐ Check that the room unit displays the correct temperature if an outdoor sensor is installed.
- ☐ Fill out the installation information on page 4 of the User Manual.
- ☐ Demonstrate the boiler to the customer in accordance with Customer demonstration/handover on page 27.
- ☐ Fill out and post the installation registration to register the boiler and the warranty.

3.3.3. Customer demonstration / handover

1. Demonstrate the parts and functions of the boiler to the user, and show where the information can be found in the User Manual.
2. Demonstrate how the user should fill the system with water via the filling valve.
3. Explain the home screen on the display (page 7 of the User Manual).
4. Show how the user can increase and decrease the boiler's temperature, or the heating curve level, using the optional outdoor sensor (pages 7 and 11–12 of the User Manual).

5. Explain the ECO function to the user and demonstrate how the user activates and deactivates the ECO function (page 8 of the User Manual).
6. Demonstrate how the user should set the time and date.
7. Explain alarms, warnings and limitations to the user (page 10 of the User Manual).
8. Demonstrate how the user acknowledges an alarm or warning (page 14 of the User Manual).
9. Demonstrate how the user resets the overheating protection (page 9 of the User Manual).

3.4. Troubleshooting

Work on the system which requires tools, must only be carried out by authorised installation engineers.

Ensure the boiler is disconnected from the power supply before starting work!

What has happened	Possible cause
No or insufficient heat.	Control valves in the system are restricting the flow. A setpoint that is too low has been set on the boiler. Check and adjust.
The boiler triggers the over-temperature protection prematurely.	Check the settings for Temp guard level and Temp guard type in the installation Settings / Advanced / System Settings. Read more about Temp guard on page 26.
The boiler's display and indicator lights are turned off.	• Check the fuses and that the boiler's control switch is in the on position. • Electric boiler has no power – check the main fuses. • Main and/or control switch off – set the switches to the On position. Activation delay locks the boiler if it has had no power. • Control fuse tripped – check where the short circuit is, take remedial action and then reset the fuse. • Malfunction of the control electronics – change the power circuit board.
The group fuses for the boiler are triggered.	Immersion heater damaged. Check the insulation of the immersion heaters, which are accessible when the boiler's lower front plate and insulation are removed. Replace defective immersion heater. When the new immersion heater is in place, check that the power cables are not in contact with the electrical connections.
Uneven regulation; the boiler steps up a few stages and immediately steps down again.	Water flow through the electric boiler too low. Check that circulation pumps and valves are working. This is an easy way to get an idea of the level of flow through the boiler: 1. Limit the power stages of the boiler so that the power is constant, for example four power stages. 2. Let the boiler's temperature become stable.

	3. Measure the temperature increase between the return and flow lines of the boiler. 4. Calculate the flow through the boiler using the formula below. 5. Check against the flow details whether the flow is adequate. q = P/(Δt x 1.16) q = water flow in m3/h (m3/h x 1000/3600 = litres/second) P = electric boiler power output in kW Δt = difference in temperature between the boiler's return and flow lines in °C 1.16 = the water's thermal absorption coefficient
The boiler does not step up power even though the temperature in the boiler is lower than the set value.	• The boiler stages are limited – check the "Number of power stages" setting. • The boiler is controlled by an external signal – check the voltage of the signal. • Outdoor temperature compensator connected – check the setting for the OTC function. • The temperature sensor is defective – take control measurements of the temperature sensor.

Manual operation - test mode

In order to test the boiler's functions when troubleshooting, you can control the power stage, the circulation pump and the buzzer alarm relay manually. Read more about activating Manual operation on pages 25–26.

Troubleshooting boiler temperature sensor

The boiler temperature sensor must not be connected to the power circuit board during resistance measurement. When the boiler is energized, voltage is measured in the sensor's connection points at the PCB.

Values

°C	kΩ	Vdc	°C	kΩ	V	°C	kΩ	Vdc
5	141.9	4.7	**40**	30.0	3.7	**75**	8.2	2.3
10	111.6	4.6	**45**	24.6	3.6	**80**	6.9	2.0
15	88.3	4.5	**50**	20.2	3.3	**85**	5.8	1.8
20	70.3	4.4	**55**	16.7	3.1	**90**	5.0	1.7
25	56.3	4.2	**60**	13.9	2.9	**95**	4.2	1.5
30	45.4	4.1	**65**	11.6	2.7	**100**	3.7	1.3
35	36.8	3.9	**70**	9.7	2.5			

Troubleshooting outdoor sensor (optional)

The outdoor sensor must not be connected to the power circuit board during resistance measurement. When the boiler is energized, voltage is measured in the sensor's connection points at the PCB.

Values

°C	kΩ	V	°C	kΩ	V
-40	88.7	4.5	**0**	8.8	2.3
-35	64.2	4.3	**5**	6.8	2.0
-30	47.0	4.1	**10**	5.4	1.7
-25	34.7	3.9	**15**	4.2	1.5
-20	25.9	3.6	**20**	3.4	1.3
-15	19.5	3.3	**25**	2.7	1.1
-10	14.8	3.0	**30**	2.2	0.9
-5	11.4	2.7			

Error codes

Code	Explanation
F01: Boiler temperature sensors	Alarm: The boiler's temperature sensor is broken or the temperature cannot be measured.
F02: Temp sensor PCB	Alarm: Incorrect value or interruption/short circuit on sensor.
F03: Low boiler temp	Alarm: The boiler temperature is +3°C or lower.
F05: Overheating protection triggered	Alarm: All relays/contactors release, circulation pump continues to run.
F06: Low input voltage	Alarm: Excessively low supply voltage to electronics. The relay outputs on the control are blocked
W01: High temperature around the PCB	Warning: Temperature over 45°C. When the temperature drops below 42°C and a warning is acknowledged, the boiler resumes heating. Power steps down: temperature above 55°C Power steps in: temperature below 45°C
W02: High boiler temp	Warning: The over-temperature protection has temporarily stopped the boiler from heating. At overtemperature, the connected power steps out and steps in again only when the temperature has dropped below the limit.
W03: Low boiler temp	Warning: The boiler temperature is (or has been) +7°C or lower. The boiler should always maintain at least 7°C during operation, regardless of the specified setpoint. If external blocking/external control is active, the boiler is not allowed to step in power. If the load guard limits, the boiler must not step in power.

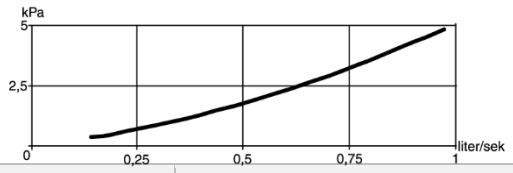
W04: Outdoor sensor	Warning: The outdoor sensor is faulty or outside the measurement range. The regulation continues to regulate and assumes outdoor temperature = 0°C.
W05: Room sensor	Warning: The room unit is faulty or outside the measurement range. The room unit is disconnected from the control until the alarm is acknowledged and the sensor is repaired.
W06: Room sensor, handwheel setting	Warning: The setting control for the room unit is faulty or outside the measuring range. The room unit is disconnected from the control until the alarm is acknowledged and the sensor is repaired.
B01: Connection delay	Power on limitation active. When the boiler is restarted after a voltage drop, the following is connected as necessary: 1/3 of the output immediately, max 2/3 after 20 minutes and the remainder 40 minutes after power has returned. In service mode, accelerated delay can be run. The time delay can also be removed permanently.
B02: The load switch limits	The boiler output is limited to avoid tripping the main fuses due to overload. The message goes out when the situation has ceased. No action is required.
B03: Ext Limitation	Limitation: External limitation: blockage or alternative temperature is activated. 0–10 V at the input corresponds to 0–100% installed power.
B04: Manual operation	Limitation: Manual operation of the boiler is activated (switches off automatically after 4 minutes).
ECO function	Limitation: The ECO function is activated.
X01: Boot	Limitation: Start-up has taken place.

Alarm
When the boiler activates an alarm, an alarm signal sounds and the red indicator light flashes. When the user or installation engineer has acknowledged the alarm, the alarm signal stops and the red indicator light stays on until the cause of the alarm ceases by itself or is rectified. Information about the alarm remains in the log list.

Warning
When the boiler activates a warning, the yellow indicator light flashes. When the user or installation engineer has acknowledged the warning, the yellow indicator light stays on until the cause of the warning ceases by itself
or is rectified. Information about the warning remains in the log list.

Limitation
When a value in the boiler reaches a set limit value and the boiler activates a limitation, the green indicator light flashes. When no limitations are activated, the green indicator light will be permanently lit

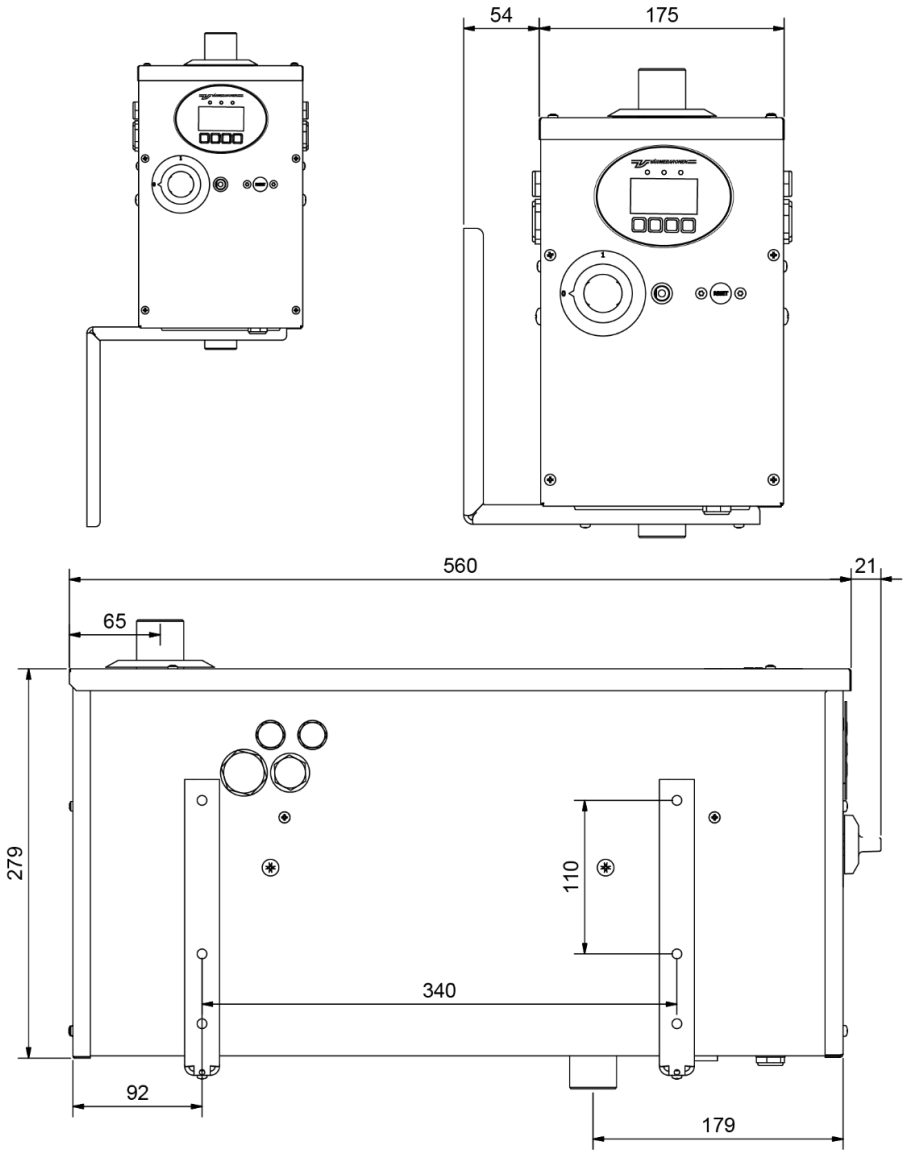
3.5. Technical specification

Type	EK 15 E
Article number	1212
Power	14.7 kW
Current	21.2 A
Number of steps	7
Highest fuse	25 A
Voltage, Power	400 V3N~
Voltage tolerance	≤ ± 10 %
Frequency	50Hz
Sealing nipple	Diameter 28.3, 22.5, 18.6 mm
Cable connection	5x6 mm² Cu
Flow requirements	
Recommended Δt = 10°C	0.35 litre/sec
Min/Max Δt = 25°C / 5°C	0.2/0.7 litres/sec
Pressure drop	
Height	279 mm
Width	175 mm
Depth	581 mm
Protection class	IPx1
Design temperature	110°C
Temperature range	20–95°C
Ambient temperature	10-30°C
Design pressure	3 bar
Test pressure	4.3 bar
Volume	3.6 litres
Weight (empty)	13 kg
Weight (filled with water)	16.6 kg
Connection flow line / return	R 25 ext.
Manufactured to	PED 2014/68/EU article 4.3

Limitation levels

Stage	Power kW	Current A
1	2.1	3
2	4.2	6.05
3	6.3	9.1
4	8.4	12.1
5	10.5	15.1
6	12.6	18.1
7	14.7	21.2

Dimensional sketch



Components

Art. no.	Designation	Quantity
90047	Container with immersion heater	1
21064	Circuit board, power	1
210206	Boiler temperature sensor	1
360020	Current transformer	3
170046	Contactor, power group 3	1
120025	Overheating protection	1
130010	Power switch	1
700223	Shaft of power switch	1

Art. no.	Designation	Quantity
120009	Knob of power switch	1
180021	Circuit breaker	1
210232	Circuit board, panel	1
210233	Overlay	1
90032	Wall bracket	2
1921	Optional outdoor sensor	1
2964	Optional room unit	1
1950	Optional remote control	1