

Installation and maintenance instructions



geoTHERM

VWS 36/4.1 230V

GB

Publisher/manufacturer

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 **Vaillant**

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1 Safety

1 Safety

1.1 Action-related warnings

Classification of action-related warnings

The action-related warnings are classified in accordance with the severity of the possible danger using the following warning signs and signal words:

Warning symbols and signal words



Danger!

Imminent danger to life or risk of severe personal injury



Danger!

Risk of death from electric shock



Warning.

Risk of minor personal injury



Caution.

Risk of material or environmental damage

1.2 General safety information

1.2.1 Danger caused by improper operation

Improper operation may present a danger to you and others, and cause material damage.

- ▶ Carefully read the enclosed instructions and all other applicable documents, particularly the "Safety" section and the warnings.
- ▶ Only carry out the activities for which instructions are provided in these operating instructions.

1.2.2 Risk caused by inadequate qualifications

Applicability: Not for Russia and Kazakhstan

OR Not for Russia

OR Not for Kazakhstan

The following work must only be carried out by competent persons who are sufficiently qualified to do so:

- Set-up
- Dismantling
- Installation
- Start-up
- Inspection and maintenance

- Repair
- Decommissioning
- ▶ Observe all instructions that are included with the product.
- ▶ Proceed in accordance with current technology.
- ▶ Observe all applicable directives, standards, laws and other regulations.

1.2.3 Risk of death due to lack of safety devices

The schematic drawings included in this document do not show all safety devices required for correct installation.

- ▶ Install the necessary safety devices in the system.
- ▶ Observe the applicable national and international laws, standards and guidelines.

1.2.4 Risk of death from electric shock

There is a risk of death from electric shock if you touch live components.

Before commencing work on the product:

- ▶ Unplug the mains plug.
- ▶ Or disconnect the product from the power supply by switching off all power supplies (electrical partition with a contact gap of at least 3 mm, e.g. fuse or circuit breaker).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the capacitors have discharged.
- ▶ Check that there is no voltage.

1.2.5 Danger due to malfunctions

Ensure that the heating installation is in a technically perfect condition.

- ▶ Ensure that no safety or monitoring devices have been removed, bridged or disabled.
- ▶ Immediately eliminate any faults and damage that may affect safety.
- ▶ Install the control in a location where it is not covered by furniture, curtains, or other objects.
- ▶ If room temperature modulation is activated, be aware that, in the room where the control is mounted, all the radiator valves must be fully open.



- ▶ Do not use the products' free terminals as supporting terminals for other wiring.
- ▶ At lengths of over 10 m, 230 V connection cables must be laid separately from sensor or bus lines.

1.2.6 Preventing the risk of injury from corrosive brine fluid

The brine fluid ethylene glycol is harmful to health.

- ▶ Avoid contact with the skin and eyes.
- ▶ Always wear gloves and protective goggles.
- ▶ Do not inhale or swallow.
- ▶ Observe the safety data sheet that accompanies the brine fluid.

1.2.7 Preventing the risk of injury due to scalding from hot and cold components

Particularly in the refrigeration circuit, the components of the heat pump can reach high temperatures or extremely low temperatures.

- ▶ Do not touch any uninsulated pipelines in any part of the heating installation.
- ▶ Do not remove any casing sections.
- ▶ Do not touch the compressor, as it can become extremely hot during operation.
- ▶ If the components have reached the environmental temperature, you can start work.

1.2.8 Risk of injury due to the heavy weight of the product

- ▶ Make sure that the product is transported by at least two people.

1.2.9 Preventing the risk of injury from freezing as a result of touching refrigerant

The product is delivered with an operational filling of R410A refrigerant. This is a chlorine-free refrigerant which does not affect the Earth's ozone layer. R410A is neither a fire hazard nor an explosion risk. Escaping refrigerant may cause freezing if the exit point is touched.

- ▶ If refrigerant escapes, do not touch any components of the product.

- ▶ Do not inhale any steam or gases that escape from the refrigerant circuit as a result of leaks.
- ▶ Avoid skin or eye contact with the refrigerant.
- ▶ In the event of skin or eye contact with the refrigerant, seek medical advice.

1.2.10 Risk of material damage caused by condensate inside the house

In heating mode, the lines between the heat pump and the heat source (environment circuit) are cold, which means that condensate may form on the lines in the house. In cooling mode, the building circuit lines are cold, which means that condensate may also form if the temperature falls below the dew point. Condensate may lead to material damage, for example due to corrosion.

- ▶ Ensure that you do not damage the heat insulation on the lines.

1.2.11 Material damage due to additives in the heating water

Unsuitable frost or corrosion protection agents may damage seals and other components of the heating circuit, and may therefore also cause water leaks.

- ▶ Only add approved frost and corrosion protection agents to the heating water.

1.2.12 Damage to the building caused by missing isolator devices

Missing isolator devices may lead to damage to the building.

- ▶ Install the isolator devices that are required in accordance with the installation standards.

1.2.13 Frost damage due to an unsuitable installation site

Frost poses a risk of damage to the product and the whole heating installation.

Even if rooms, or the whole flat, are not in use for certain periods, the heating must remain in operation.

Frost protection and monitoring devices are only active while the product is connected to the power supply. The product must be connected to the power supply.



1 Safety



The heat pump itself does not have a frost protection function. For smooth operation of the refrigeration circuit, a minimum room temperature of 7 °C must be maintained. If the room temperature falls below 7 °C, this may lead to frost damage on the heat pump.

1.2.14 Frost damage caused by insufficient room temperature

If the room temperature is set too low in individual rooms, it cannot be ruled out that sections of the heating installation might be damaged by frost.

- ▶ If you are going to be away during a cold period, ensure that the heating installation remains in operation and that the rooms are sufficiently heated.
- ▶ You must observe the frost protection instructions.

1.2.15 Frost damage as a result of a power cut

If the power supply is cut, it is possible that parts of the heating installation may become damaged by frost.

If you want to use an emergency power generator to maintain the operational readiness of the product during a power cut, note the following:

- ▶ Make sure that the technical values of this emergency power generator (frequency, voltage, earthing) match those of the power grid.

1.2.16 Material damage due to unsuitable installation surface

The installation surface must be even and have sufficient load-bearing capacity to support the operating weight of the product. An uneven installation surface may cause leaks in the product. If the installation surface does not have sufficient load-bearing capacity, the product may become detached and fall off. There is a risk of death if the connections are subject to leaks.

- ▶ Make sure that the product is positioned flush against the installation surface.
- ▶ Ensure that the installation surface has sufficient load-bearing capacity to bear the operating weight of the product.

1.2.17 Risk of material damage caused by using an unsuitable tool

- ▶ Use the correct tool to tighten or loosen threaded connections.

1.2.18 Product fault as a result of incorrect system pressure

To avoid operating the system with too little water and thus prevent resulting damage, note the following:

- ▶ Check the system pressure of the heating installation at regular intervals.
- ▶ The system pressure instructions must be observed.

1.2.19 Avoid environmental damage caused by escaping refrigerant

The product contains R 410 A refrigerant. The refrigerant must not be allowed to escape into the atmosphere. R410A is a fluorinated greenhouse gas covered by the Kyoto Protocol, with a GWP of 2088 (GWP = global warming potential). If this gas escapes into the atmosphere, its impact is 2088 times greater than the natural greenhouse gas CO₂.

Before the product is disposed of, the refrigerant that is contained in it must be completely drained into a suitable vessel so that it can then be recycled or disposed of in accordance with regulations.

- ▶ Ensure that only officially certified competent persons with appropriate protective equipment carry out maintenance work on the refrigerant circuit or access it.
- ▶ Arrange for the refrigerant that is contained in the product to be recycled or disposed of by a certified competent person in accordance with the regulations.

1.3 Intended use

There is a risk of injury or death to the user or others, or of damage to the product and other property in the event of improper use or use for which it is not intended.

The brine-to-water heat pump is designed for use as a heat generator for closed heating installations. The product is intended exclusively for domestic use as a heat generator for closed central heating installations. Operating the product outside the operating limits res-





ults in the product being switched off by the internal control and safety devices.

Intended use includes the following:

- observance of accompanying operating, installation and maintenance instructions for the product and any other system components
- installing and fitting the product in accordance with the product and system approval
- compliance with all inspection and maintenance conditions listed in the instructions.

Intended use also covers installation in accordance with the IP class.

Any other use that is not specified in these instructions, or use beyond that specified in this document, shall be considered improper use. Any direct commercial or industrial use is also deemed to be improper.

Caution.

Improper use of any kind is prohibited.

1.4 Regulations (directives, laws, standards)

- ▶ Observe the national regulations, standards, guidelines and laws.



2 Notes on the documentation

2 Notes on the documentation

2.1 Observing other applicable documents

- ▶ You must observe all the operating and installation instructions included with the system components.

2.2 Storing documents

- ▶ Pass these instructions and all other applicable documents on to the system operator.

2.3 Validity of the instructions

These instructions apply to products with the following type designations and article numbers only:

Type designation	Art. no.
VWS 36/4.1 230 V	0010022462

- ▶ You can find the 10-digit article number for the heat pump on the plate that is located behind the front flap. The seventh to sixteenth digits of the serial number on the data plate form the article number.

3 Product description

3.1 Safety devices

3.1.1 Frost protection function

The frost protection function for the system is controlled via the system control. If the system control fails, the heat pump guarantees limited frost protection for the heating circuit.

3.1.2 Protection against low heating water pressure

This function continuously monitors the pressure of the heating water in order to prevent a possible loss of heating water.

An analogue pressure sensor switches off the heat pump if the water pressure drops below the minimum pressure. It switches the heat pump on again if the water pressure reaches the operating pressure.

- Minimum heating water pressure: ≥ 0.05 MPa (≥ 0.50 bar)
- Heating water operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)

3.1.3 Brine pressure detector

The brine loss protection system continuously monitors the fluid pressure in the environment circuit in order to prevent a possible shortage of fluid.

An analogue pressure sensor switches off the heat pump if the fluid pressure drops below the minimum pressure. It switches the heat pump on again if the fluid pressure reaches the operating pressure.

- Minimum brine fluid pressure: ≥ 0.05 MPa (≥ 0.50 bar)
- Brine fluid operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)

3.1.4 Freeze protection

This function prevents the evaporator from freezing when the heat source temperature drops below a certain value.

The outlet temperature of the heat source is constantly measured. If the outlet temperature of the heat source falls below a certain value, the compressor temporarily switches off and displays a status message. If this fault occurs three times in succession, the unit is permanently shut down and displays a fault message.

3.1.5 Pump- and valve-blocking protection system

This function prevents the pumps for heating water and brine and all diverter valves from sticking. The pumps and the valves, which were out of operation for 23 hours, are switched on for 10 - 20 seconds, one after the other.

3.1.6 High-pressure pressure switch in the refrigeration circuit

The high-pressure pressure switch shuts down the heat pump if the pressure in the refrigeration circuit is too high.

If the pressure in the heat pump's refrigeration circuit exceeds the maximum pressure, the high-pressure pressure switch temporarily shuts down the heat pump. Following a waiting period, another attempt is made to start the heat pump. After eleven failed start attempts in succession, a fault message is displayed.

- Max. refrigeration circuit pressure: 4.15 MPa (g) (41.50 bar (g))
- Waiting period: 5 minutes (after the first occurrence)
- Waiting period: 30 minutes (after the second and every further occurrence)

The fault counter is reset if both of the following conditions are met:

- Heat requirement without switching off prematurely
- 60 minutes of uninterrupted operation

3.1.7 Pressure sensor in the heating circuit and brine circuit

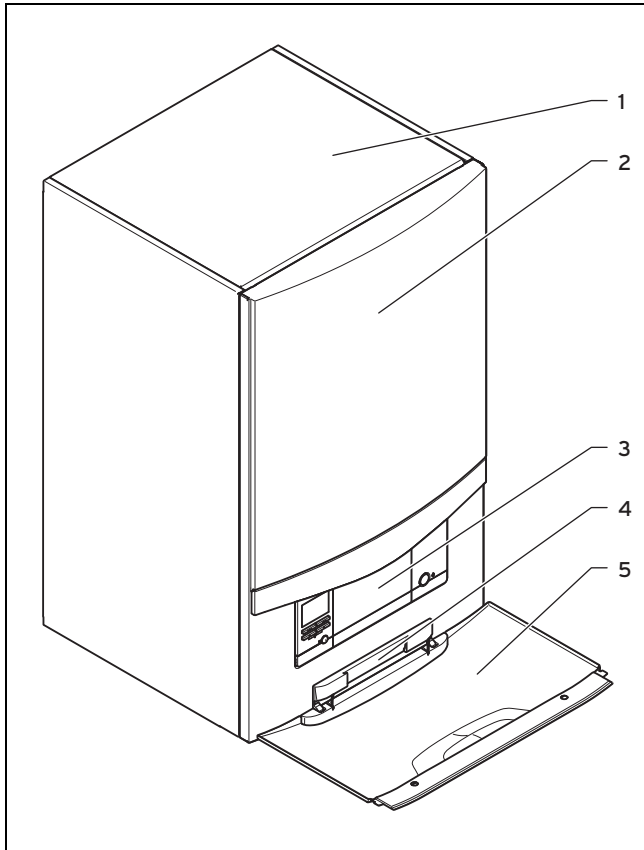
The heating circuit and brine circuit each have a pressure sensor which measures the actual pressure.

The pressure can be read in the heat pump's display. If the pressure in either of the circuits falls below the minimum operating pressure, a fault message is shown in the heat pump's display.

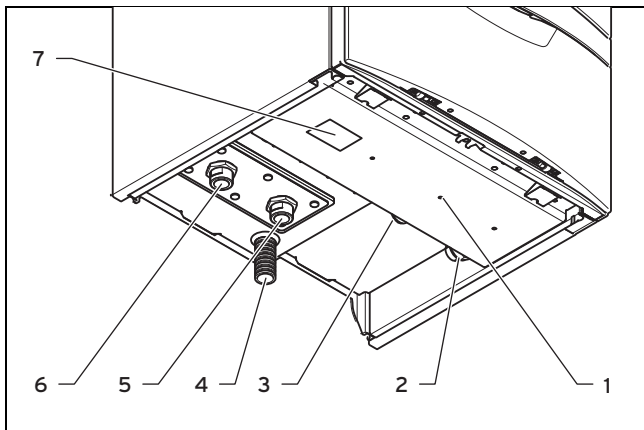
- Heating water operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)
- Brine fluid operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)

3.2 Design and functionality of the product

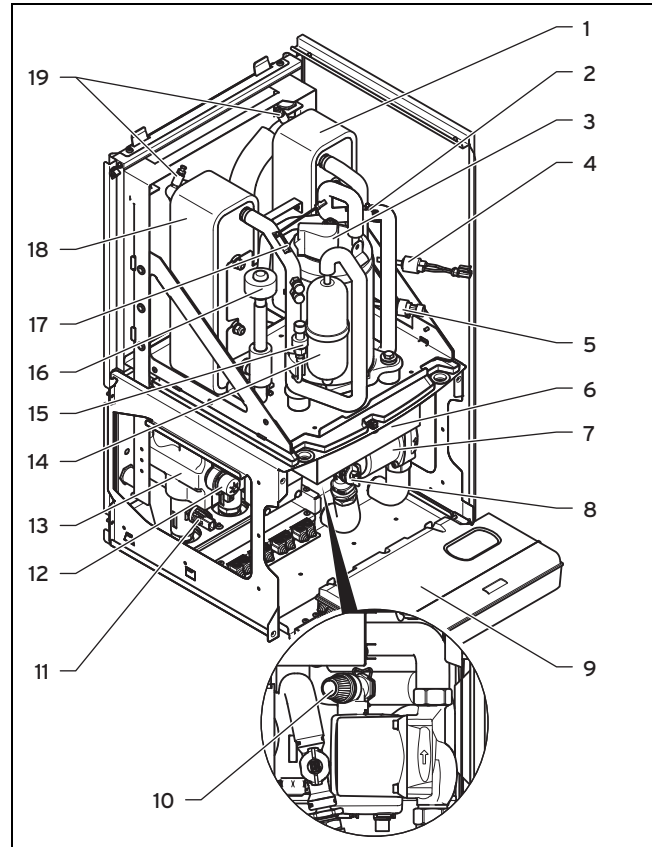
3.2.1 Design



- | | | | |
|---|-----------------|---|--------------------------------------|
| 1 | Removable hood | 4 | Plate with serial number on the rear |
| 2 | Front casing | 5 | Front flap |
| 3 | Operating panel | | |



- | | | | |
|---|--|---|--|
| 1 | Cable feedthrough for electrical connections | 5 | From the heat pump to the heat source (cold brine) |
| 2 | Heating return | 6 | From the heat source to the heat pump (hot brine) |
| 3 | Heating flow | 7 | Data plate |
| 4 | Expansion relief valve drain hose | | |

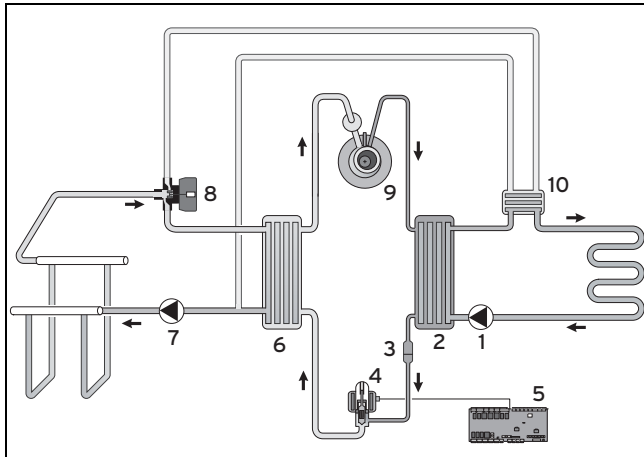


- | | | | |
|----|--|----|-------------------------------------|
| 1 | Condenser | 11 | Brine circuit pressure sensor |
| 2 | Compressor outlet temperature sensor | 12 | Brine mixer |
| 3 | Rotary piston compressor | 13 | Brine pump |
| 4 | High-pressure pressure switch | 14 | Refrigerant collector |
| 5 | High-pressure sensor | 15 | Low-pressure sensor |
| 6 | Relay PCB | 16 | Electronic expansion valve |
| 7 | Heating pump | 17 | Compressor inlet temperature sensor |
| 8 | Flow rate sensor | 18 | Evaporator |
| 9 | Switch box | 19 | Purging valves |
| 10 | Heating circuit expansion relief valve | | |

3 Product description

3.2.2 Functionality

3.2.2.1 Heat pump



- | | |
|------------------------------|--------------------------------|
| 1 Heating pump | 6 Evaporator |
| 2 Condenser | 7 Brine pump |
| 3 Filter element | 8 Brine mixer |
| 4 Electronic expansion valve | 9 Rotary compressor |
| 5 Printed circuit board | 10 Intermediate heat exchanger |

The product is a brine-to-water heat pump and uses geothermal energy as a heat source.

The heat pump consists of the following separate circuits which are coupled with one another by means of heat exchangers. These circuits are:

- The brine circuit, which extracts the thermal energy from the ground or the ground water and transfers this to the refrigeration circuit
- The refrigerant circuit, which is used to bring the thermal energy from the ground to a usable, higher temperature level and deliver it to the heating circuit
- The heating circuit, which is used to heat up the living rooms

3.3 Information on the data plate

The data plate is mounted on the underside of the product.

Information on the data plate	Meaning
Serial no.	Unique unit identification number
	Measuring voltage of the compressor, pumps and controls
P max	Maximum rated power
I max	Maximum in-rush current
	Refrigerant type, fill quantity, permissible rated overpressure
COP B0/W35	Output figure (coefficient of performance) at a brine temperature of 0 °C and heating flow temperature of 35 °C
COP B0/W55	Coefficient of performance at a brine temperature of 0 °C and heating flow temperature of 55 °C

Information on the data plate	Meaning
B0/W35	Heating output at a brine temperature of 0 °C and heating flow temperature of 35 °C
B0/W55	Heating output at a brine temperature of 0 °C and heating flow temperature of 55 °C
Volt	Mains voltage
Hz	Mains frequency
W	Power consumption
IP	Protection class
	Information on disposal
	Reading the operating and installation instructions

3.4 Explanation of product stickers

Symbol on the sticker	Meaning
	Heating flow connection
	Heating return connection
	Connection from the heat source to the heat pump (hot brine)
	Connection from the heat pump to the heat source (cold brine)
	Brine heat source

3.5 CE label



The CE label shows that the products comply with the basic requirements of the applicable directives as stated on the identification plate.

The declaration of conformity can be viewed at the manufacturer's site.

3.6 Benchmark

Applicability: Great Britain

Vaillant is a licensed member of the Benchmark Scheme.

Benchmark places responsibilities on both manufacturers and installers. The purpose is to ensure that customers are provided with the correct equipment for their needs, that it is installed, commissioned and serviced in accordance with the manufacturer's instructions by a competent person approved at the time by the Health and Safety Executive and that it meets the requirements of the appropriate Building Regulations. The Benchmark Checklist can be used to demonstrate compliance with Building Regulations and should be provided to the customer for future reference.

Installers are required to carry out installation, commissioning and servicing work in accordance with the Benchmark Code of Practice which is available from the Heating and Hotwater Industry Council who manage and promote the Scheme.

Benchmark is managed and promoted by the Heating and Hotwater Industry Council.



For more information visit www.centralheating.co.uk

4 Set-up

4.1 Removing the packaging

- ▶ Carefully remove the packaging and padding without damaging the parts of the product.



Note

Remove the transport locks from the product only after it has been mounted on the wall or on the mounting frame.

4.2 Checking the scope of delivery

- ▶ Check that the scope of delivery is complete.

Quantity	Designation
1	Unit mounting bracket
1	Bag of small parts with fixing material
1	Heat insulation for the brine line
1	Heat pump
1	Installation set: <ul style="list-style-type: none"> – 4 x compression fitting – 2 x connection pipe (22 mm Cu) – 2 x seal with metal support ring for brine circuit, – 2 x flat seal for heating circuit
1	Enclosed documentation

4.3 Selecting the installation site

- ▶ Select a dry room that is frost-proof throughout and where the environmental temperature does not fall below 7 °C and does not exceed a maximum of 40 °C.
- ▶ The installation room must have a minimum volume of 1.60 m³ at a refrigerant volume of 0.70 kg (R410A).
- ▶ Ensure that the required minimum clearances can be maintained.
- ▶ Choose the installation site so that, where possible, vibrations that occur during operation are not transferred.
- ▶ Ensure that the fastening is adapted to the circumstances so that it can bear the weight of the heat pump.
 - Weight without packaging: 59 kg
- ▶ In the case of walls with a mass per unit area of less than 200 kg/m², lightweight construction walls and, in particular, dry-lined walls, use a mounting frame for the prewall installation of the heat pump in order to prevent vibrations and resulting noise emissions.
- ▶ Secure the mounting frame to the wall only at floor and ceiling level in order to minimise vibrations.
- ▶ Ensure that cables can be easily routed (for brine, domestic hot water and heating).
- ▶ Use an open hopper for the drain hose on the expansion relief valve in the heating circuit.
- ▶ Ensure that there is an option to divert any condensate that forms.

4.4 Transporting the heat pump



Warning.

Risk of injury from lifting a heavy weight.

The heat pump weighs 59 kg.

- ▶ To prevent injuries, have several people lift the heat pump.



Caution.

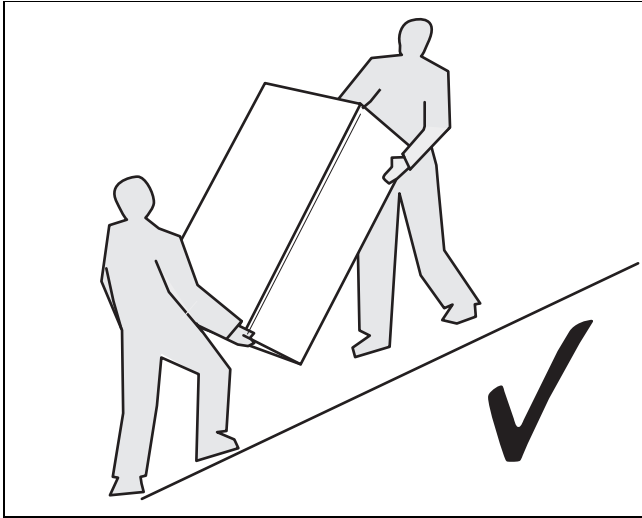
Risk of damage due to improper transportation.

Regardless of the mode of transport, the heat pump must never be tilted by more than 45°. Otherwise, this may lead to faults in the refrigerant circuit during subsequent operation. In the worst case scenario, this may lead to a fault in the whole system.

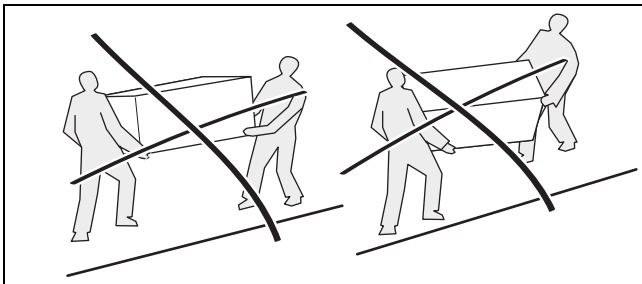
- ▶ During transport, do not tilt the heat pump by any more than the maximum angle of 45°.

1. Have two people lift the product on the frame.
2. Transport the product to the installation site.

4 Set-up

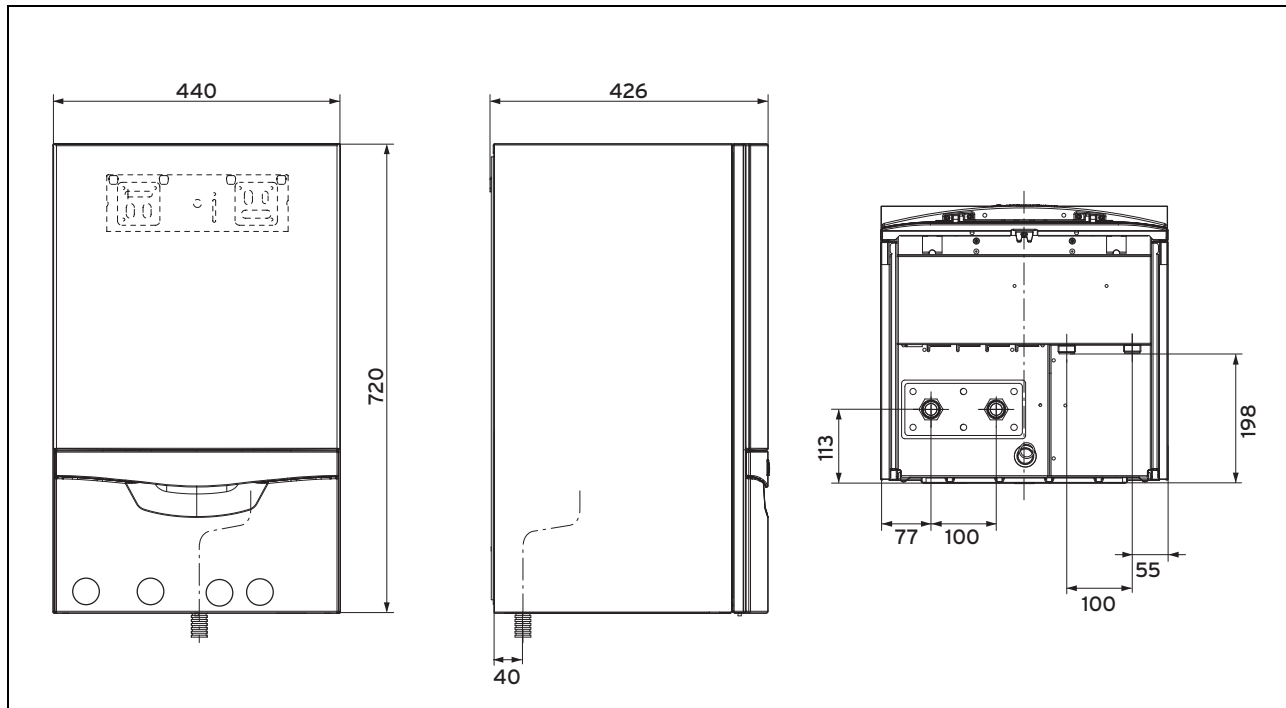


3. Always transport the product as illustrated above.



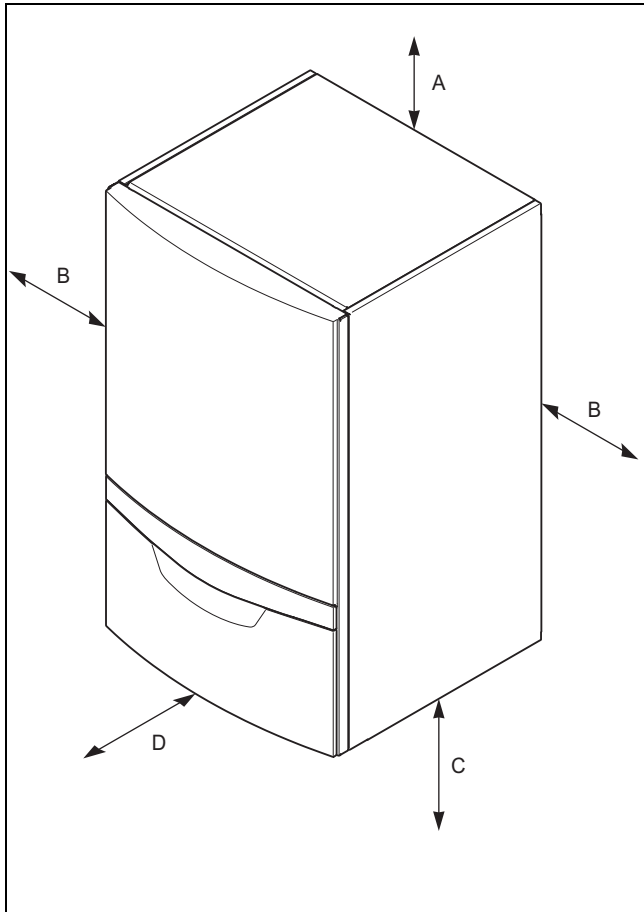
4. Never transport the product as illustrated above.

4.5 Dimensions



4 Set-up

4.6 Minimum clearances



The product is securely mounted on a wall.

	Minimum clearance to the uniTOWER and domestic hot water cylinder	Minimum clearance to the MEH 60, MEH 61 and gas-fired wall-hung boiler
A	200 mm	
B	300 mm	100 mm
C	500 mm	
D	600 mm	

- ▶ Comply with the minimum clearances specified in order to facilitate maintenance work.

If the product is mounted next to the uniTOWER accessory module, a clearance of 300 mm must be maintained.

If the product is mounted next to the MEH61/60 accessory module, a clearance of 100 mm must be maintained.

4.7 Using the mounting template

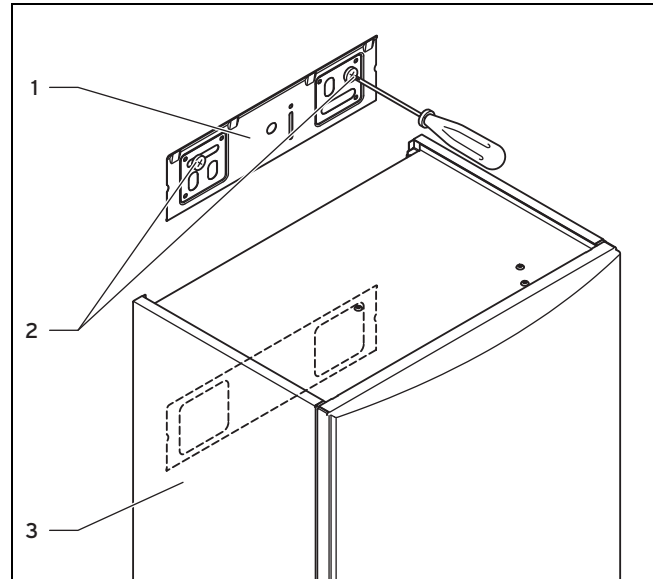


Note

A mounting template is supplied with the product to aid wall mounting.

1. Position the mounting template vertically over the installation site.
2. Attach the template to the wall, using tacks for example.
3. Mark the drill holes for the unit mounting bracket on the wall.

4.8 Wall-mounting the product



Danger!

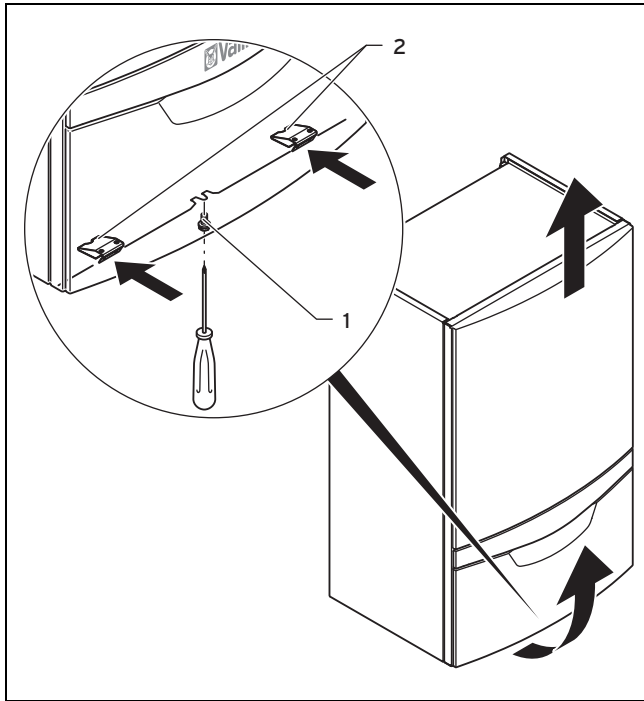
Risk of accidents as a result of insufficient load-bearing capacity of the fixing means.

If the fixing elements or wall do not have sufficient load-bearing capacity, the product may come loose and fall down. Brine fluid may leak from damaged lines.

- ▶ When installing the product, ensure that the fixing elements and the wall have sufficient load-bearing capacity.
- ▶ Check the quality of the wall.

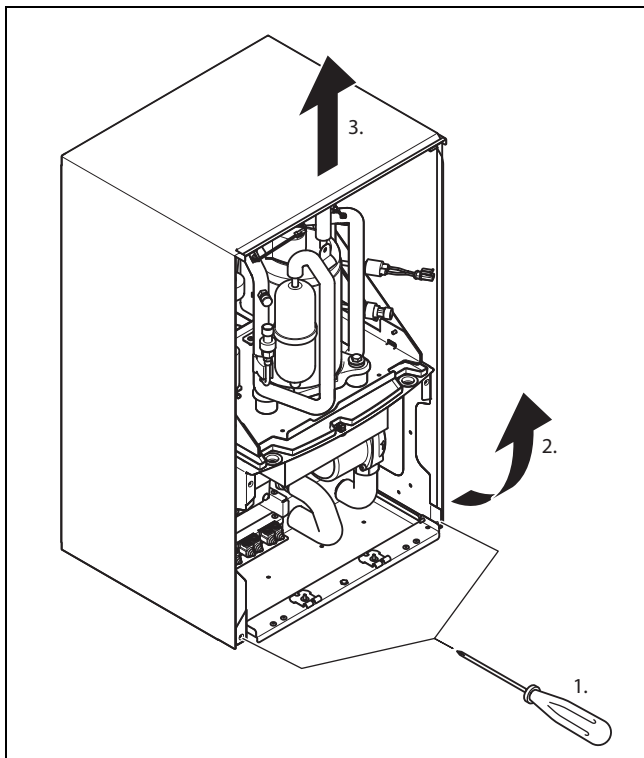
1. Use the minimum wall clearances (→ Page 14) and the supplied mounting template to align the product.
2. Observe the requirements for the installation site (→ Page 11).
3. Install the unit mounting bracket (1) on the wall or mounting frame using the rawl plugs and screws (2) provided.
4. Hang the product (3) on the unit mounting bracket from above using the hanging bracket.

4.9 Removing the front casing



1. Undo the screw (1) on the underside of the product.
2. Push in the two retaining clips (2) on the underside of the product so that the front casing is released.
3. Pull the front casing forwards at the bottom edge.
4. Lift the front casing up and out of the retainer.

4.10 Removing the side casing



1. Remove both screws (1).
2. Pull the lower section of the side casing forwards.
3. Lift the side casing up to remove it.

4.11 Removing the transport locks

1. Remove the front casing as shown in the illustration. (→ Page 15)
2. Remove the side casing. (→ Page 15)
3. Remove the left- and right-hand transport locks (foam pieces):
 - To the side below the refrigeration circuit platform.
4. Remove the transport lock (foam piece) from the front casing.

5 Hydraulics installation

- ▶ Observe the relevant information about hydraulic installation in the appendix and in the system instructions.

5.1 Carrying out the hydraulics installation



Caution.

Risk of damage caused by residue in the heating flow and return.

Residue from the pipelines, such as welding beads, scale, hemp, putty, rust and coarse dirt, may be deposited in the heat pump and cause faults.

- ▶ Flush the heating installation thoroughly before connecting the heat pump in order to remove any possible residue.



Caution.

Risk of damage caused by leaks.

Mechanical stress on connection cables may cause leaks and damage to the product.

- ▶ Avoid mechanical stress on connection cables.

1. Install the connection cables in accordance with the dimension and connection drawings.
2. Position the pipe brackets for securing the heating circuit and solar circuit piping so that they are not too close to the heat pump in order to prevent noise transmission.



Note

The heat pump's compressor has two-fold vibration insulation. This eliminates vibrations in the refrigeration circuit that are inherent in the system. However, under certain circumstances, residual vibrations may occur.

3. If required, instead of pipe brackets, use cold insulation brackets with additional rubber insulation and, in some cases, reinforced hoses (armoured rubber hoses).
4. To prevent excessive pressure losses on the heating water side, do not use stainless steel corrugated pipes.
5. Attach purging valves to the heating installation.

5 Hydraulics installation

5.2 Requirements for the heating circuit

In heating installations that are equipped primarily with thermostatic or electrically controlled valves, a constant and sufficient flow through the heat pump must be ensured. Irrespective of which heating installation is selected, the minimum volume of circulating heating water (40% of the nominal volume flow, see the technical data table) must be guaranteed as the product does not have a bypass valve.

5.3 Connecting the heat pump to the heating circuit



Caution.
Risk of damage from magnetite deposition.

In heating installations with steel pipes, static heating surfaces and/or buffer cylinder systems, magnetite may form where large volumes of water are involved.

- ▶ Insert a magnetite filter to protect the pump inside the product.
- ▶ You must position the filter in direct proximity to the return line to the heat pump.



Caution.
Risk of damage due to unsuitable frost and corrosion protection agents.

Unsuitable frost or corrosion protection agents may damage seals and other components and may therefore also cause leaks in the water outlet.

- ▶ Only add permitted frost or corrosion protection agents to the heating water.
- ▶ Observe the filling regulations.



Caution.
In cooling mode, there is a risk of damage caused by the temperature falling below the dew point and by a build-up of condensation.

Radiator heating is not suitable for cooling mode with this product.

- ▶ Ensure that the radiator heating is not used for the cooling mode.



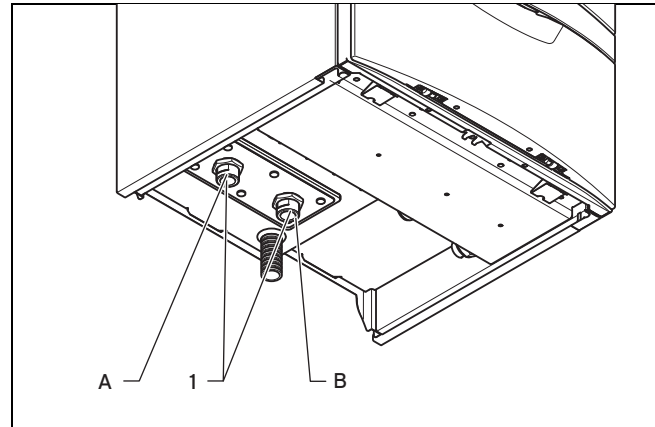
Warning.
Risk of scalding caused by steam or hot water!

If there is overpressure, then steam and/or hot water is guided out via the drain hose of the expansion relief valve.

- ▶ Have the hose end in such a way that nobody is at risk when steam and/or hot water is drained.

1. Install the expansion relief valve hose in a frost-free environment and ensure that its routing ends in an open hopper where it is then visible.
2. Connect the heating flow to the heating flow connection of the heat pump.
3. Connect the heating return to the heating return connection of the heat pump.
4. Insulate all of the pipes in the heating circuit and the connections for the heat pump so that they are vapour diffusion-tight in order to prevent them from falling below the dew point in cooling mode.

5.4 Connecting the heat pump to the brine circuit

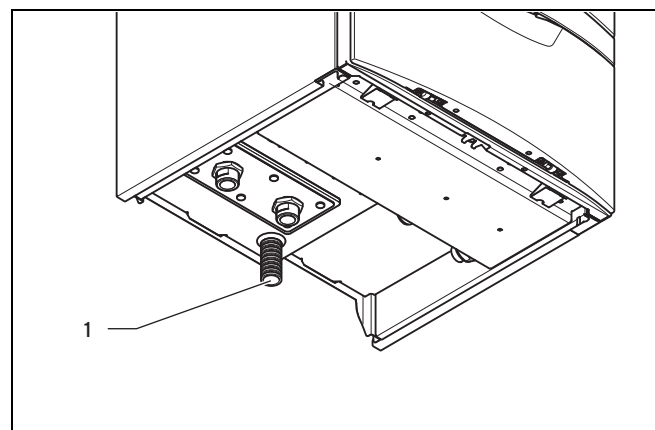


1. Remove the blind caps (1) from the unit's connections. These are no longer required and can be properly disposed of.
2. Connect the brine lines to the heat pump.
3. Connect the brine lines to connection "A" (hot brine) and "B" (cold brine) of the heat pump.
4. Install an automatic air separator in the brine circuit on the installation side.
5. Insulate all of the brine lines and the connections of the heat pump so that they are vapour diffusion-tight.

5.5 Routing the drain pipework of the expansion relief valve



Note
The expansion relief valve for the heating installation is integrated into the product.



1. Install a tundish for the expansion relief valve.

- Diameter of the tundish/discharge pipe: ≥ 32 mm (≥ 1.26 in)
2. Install the tundish in such a way that no cables or other electrical components can be damaged if there is a water leak.
- The end of the line must be visible.

5.6 Filling and purging the heating circuit

5.6.1 Checking and treating the heating water/filling and supplementary water



Caution.
Risk of material damage due to poor-quality heating water

- ▶ Ensure that the heating water is of sufficient quality.

- ▶ Before filling or topping up the installation, check the quality of the heating water.

Checking the quality of the heating water

- ▶ Remove a little water from the heating circuit.
- ▶ Check the appearance of the heating water.
- ▶ If you ascertain that it contains sedimentary materials, you must desludge the installation.
- ▶ Use a magnetic rod to check whether it contains magnetite (iron oxide).
- ▶ If you ascertain that it contains magnetite, clean the installation and apply suitable corrosion-protection measures, or fit a magnet filter.
- ▶ Check the pH value of the removed water at 25 °C.
- ▶ If the value is below 8.2 or above 10.0, clean the installation and treat the heating water.
- ▶ Ensure that oxygen cannot get into the heating water.

Checking the filling and supplementary water

- ▶ Before filling the installation, measure the hardness of the filling and supplementary water.

Treating the filling and supplementary water

- ▶ Observe all applicable national regulations and technical standards when treating the filling and supplementary water.

Provided the national regulations and technical standards do not stipulate more stringent requirements, the following applies:

You must treat the heating water in the following cases:

- If the entire filling and supplementary water quantity during the operating life of the system exceeds three times the nominal volume of the heating installation, or
- If the guideline values listed in the following table are not met, or
- If the pH value of the heating water is less than 8.2 or more than 10.0.

Applicability: Great Britain

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³	ppm CaCO ₃	mol/m ³
< 50	< 300	< 3	200	2	2	0.02
> 50 to ≤ 200	200	2	150	1.5	2	0.02
> 200 to ≤ 600	150	1.5	2	0.02	2	0.02
> 600	2	0.02	2	0.02	2	0.02

1) Nominal capacity in litres/heating output; in the case of multi-boiler systems, the smallest single heating output is to be used.

Applicability: Great Britain



Caution.
Risk of material damage if the heating water is treated with unsuitable additives.

Unsuitable additives may cause changes in the components, noises in heating mode and possibly subsequent damage.

- ▶ Do not use any unsuitable frost and corrosion protection agents, biocides or sealants.

No incompatibility with our products has been detected to date with proper use of the following additives.

- ▶ When using additives, follow the manufacturer's instructions without exception.

We accept no liability for the compatibility of any additive or its effectiveness in the rest of the heating system.

Additives for cleaning measures (subsequent flushing required)

- Adey MC3+
- Adey MC5
- Fernox F3
- Sentinel X 300
- Sentinel X 400

Additives intended to remain permanently in the installation

- Adey MC1+
- Fernox F1
- Fernox F2
- Sentinel X 100
- Sentinel X 200

Additives for frost protection intended to remain permanently in the installation

- Adey MC ZERO
- Fernox Antifreeze Alphi 11
- Sentinel X 500

- ▶ If you have used the above-mentioned additives, inform the end user about the measures that are required.
- ▶ Inform the end user about the measures required for frost protection.

5 Hydraulics installation

5.6.2 Filling/refilling the heating installation

1. Open all of the thermostatic valves on the heating installation and, if required, all other isolation valves.
2. Check all of the connections and the entire heating installation for leaks.
3. To remove air pockets from the heating installation, use a filling pump to rinse the heating installation. To do this, fill the heat pump via the return line and allow the water to flow out via the flow line.

5.7 Filling and purging the brine circuit

5.7.1 Mixing the brine fluid

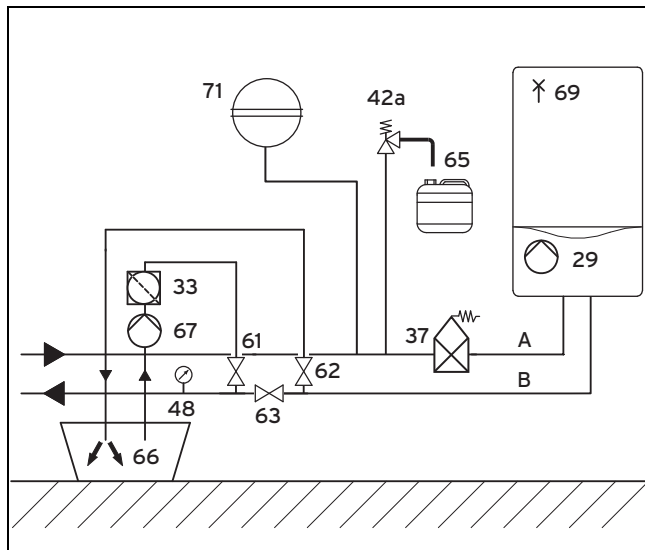
The brine fluid consists of water mixed with a concentrated antifreeze. The brine fluids that may be used differ greatly from region to region. For more information, contact the responsible authorities.

Only ethylene glycol in the specified ratio is authorised by Vaillant as a brine fluid for operating the heat pump.

Alternatively, suitable ready-mixed fluids for heat pumps can be ordered from Vaillant.

- ▶ Carefully mix ethylene glycol with water.
 - Ratio of ethylene glycol to water: 3:7
 - ◁ This results in an aqueous solution with 30% vol. ethylene glycol.
 - ◁ The brine fluid is protected against frost.
 - Frost protection for the brine fluid: $-16 \dots -14 \text{ }^{\circ}\text{C}$
- ▶ Check the mixture ratio of the brine fluid.
 - Working materials: Refractometer

5.7.2 Filling the brine circuit



29	Brine pump	62	Stop valve
33	Dirt filter	63	Stop valve
37	Automatic air separator	65	Brine collecting container
42a	Expansion relief valve	66	Brine container
48	Pressure gauge (optional)	67	Filling pump
61	Stop valve	69	Purging screws

71	Expansion vessel	B	From the heat pump to the heat source (cold brine)
A	From the heat source to the heat pump (hot brine)		

1. Install a dirt filter (33) in the pressure line.
2. Connect the filling pump's pressure line to the isolation valve (61).
3. Close the isolation valve (63).
4. Open the isolation valve (61).
5. Connect a hose, which leads to the brine fluid, to the isolation valve (62).
6. Open the isolation valve (62).



Caution.

Risk of material damage caused by an incorrect filling direction.

If you fill the brine pump against the direction of flow, this may lead to a turbine effect which can damage the pump's electronics.

- ▶ Ensure that the brine pump is filled in the direction of flow.

7. Use the filling pump (67) to pour the brine fluid from the brine container (66) into the brine circuit.
 - Brine fluid: Ethylene glycol/water ratio: 3/7
8. If you choke the filling pump, you can reduce the air ingress into the brine circuit.

5.7.3 Purge the brine circuit

1. Start up the filling pump (67) in order to fill and rinse the brine circuit.
2. Allow the filling pump (67) to run for at least 10 minutes in order to fill and rinse the circuit sufficiently.
3. Then close the isolation valves (61) and (62) and switch off the filling pump (67).
4. Open and close the purging valves (69) on the heat pump and check whether air is still escaping.
5. Purge the heat pump completely in order to prevent its functioning from being impaired by air in the brine circuit.
6. Place a silicone hose (5 mm diameter) on the purging valves and catch the brine fluid in a bucket.
7. If required, repeat this rinsing process.
8. Open the isolation valve (63).

5.7.4 Building up pressure in the brine circuit

1. Use the filling pump (67) to pressurise the brine circuit.



Note

To operate the brine circuit without any problems, a filling pressure of 0.15 MPa (1.5 bar) is required. The expansion relief valve opens at 0.3 MPa (3 bar).

2. Read off the pressure on the manometer.

- Brine circuit operating pressure: 0.15 MPa (1.50 bar)
3. Build up the pressure in the brine circuit by using the filling pump to top up the brine fluid by opening the isolation valve **(61)**.
 4. Open the isolation valve **(62)** to allow any excess pressure to escape if it is above the required filling pressure of 0.15 MPa (1.5 bar) and below the expansion relief valve's operating pressure of 0.3 MPa (3 bar).
 5. Check the brine circuit's filling pressure in the heat pump's DIA system.
 6. If required, repeat the process.
 7. Remove the two hoses from the valves **(61)** and **(62)**.
 8. Purge the system once more after starting up the heat pump.
 9. Pass the vessel with the remaining brine fluid on to the end user to be stored.

6 Electrical installation

6.1 Carrying out the electrical installation

1. Observe the relevant information about electrical installation in the appendix and in the system instructions.



Danger!

Risk of electric shock!

Touching live connections may cause serious personal injury.

- ▶ Before carrying out electrical installation work, always pull the product's mains plug out of the earthed plug socket.
- ▶ Secure the power supply against being switched back on.



Danger!

Risk of death from electric shock as a result of an improper electrical connection!

An improper electrical connection may negatively affect the operational safety of the product and result in material damage or personal injury.

- ▶ The electrical installation must be carried out by a suitably qualified competent person who is responsible for complying with the existing standards and directives.



Caution.

Material damage caused by short circuit.

A maximum of 10 mm of the insulation may be removed from the ends of lines that carry mains voltage (230 V) for the connection to the 230 V terminal. If more insulation is removed, there is a risk of short circuits on the PCB if the cable has not been correctly secured to the 230 V terminal.

- ▶ Strip the cable ends to a maximum of 10 mm.
- ▶ Take care to wire up correctly.

2. When electrically connecting the product, observe the technical connection conditions for connecting to the power supply network operator's low-voltage network.
3. Route low-voltage wires, such as sensor lines, on-site in the building so that there is sufficient clearance to 230 V lines. Minimum clearance for the low-voltage wire and power supply cable at a line length of > 10 m: 25 cm.
4. To establish the power supply, plug the heat pump's mains plug into a suitable earthed plug socket. You must observe the notes (→ Page 24) on this.
 - Make sure that the earthed plug socket for the heat pump is individually fused. The earthed plug socket must be freely accessible at all times following installation.



Note

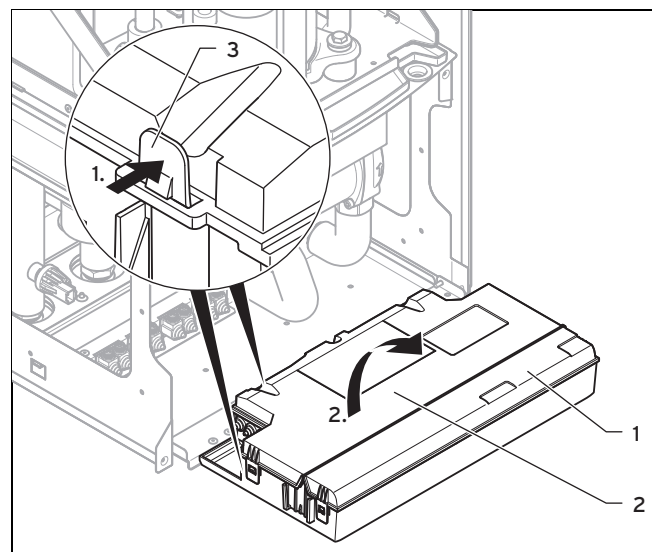
If one of the product's power supply cables is damaged, you must replace it with a special connection cable that is available from the manufacturer or customer service.

5. Observe the maximum line length of the sensor lines.
 - Max. length of the sensor line: 50 m (164 ft – 1 in)

6.2 Routing eBUS lines

1. Route the eBUS lines in a star formation from a junction box to the individual products.
2. If several conductors are connected, use connection terminals.
3. Ensure that you do not route the eBUS lines parallel to the power supply cables.
 - Piping diameter: $\geq 0.75 \text{ mm}^2$

6.3 Opening the electronics box

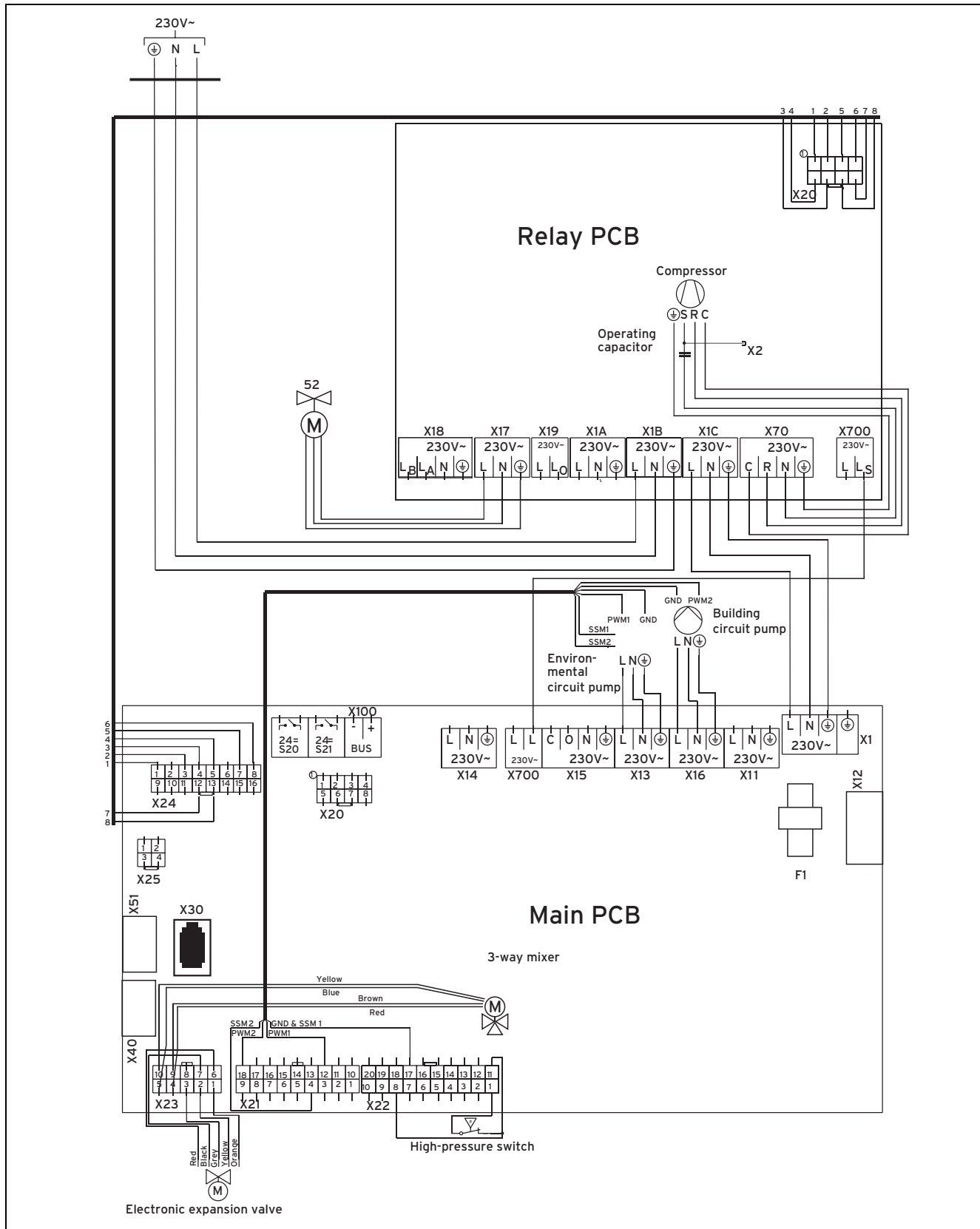


1. Hinge the electronics box **(1)** forwards.
2. Undo the four clips on the rear cover **(2)** of the electronics box from the brackets **(3)** on the electronics box at the rear and at the sides.

6 Electrical installation

3. Hinge up the cover.
4. Note the components and accessories in the relevant system instructions (→ Page 51) that you have to connect in the electronics box.

6.4 Wiring diagrams



Relay PCB

X700	Compressor safety relay	X17	Cooling active signal, thermostatic radiator valve switch
X70	Compressor	X18	—
X1A	—	X19	—
X1B	Power supply	X20	Main PCB control line
X1C	Main PCB mains connection transfer		

6 Electrical installation

Main PCB

F1	F2 T 4A/250 V fuse	X16	Building circuit pump
S20	Contact thermostat connection (24 V=)	X20 - X25	Internal electrical connections
S21	—	X30	Diagnostics interface
X1	230 V~ mains connection (main PCB)	X40	Control connection for 2 in 7 additional module
X11	—	X41	DCF/AF edge connector (outdoor temperature sensor + DCF signal)
X12	Mains supply edge connector for the 2 in 7 additional module	X51	AI display edge connector
X13	Environment circuit pump	X100	eBUS (e.g. VRC 700 control)
X14	—	X700	Compressor safety relay
X15	—		

6.5 Connecting controls and accessories to the electronics



Danger! Risk of death from live connections!

There is a risk of death from electric shock when working in the heat generator's electronics box.

- ▶ Before working on the heat generator's electronics box, pull out the mains plug from the earthed plug socket.
- ▶ Secure the power supply against being switched back on.
- ▶ Open the electronics box only when the heat generator is disconnected from the power supply.



Caution. Risk of damage caused by incorrect installation.

Mains voltage at the incorrect plug terminals on the ProE system may destroy the electronics.

- ▶ Do not connect a mains voltage to the eBUS terminals (+/-).

1. Open the electronics box. (→ Page 19)
2. Guide the connection cables of the components to be connected (e.g. external components, outdoor temperature sensor) through the grommet on the underside of the product.
3. Use strain reliefs.
4. Shorten the connection cables as necessary.
5. Only strip a maximum of 3 cm from the outer sheathing of the flexible lines.
6. Ensure the inner conductor insulation is not damaged when stripping the outer sheathing.
7. Only strip inner conductors just enough to establish good, sound connections.
8. Fit the stripped ends of the conductors with crimp pin terminals to ensure a secure connection that is free from loose strands and to thus prevent short circuits.
9. Use a screwdriver to connect the ProE plug to the control's connection cables.

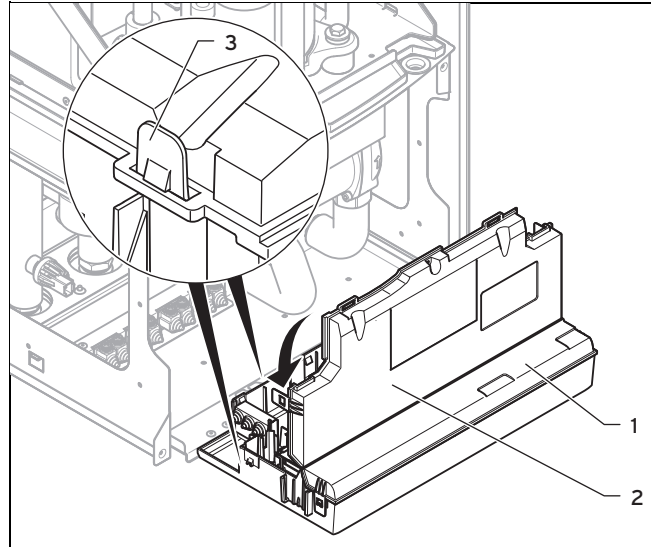


Note
Ensure that the conductors are securely fastened to the plug terminals of the ProE plug.

10. Connect the controls and accessories in accordance with the wiring diagrams in the appendix.
11. If you install the control in the product (depending on the basic system diagram, see appendix), remove the panel from the product and insert the control into the slot.
12. Plug the ProE plug into the relevant PCB slot of the heat pump's main PCB.

13. Lay the lines correctly.
14. Use the strain reliefs to secure the cable in the electronics box.
15. Close the electronics box. (→ Page 23)

6.6 Closing the electronics box



1. Close the back wall (2) by pressing downwards on the electronics box (1).
2. Ensure that all four clips (3) audibly click into the brackets.
3. Fold the electronics box upwards.
4. Attach the casing. (→ Page 23)
5. Attach the front casing. (→ Page 24)

6.7 Checking the electrical installation

- ▶ After the installation is complete, check the electrical installation by checking that the established connections are secured correctly and are sufficiently insulated.

6.8 Completing installation

6.8.1 Checking the system pressure and leak-tightness

1. After completing the installation, carry out a check of the system.
2. Start up the heat pump in accordance with the relevant operating instructions.

Checking the water pressure and checking for water leaks

3. Check the heating installation for leaks.

6.8.2 Attaching the casing to the heat pump

1. Hang the casing on the upper hooks for the heat pump.
2. Use two screws to secure the casing to the front side of the heat pump.

7 Start-up

6.8.3 Attaching the front casing to the heat pump

1. Place the front casing on the upper brackets.
2. Push the front casing onto the heat pump until the retaining clips snap into place on the front casing. To help you, you can also push the retaining clips upwards at the same time.
3. Secure the front casing by screwing in the screw on the underside of the heat pump.

6.8.4 Connecting the heat pump to the power supply



Danger!

Risk of death from electric shock!

The product is fitted with a CEE 7/7 mains plug at the factory. There is a risk of death from electric shock if the mains plug is connected to an incompatible earthed plug socket.

- ▶ If no suitable country-specific earthed plug socket is available, use a country-specific adapter plug with a protection contact.



Danger!

Risk of fire caused by an incompatible earthed plug socket.

The product is fitted with a CEE 7/7 mains plug at the factory. There is a risk of fire if the mains plug is connected to an incompatible earthed plug socket.

- ▶ If no suitable country-specific earthed plug socket is available, use a country-specific adapter plug with a protection contact.

- ▶ After completing all of the other installation steps, plug the mains plug into a suitable earthed plug socket.

7 Start-up

- ▶ Observe the relevant information about starting up the unit in the system instructions.

7.1 Heat pump operating concept

The operating concept and operation of the heat pump is described in the operating instructions for the heat pump.

7.1.1 Overview of the installer level menu structure

Installer level overview (→ Page 32)

7.2 Starting up the heat pump

- ▶ Plug the mains plug into an earthed plug socket.
 - ◀ The display shows the basic display.

7.3 Running through the installation assistant

The installation assistant is launched when the heat pump is switched on for the first time.

You must confirm the launching of the installation assistant. Once confirmed, all heating demands from the heat pump are blocked. This status remains until the installation assistant is completed or cancelled.

7.3.1 Setting the language

- ▶ Set the required language.

7.3.2 Setting the freeze protection

Applicability: Ground/brine environment circuit type

- ▶ If required, change the temperature. It is set to -7 °C at the factory.
 - Freeze protection: -13 ... 4 °C

7.3.3 Purging the building circuit


- ▶ Start the check programme **P.05** in order to purge (→ Page 29) the building circuit.

7.3.4 Purging the environment circuit

- ▶ Start the check programme **P.06** in order to purge (→ Page 29) the environment circuit.


7.3.5 Telephone number for the competent person

You can store your telephone number in the appliance menu.

The operator can display it in the information menu. The telephone number can be up to 16 digits long and must not contain any spaces. If the telephone number is shorter, end the entry after the last digit by pressing the right-hand selection button .

All of the digits to the right will be deleted.

7.3.6 Ending the installation assistant




- ▶ Once you have run through the installation assistant successfully, confirm by pressing .
- ◀ The installation assistant will close and will not launch again when the product is next switched on.

7.4 Calling up Live Monitor (checking status codes)

Menu → Live Monitor

- You can use this function to call up the status code of the heat pump, which provides you with information about the current operating condition of the heat pump (Status display (→ Page 28)).

7.5 Calling up the installer level

1. Press  and  at the same time.
 - **Menu → Installer level**
2. Set the value **17** (code) and confirm by pressing .

7.6 Heating mode flow temperature control

For economical and fault-free operation of a heat pump, it is important to regulate the start of the compressor. The start-up of the compressor is the point at which the highest loading occurs. Using the energy balance control, it is possible to minimise the number of heat pump start-ups without having to forgo the convenience of a comfortable room environment. As with other weather-compensated heating controls, the control determines a target flow temperature by recording the outdoor temperature using a heating curve. The energy balance calculation is made on the basis of this target flow temperature and the actual flow temperature – the difference per minute is measured and added up:

1 degree minute [°min] = 1 K temperature difference in the course of 1 minute

The heat pump starts up at a defined heat deficit (under the menu item **Configuration → Compressor starts at**) and only switches off again when the supplied heat is equal to the heat deficit. The larger the preset negative numerical value, the longer the periods for which the compressor operates or does not operate.

As an additional condition, if there is a deviation of more than 7 K between the actual flow temperature and the target flow temperature, the compressor is directly switched on and switched off. The compressor always starts immediately if a heating demand only just arises from the control (e.g. due to a time period or switching from gas-fired product operation to heat pump mode).

Time conditions for compressor operation

When operating the compressor, the following shall always apply:

- Minimum running time: 2 minutes
- Minimum rest period: 5 minutes
- Minimum time from start to start: 20 minutes

7.7 Calling up statistics

Menu → Installer level → Test menu → Statistics

- You can use this function to call up the statistics for the heat pump.

7.8 Checking that the product works correctly

1. Start up the product in accordance with the relevant operating instructions.
2. Navigate to **Menu → Installer level → Test programmes → Check programmes**.
3. Check the heating mode using **P.01**.
4. Check the cooling mode using **P.02**.

8 Adapting the unit to the heating installation

8.1 Adapting the unit to the heating installation

The installation assistant is launched when the heat pump is switched on for the first time.

If you have already filled the heating installation and terminated the installation assistant, but want to set the most important system parameters again, you can also call up the **Configuration** menu item.

Menu → Installer level Configuration

8.2 Heat pump setting parameters

To individually adjust the heat pump, you can adjust certain parameters in the **Configuration** menu.

Menu → Installer level Configuration

Parameter	Explanation
Language	Select the required language here.
Contact data	As a competent person, you can enter your telephone number here. The end customer can read this number in the menu → Information.
Compressor starts at	Heat deficit at which the compressor is started in heating mode. See section "Heating mode flow temperature control".
Comp. hysteresis	Additional condition for switching the compressor on and off. See section "Heating mode flow temperature control"
Max. rem. feed head	Limiting the product's remaining feed head in the building circuit. If the value is reduced, the pump speed is limited as far as necessary in order to prevent the remaining feed head from being exceeded.
Conf. build cir. pump	Switching between automatic mode (flow rate regulation with operation-dependent target values) and fixed value mode (1-100%). The fixed value mode should only be selected if the installation does not permit automatic mode.
Boiler supp. set p.	Flow rate target value for controlling the internal building circuit pump in the event that the gas-fired boiler is used for the mixing circuit and the pump also runs in the heat pump. Only in conjunction with the VWZ ZK accessory.
Enviro. pump set p.	Target fixed value for the environment circuit pump. This setting is used to adapt to the installed environment circuit (e.g. ground probe or ground collector).

8 Adapting the unit to the heating installation

Parameter	Explanation
Freeze protection	Minimum outlet temperature from the heat pump into the environment circuit at which operation is stopped in order to prevent the brine from freezing.
Enable emergency mode	If "On" is selected here and no control is connected (e.g. due to a defect), it is possible to adjust a target flow value and select an operating mode in the basic menu in order to operate the heat pump in limp home mode.
Software version	The version number for the main PCB (HMU xxxx) and the display (AI xxxx) are shown here alternately.

Additional setting data is listed in the appendix.

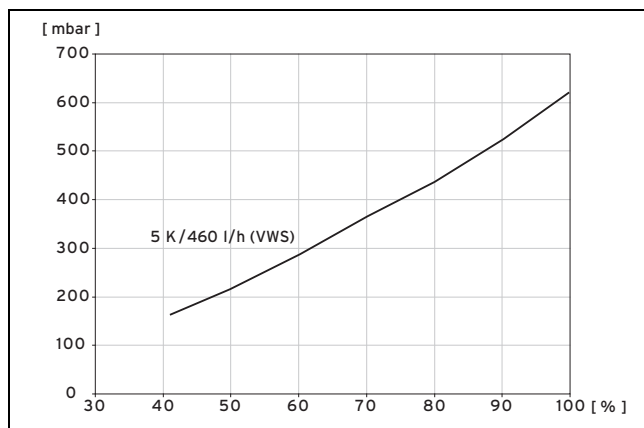
8.3 Setting the high-efficiency pumps

8.3.1 Setting the building circuit pump

Automatic mode

At the factory, the nominal volume flow is automatically achieved by volume flow regulation. This volume flow regulation allows for efficient operation of the heating pump because the pump speed is adjusted to the hydraulic resistance of the system. Vaillant recommends that you retain this setting.

Manual operation



Menu → **Installer level** → **Configuration** → **Building circuit pump conf.**

If you do not want to operate the pump in automatic mode, you can set the manual mode in the **Configuration** menu. The diagram shows how setting the pump actuation affects the remaining feed head at nominal volume flow for a temperature spread of 5 K on the heating side.

Setting the maximum differential pressure in the building circuit

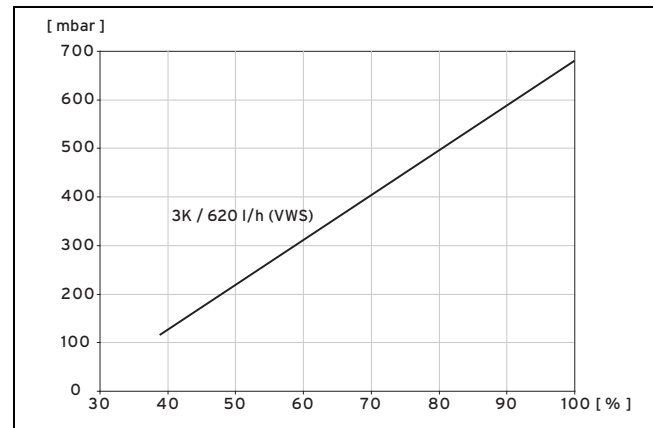
If the differential pressure in the building circuit is not permitted to exceed a maximum value, this limit can be set in the **Configuration** menu within the range of 0.02 to 0.07 MPa (0.2 to 0.7 bar).

Menu → **Installer level** → **Configuration** → **Max. remaining feed head**

8.3.2 Setting the environment circuit pump

If the heat source temperature spread lies below 2 K due to low pressure losses (large pipe cross-sections, low drilling depth) in continuous operation, you can adjust the pump output. The following diagram shows how setting the pump ac-

tuation affects the remaining feed heads at nominal volume flows for a heat source temperature spread of 3 K.



The default setting for the environment circuit pump is 75%.

8.4 Setting the flow temperature in heating mode (with no control connected)

1. Activate manual operation.
 - **Menu** → **Installer level** → **Configuration** → **Enable limp home mode**
2. Press the right-hand selection button ("OK").
 - ◀ The display shows the flow temperature in heating mode.
3. Use the minus button or plus button to change the flow temperature in heating mode.
 - Max. heating mode flow temperature: 55 °C (131.0 °F)
4. Confirm the change by pressing the right-hand selection button ("OK").

8.5 Setting the flow temperature in cooling mode (with no controller connected)

1. Activate manual operation.
 - **Menu** → **Installer level** → **Configuration** → **Enable limp home mode**
2. Press the right-hand selection button twice.
 - ◀ The display shows the value of the flow temperature in cooling mode.
3. Use the minus button or plus button to change the flow temperature in cooling mode.
4. Confirm the change by pressing the right-hand selection button ("OK").



Note

At the factory, the target flow temperature can be set between 20 °C and 16 °C in cooling mode.

8.6 Handing the product over to the end user

- ▶ Explain to the end user how the safety devices work and where they are located.
- ▶ Inform the end user how to handle the product.
- ▶ In particular, draw attention to the safety information which the end user must follow.
- ▶ Inform the end user of the necessity to have the product maintained according to the specified intervals.
- ▶ Pass all of the instructions and documentation for the product to the end user for safe-keeping.

9 Inspection and maintenance

9.1 Inspection and maintenance check-list

The following table shows the inspection and maintenance work that must be carried out at specific intervals.

No.	Work	Inspection (every year, within 24 months at the latest)	Maintenance (every two years)
1	Check the general condition and leak-tightness of the heat pump.	x	x
2	Check the pressure in the heating circuit and, if required, top up the heating water.	x	x
3	Check the volume and concentration of the brine fluid and the pressure in the brine circuit.	x	x
4	Check the condensate discharge of the heat pump for blockages and remove any dirt or blockages.	x	x
5	Check that the expansion vessel in the heating circuit operates correctly.	x	x
6	Check the heat pump for leaks in the brine and heating circuit and eliminate these leaks, if required.	x	x

9.2 Observing inspection and maintenance intervals



Danger!
Risk of damage and personal injury as a result of neglected and improper inspection and maintenance.

Inspection and maintenance work must only be carried out by a competent person.

- ▶ Carry out the inspection and maintenance work described on a regular basis and to a professional standard.



Danger!
Risk of electric shock!

Touching live connections may cause serious personal injury.

- ▶ Always switch off all power supply lines for the heat pump and all components involved before carrying out any electrical installation or maintenance work.
- ▶ Check that there is no voltage.
- ▶ Secure the power supply against being switched back on.

9.3 Preparing for inspection and maintenance

9.3.1 Procuring spare parts

The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may void the conformity of the product and it will therefore no longer comply with the applicable standards.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the reverse of these instructions.

- ▶ If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

9.3.2 General inspection and maintenance information


Inspection

The inspection is intended to determine the actual condition of the respective product and compare it with the target condition. This is done by measuring, checking and observing.

Maintenance

Maintenance is required in order to eliminate any deviations between the actual condition and the target condition. This is normally done by cleaning, setting and, if necessary, replacing individual components that are subject to wear.

9.3.3 Checking maintenance messages

If the  symbol is shown in the display, the product requires maintenance work or the product is in comfort protection mode.

- ▶ To obtain further information, call up the **Live Monitor**. (→ Page 28)
- ▶ Carry out the maintenance work that is listed in the table. Maintenance messages (→ Page 35)

Conditions: Lhm. 37 is displayed

The product is in Comfort protection mode. The product has detected a permanent fault and continues to run with restricted comfort.

If the temperature sensor for the building circuit outlet, environment circuit inlet or environment circuit outlet fails, the product continues to run with replacement values.

- ▶ To determine which component is defective, read the fault memory. (→ Page 28)

10 Troubleshooting



Note

If a fault message is present, the product remains in comfort protection mode after it is reset. After the product is reset, the fault message is displayed first before the message **Limp home mode (comfort protection)** appears again.

- ▶ Check the component that is displayed and replace it.

9.4 Cleaning the product



Caution.

Risk of material damage caused by unsuitable cleaning agents.

- ▶ Do not use sprays, scouring agents, detergents, solvents or cleaning agents that contain chlorine.

- ▶ Clean the casing and operator control elements with a damp cloth and a little solvent-free soap.

9.5 Checking and correcting the filling pressure of the heating installation

If the filling pressure falls below the minimum pressure, a fault message is shown in the display.

- Minimum heating water pressure: ≥ 0.05 MPa (≥ 0.50 bar)
- ▶ Top up the water to start up the heat pump again. (See section: Filling the system (→ Page 18)).
- ▶ If you notice frequent drops in pressure, determine and eliminate the cause.

9.6 Checking and correcting the filling pressure in the brine circuit

If the filling pressure falls below the minimum pressure, the heat pump is automatically shut down and a fault message is shown in the display.

- Minimum brine fluid pressure: ≥ 0.05 MPa (≥ 0.50 bar)
- ▶ Top up the brine fluid to start up the heat pump again. (See section: Filling the brine circuit (→ Page 18)).
 - Brine fluid operating pressure: $0.1 \dots 0.2$ MPa ($1.0 \dots 2.0$ bar)
- ▶ If you notice frequent drops in pressure, determine and eliminate the cause.

9.7 Carrying out a restart and test operation



Warning.

Risk of injury due to hot and cold components.

The heat pump must only be started up after all the casing sections have been installed.

- ▶ Before starting up the unit, fit all of the casing sections for the heat pump.

1. Start up the heat pump system.

2. Check that the heat pump system is working without any problems.

10 Troubleshooting

10.1 Troubleshooting

10.1.1 Checking the status codes

10.1.1.1 Calling the Live Monitor

Menu → Live Monitor

- You can call up status codes in the heat pump's display and these codes provide you with information about the current operating status of the heat pump.

Status codes (→ Page 35)

10.1.1.2 Status code meanings

The status codes provide you with information about the current operating status of your product.

If several operating statuses occur at the same time, the applicable status codes are displayed alternately, one after the other.

10.1.2 Querying the fault memory

Menu → Installer level Fault list

The heat pump has a fault memory. You can use this to query the last ten faults that occurred in chronological order.

If a DCF sensor is connected, the date on which the fault occurred is also displayed.

You can only call up fault lists if faults have previously occurred.

Display views

- Number of faults that occurred
- The fault currently selected with fault number **F.xxx**

You can find a list of the sensor characteristic values in the appendix.

Sensor characteristics for the VR 10 external temperature sensor (→ Page 39)

Sensor characteristics for the internal temperature sensors (→ Page 40)

Sensor characteristic value for the VRC DCF outdoor temperature sensor (→ Page 41)

10.1.3 Resetting the fault memory

1. Press (Delete).
2. Confirm that you wish to clear the fault memory by pressing (OK).

10.1.4 Overview of fault codes

You can find an overview of the fault codes in the appendix.

You can find a list of the surface-mounted sensor resistances in the appendix.

10.1.5 Restarting the installation assistant

You can restart the installation assistant any time by calling it up manually in the menu.

Menu → Installer level → Start inst. assistant

10.1.6 Using check programmes

Menu → Installer level → Test menu → Check programmes

You can use this function to start check programmes.



Note

If the heat pump is in a fault state, you cannot start the check programmes.

You can press the left-hand selection button (**Cancel**) at any time to end the check programmes.

11 Replacing components

11.1 Procuring spare parts

The original components of the product were also certified by the manufacturer as part of the declaration of conformity. If you use other, non-certified or unauthorised parts during maintenance or repair work, this may void the conformity of the product and it will therefore no longer comply with the applicable standards.

We strongly recommend that you use original spare parts from the manufacturer as this guarantees fault-free and safe operation of the product. To receive information about the available original spare parts, contact the contact address provided on the reverse of these instructions.

- ▶ If you require spare parts for maintenance or repair work, use only the spare parts that are permitted for the product.

11.1.1 Preparing for replacement work



Danger!

Risk of death from electric shock!

Power supply terminals L and N remain live even if the heat pump is switched off.

- ▶ Isolate the heat pump from the power grid by pulling out the mains plug.

1. Decommission the heat pump.



Note

When carrying out any repair work on the heat pump, make sure that you observe the following instructions for your own safety and to avoid material damage to the heat pump.

2. Disconnect the heat pump from the power grid.
3. Remove the front casing as shown in the illustration. (→ Page 15)
4. Remove the side casing. (→ Page 15)
5. Close the service valves in the heating flow and in the heating return.
6. Drain the heat pump if you want to replace water-carrying components in the heat pump.

7. Ensure that water does not drip on live components (e.g. the electronics box).
8. Use only new seals and O-rings.

11.1.2 Completing the replacement work

1. Attach the casing. (→ Page 23)
2. Attach the front casing. (→ Page 24)

11.1.3 Replacing the PCB and/or the display



Danger!

Risk of death from electric shock!

Power supply terminals L and N remain live even if the heat pump is switched off.

- ▶ Isolate the heat pump from the power grid by pulling out the mains plug.



Caution.

Risk of damage caused by incorrect repair work.

Using an incorrect replacement display may cause damage to the electronics.

- ▶ Before replacing, check that the correct replacement display is available.
- ▶ Never use another replacement display.

- ▶ Comply with the assembly and installation instructions provided with the spare parts.

11.1.3.1 Replacing either the PCB or the display

1. Replace the PCB or display according to the assembly and installation instructions supplied.
 - ◁ If you are replacing only one of the two components (PCB or display), the parameterization functions automatically. When the product is switched on, the new component adopts the previously set parameters from the unreplaced component.
2. Plug the plug into the new PCB.
 - When replacing the PCB

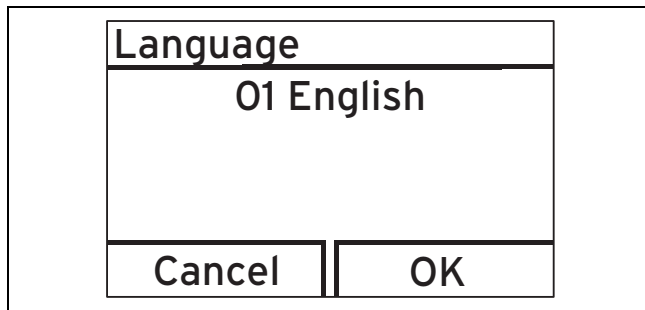




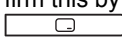
Note

Coding resistors are integrated into the plugs and these enable the unit type to be detected.

12 Decommissioning

11.1.3.2 Replacing the PCB and the display at the same time

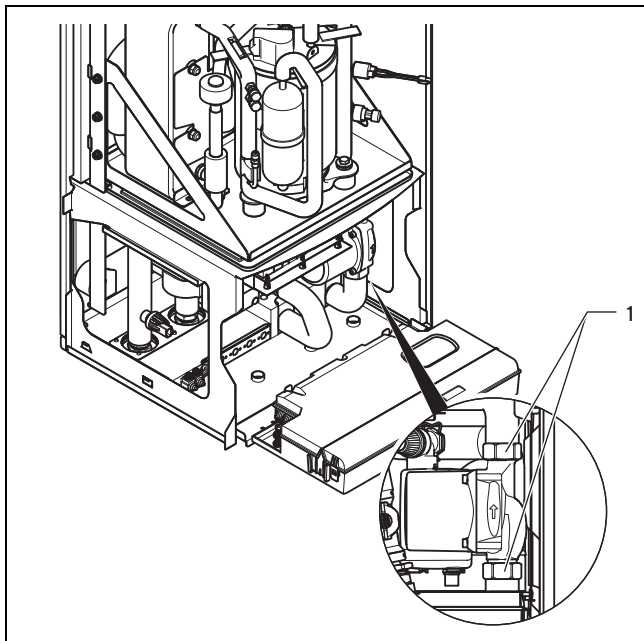


- Use the minus button  and the plus button  to select the required language, and confirm this by pressing the right-hand selection button  "OK".
 - ◁ You then automatically access the installation assistant.
- Set the required values for the initial installation.

11.1.4 Replacing the secondary PCB

- Undo the fixing screw for the secondary PCB box.
- Fold the secondary PCB box downwards.
- Undo the connection cable.
- Release the secondary PCB from the clips.
- Insert the new secondary PCB and use the clips to secure it in place.
- Reconnect the connection cable to the secondary PCB.

11.1.5 Replacing pumps



- Remove the insulating material from the pipelines in the area of the pump.
- Undo the cap nuts (**1**) from the pump connections.
- Install the new pump with new seals.
- Install new vapour-diffusion-tight insulating material around the pipelines.

12 Decommissioning

12.1 Temporary decommissioning

12.1.1 Protecting the heat pump against frost

- ▶ Observe the requirements for the installation site of the heat pump (→ Page 11).

12.2 Permanently decommissioning

12.2.1 Recycling and disposal



Caution.

Environmental hazard resulting from improper disposal.

Improper disposal of refrigerant can be harmful to the environment.

- ▶ Ensure that refrigerant and brine fluid is only disposed of by qualified competent persons.

Product

Do not dispose of the product or any accessories in household waste.

- ▶ Ensure that your old unit and any accessories are disposed of properly.

Disposing of the product



If the product is identified with this symbol, it does not belong with the household waste at the end of its useful life.

- ▶ Instead, take the product to a collection point for recycling electrical and electronic devices.

For more information on where to take used electrical and electronic devices, contact your town or district authorities, or a waste disposal company.

12.2.2 Disposing of the brine fluid



Danger!

Risk of injury due to chemical burns!

The brine fluid ethylene glycol is harmful to health.

- ▶ Avoid contact with the skin and eyes.
- ▶ Do not inhale or swallow.
- ▶ Always wear gloves and protective goggles.
- ▶ Observe the safety data sheet that accompanies the brine fluid.

- ▶ Ensure that the brine fluid is disposed of in compliance with local regulations, for example, at an appropriate waste site or waste incineration plant.

- ▶ For smaller volumes, contact your local disposal company.

12.2.3 Arranging disposal of refrigerant

The product is filled with R410A refrigerant.

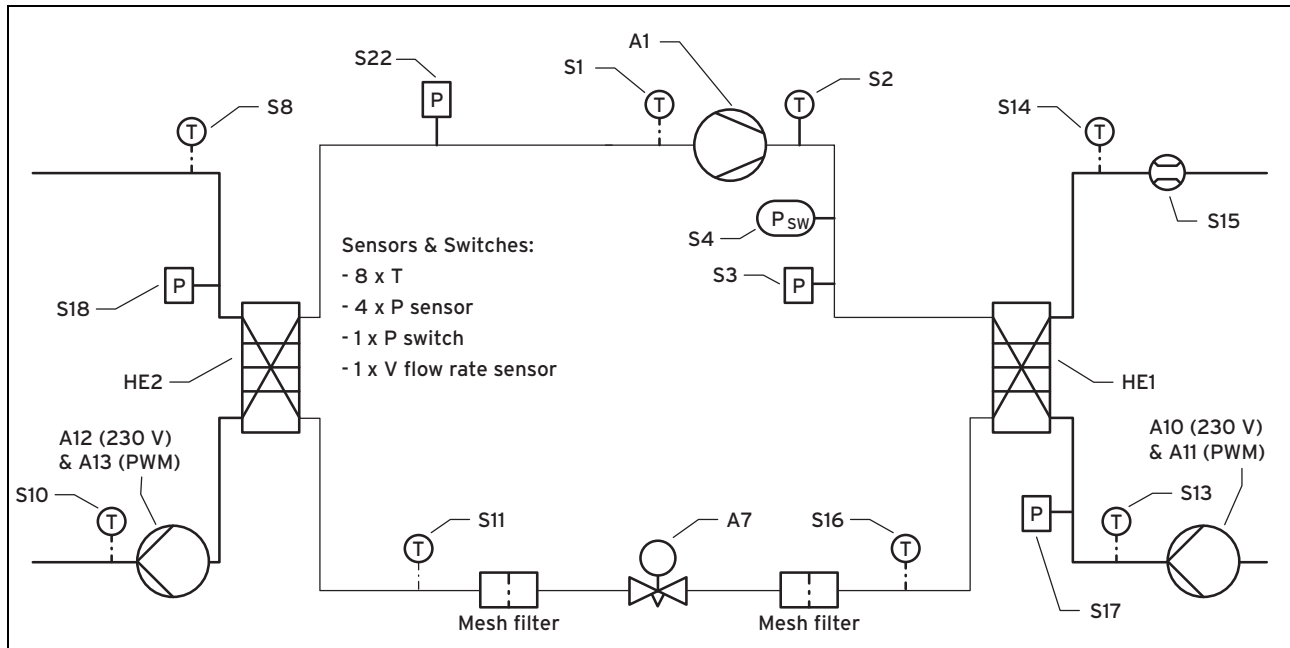
- ▶ Refrigerant must only be disposed of by a qualified competent person.

13 Customer service

Appendix

Appendix

A Heat pump schematic



A1	Compressor	S8	Source inlet temperature sensor
A7	Electronic expansion valve	S10	Source outlet temperature sensor
A10/ A11	Heating pump (relay and pulse-width modulation)	S11	Temperature sensor of the electronic expansion valve with HEX heat source
A12/ A13	Source pump (relay and pulse-width modulation)	S13	Heating return temperature sensor
HE1	Condenser	S14	Heating flow temperature sensor
HE2	Evaporator	S15	Heating circuit flow rate sensor
S1	Compressor inlet temperature sensor	S16	Temperature sensor of the electronic expansion valve with HEX heating
S2	Compressor outlet temperature sensor	S17	Heating circuit pressure sensor
S3	High-pressure sensor	S18	Heat source pressure sensor
S4	High-pressure switch	S22	Low-pressure sensor

B Installer level overview

Setting level	Values		Unit	Increment, select	Default setting	Setting
	Min.	Max.				
Installer level →						
Enter code	00	99		1 (competent person code 17)	00	
Installer level → List of faults →						
F.514 – F.743 ²⁾				Deleting		
Installer level → Test menu → Statistics →						
Compressor hours	Current value		h			
Compressor starts	Current value					
Build. pump hours	Current value		h			
Build. pump starts	Current value					
Environm. pump hours	Current value		h			
¹⁾ Can only work in conjunction with the VVZ ZK accessory.						
²⁾ Fault lists (section 9.1) are only available, and can only be deleted, if faults have occurred.						

Setting level	Values		Unit	Increment, select	Default setting	Setting
	Min.	Max.				
Environm. pump starts	Current value					
Cooling mixer steps	Current value					
EEV steps	Current value					
VUV DHW switchings	Current value					
Installer level → Test menu → Check programmes →						
P.01 Heating mode				Select		
P.02 Cooling mode				Select		
P.03 Hot water handling				Select		
P.05 Purge building circuit				Select		
P.06 Purge environment circuit				Select		
P.07 Purge building and environment circuit				Select		
Installer level → Test menu → Sensor/actuator test →						
T.01 Building circuit pump power	0	100	%	5, off		
T.14 Env. circuit pump power	0	100	%	5, off		
T.15 Cooling mixer position	0	100	%	5		
T.33 Position of the electronic expansion valve	0	100	%	5		
T.45 Fault outlet				On, Off		
T.48 Circulation pump				On, Off		
T.49 Cooling relay active				On, Off		
T.79 Flow temperature	-40.0	150.0	°C	0.1		
T.81 Return temperature	-40.0	150.0	°C	0.1		
T.82 Building circuit: Pressure	0	4.5	bar	0.1		
T.83 Building circuit: Flow rate	0	1400	l/h	1		
T.97 Environment circuit: Inlet temperature	-40.0	150.0	°C	0.1		
T.98 Environment circuit: Outlet temperature	-40.0	150.0	°C	0.1		
T.121 Compressor outlet temperature	-25.0	150.0	°C	0.1		
T.122 Compressor inlet temperature	-40.0	150.0	°C	0.1		
T.125 EEV environment circuit temperature	-40.0	150.0	°C	0.1		
T.126 EEV building circuit temperature	-40.0	150.0	°C	0.1		
T.127 High pressure	0.0	51.0	bar (abs)	0.1		
T.128 Condensation temperature	-52.0	70.0	°C	0.1		
T.129 Low pressure	0.0	22.0	bar (abs)	0.1		
T.130 Evaporation temperature	-52.0	70.0	°C	0.1		
T.131 Superheating target value	0.0	16.0	K	0.1		
T.132 Superheating actual value	0.0	16.0	K	0.1		
T.133 Subcooling actual value	0.0	99.0	K	0.1		
T.134 High-pressure switch				Open, closed	Closed	
T.146 Outside temperature	-60.0	45.0	°C	0.1		
¹⁾ Can only work in conjunction with the VWZ ZK accessory. ²⁾ Fault lists (section 9.1) are only available, and can only be deleted, if faults have occurred.						

Appendix

Setting level	Values		Unit	Increment, select	Default setting	Setting
	Min.	Max.				
T.147 DCF status				No DCF signal Validate DCF signal Valid DCF signal		
Installer level → Configuration →						
Language	Current language			01 Deutsch 02 English 03 Français 06 Nederlands 16 Norsk 18 Čeština 20 Slovenščina 27 Suomi	02 English	
Contact data	Phone number			0 - 9		
Compressor starts at	-999	0	°min	1	-60	
Comp. hysteresis	3	15	K	1	7	
Max. rem. feed head	200	700	mbar	1	700	
Conf. heat. build. pump	1	100	%	1, auto	Auto	
Conf. cool. build. pump	1	100	%	1, auto	Auto	
Conf. DHW build. pump	1	100	%	1, auto	Auto	
Reset anti-cycl. time	0	120	min	1	0	
Boiler supp. set p. ¹⁾	300	1300	l/h	20	1000	
Enviro. pump set p.	29	100	%	1	75	
Freeze protection	-14	5	°C	1	-7	
Enable emergency mode				On, Off	Off	
Software version	Current value for the main PCB (HMU xxxx) and the display (AI xxxx)					
Installer level → Resets →						
Switch-on delay				Yes, No	No	
Statistics				Yes, No	No	
Factory settings				Yes, No	No	
Installer level → Start inst. assistant →						
Language				01 Deutsch 02 English 03 Français 06 Nederlands 16 Norsk 18 Čeština 20 Slovenščina 27 Suomi	02 English	
Freeze protection	-13	4	°C	1	-7	
Check programme				P.05 Purge building circuit P.06 Purge environment circuit P.07 Purge environment and building circuit		
Contact data	Phone number			0 - 9		
¹⁾ Can only work in conjunction with the VWZ ZK accessory. ²⁾ Fault lists (section 9.1) are only available, and can only be deleted, if faults have occurred.						

Setting level	Values		Unit	Increment, select	Default setting	Setting
	Min.	Max.				
End the installation assistant?				Yes, back		
¹⁾ Can only work in conjunction with the VWZ ZK accessory. ²⁾ Fault lists (section 9.1) are only available, and can only be deleted, if faults have occurred.						

C Maintenance messages

Code	Meaning	Cause	Remedy
M.32	Building circuit: Pressure low	<ul style="list-style-type: none"> – Pressure loss in the building circuit due to leaks or air pockets – Building circuit pressure sensor is defective 	<ul style="list-style-type: none"> – Check the building circuit for leaks, top up with heating water and purge – Check the plug contact on the PCB and on the cable harness; check that the pressure sensor is working correctly and, if required, replace the pressure sensor
M.34	Environment circuit: Pressure low	<ul style="list-style-type: none"> – Pressure loss in the environment circuit due to leaks or air pockets – Environment circuit pressure sensor defective 	<ul style="list-style-type: none"> – Check the environment circuit for leaks, top up with medium (brine/water), and purge – Check the plug contact on the PCB and on the cable harness; check that the pressure sensor is working correctly and, if required, replace the pressure sensor

D Status codes

Code	Meaning
Heat pump system	
S.34	Heating mode: Frost protection
S.91	Service message: Demo mode
S.100	Standby
S.101	Heating: Compressor switched off
S.102	Heating: Compressor blocked
S.103	Heating: Flow
S.104	Heating: Compressor active
S.107	Heating: Overrun
S.118	Cooling: Flow
S.119	Cooling: Mixer active
S.131	Hot water: Compressor shutdown
S.132	Hot water: Compressor blocked
S.133	Hot water: Flow
S.134	Hot water: Compressor active
S.137	Hot water: Overrun
General	
S.201	Check program: Purging of env. circuit active
S.202	Check program: Purging of building circuit active
S.203	Actuator test active
Communication	
S.211	Connection error: Display not detected
S.212	Connection error: Control not detected

Appendix

Code	Meaning
Environment circuit	
S.242	Environment circuit: Outlet temperature too low
S.246	Environment circuit: Pressure too low
S.247	Env. circuit: Fault contact: Pump open
Building circuit	
S.272	Building circuit: Remaining feed heads limit active
S.273	Building circuit: Flow temperature too low
S.274	Building circuit: Pressure too low
S.275	Building circuit: Flow rate too low
S.276	Building cir.: Lockout contact S20 opened
Refrigeration circuit	
S.302	High pressure switch opened
S.303	Compressor outlet temperature too high
S.304	Evaporation temperature too low
S.305	Condensation temperature too low
S.306	Evaporation temperature too high
S.308	Condensation temperature too high
S.311	Environment cir. inlet temperature too low
S.312	Building circuit inlet Return temperature too low
S.313	Environment cir. inlet temperature too high
S.314	Building circuit inlet Return temperature too high
S.315	Compressor circuit breaker open
S.316	WHB support active
S.240	Oil temperature too low

E Fault codes

Code	Meaning	Cause	Remedy
F.042	Sensor fault: Coding resistor 1	– Sensor not connected or sensor input has short-circuited	– Check and, if required, replace the sensor (see sensor characteristic values in the appendix) – Replace the cable harness
F.042	Sensor fault: Coding resistor 2		
F.042	Sensor fault: Coding resistor 3		
F.070	Invalid Device Specific Number	– Replacing the control PCB and display PCB	– Checking coding resistors 1 and 2 – Disconnecting the product from the power supply and switching it back on again
F.514	Temp. sensor fault: Compressor inlet	– Sensor not connected or sensor input has short-circuited	– Check and, if required, replace the sensor (see sensor characteristic values in the appendix) – Replace the cable harness
F.517	Temp. sensor fault: Compressor outlet		
F.519	Sensor fault: Building circuit return temp.		
F.520	Temp. sensor fault: Building circuit flow		
F.532	Building circuit: Flow rate too low	– Stopcock was not opened – Building circuit pump defective – All consumers in the heating system are closed – Flow rate is too low for recording with the volume flow sensor (< 120 l/h)	– Check the stopcocks and thermostatic valves – Ensure that there is a minimum flow rate of 150 l/h – Check that the building circuit pump functions correctly

Code	Meaning	Cause	Remedy
F.546	Sensor fault: High pressure	<ul style="list-style-type: none"> – Sensor not connected or sensor input has short-circuited 	<ul style="list-style-type: none"> – Check and, if required, replace the sensor (see sensor characteristic values in the appendix) – Replace the cable harness
F.583	Building circuit: Flow temperature too low	<ul style="list-style-type: none"> – The temperature sensor in the flow is defective – Air in the building circuit 	<ul style="list-style-type: none"> – Checking the building circuit's flow rate – Check the quality of the plug contact on the PCB and on the cable harness – Check that the sensor is working correctly (measure the resistance using the sensor characteristic values, see appendix) – Replace the sensor – Purging the building circuit
F.585	Sensor fault: Building EEV temp	<ul style="list-style-type: none"> – Sensor not connected or sensor input has short-circuited 	<ul style="list-style-type: none"> – Check and, if required, replace the sensor (see sensor characteristic values in the appendix) – Replace the cable harness
F.685	Connection error: Control not detected	<ul style="list-style-type: none"> – The VRC 700 control was previously detected but the connection is broken 	<ul style="list-style-type: none"> – Check the eBUS connection to the VRC 700 control
F.700	Temp. sensor fault: EEV environment cir.	<ul style="list-style-type: none"> – Sensor not connected or sensor input has short-circuited 	<ul style="list-style-type: none"> – Check and, if required, replace the sensor (see sensor characteristic values in the appendix) – Replace the cable harness
F.701	Temp. sensor fault: Environ. circuit inlet		
F.702	Temp. sensor fault: Environment cir. out		
F.703	Sensor fault: Low pressure		
F.704	Sensor fault: Building cir. pressure		
F.705	Sensor fault: Enviro. cir. pressure		
F.706	Sensor fault: Building flow rate		
F.710	Environment circuit: Outlet temperature too low	<ul style="list-style-type: none"> – Environment circuit pump defective – Temperature sensor for environment circuit outlet defective – Volume flow too low in the environment circuit – Air in the environment circuit 	<ul style="list-style-type: none"> – Check the environment circuit flow rate – Check the quality of the plug contact on the PCB and on the cable harness – Check that the sensor is working correctly (measure the resistance using the sensor characteristic values in the appendix) – Replace the sensor – Check the volume flow of the environment circuit pump (optimum spread of 3 K) – Purging the environment circuit
F.714	Environment circuit: Pressure too low	<ul style="list-style-type: none"> – Pressure drop in the environment circuit due to leakages or air pockets – Environment circuit pressure sensor defective 	<ul style="list-style-type: none"> – Check the environment circuit for leaks – Top up the medium (brine/water), purge – Check the quality of the plug contact on the PCB and on the cable harness – Check that the pressure sensor works correctly – Replace the pressure sensor
F.715	Environment circuit: Fault contact, pump open	<ul style="list-style-type: none"> – The electronics of the high-efficiency pump has detected a fault (e.g. dry running, blockage, overvoltage, undervoltage) and switched the pump off as a securing measure. 	<ul style="list-style-type: none"> – Switch the heat pump off for at least 30 seconds (no current) – Check the quality of the plug contact on the PCB – Check that the pump functions correctly – Purging the environment circuit

Appendix

Code	Meaning	Cause	Remedy
F.723	Building circuit: Pressure too low	<ul style="list-style-type: none"> - Pressure drop in the building circuit due to leakages or air pockets - Building circuit pressure sensor defective 	<ul style="list-style-type: none"> - Check the building circuit for leaks - Top up with water, purge - Check the quality of the plug contact on the PCB and on the cable harness - Check that the pressure sensor works correctly - Replace the pressure sensor
F.726	Compressor protector switch opened	<ul style="list-style-type: none"> - Compressor overheated, e.g. as a result of operating outside of its application limits - Maximum environmental temperature of 40 °C exceeded for the heat pump - Compressor blocked due to mechanical defect - Compressor blocked because the pressure difference is too high when switched on (> 3 bar) 	<ul style="list-style-type: none"> - Environmental temperatures fall below 40 °C - Check the pressure difference during the start-up attempt
F.730	Low pressure switch opened	<ul style="list-style-type: none"> - Low-pressure switch input not bridged (X22-8 to X22-11) 	<ul style="list-style-type: none"> - Replace the cable harness
F.731	High pressure switch opened	<ul style="list-style-type: none"> - Refrigerant pressure too high. The integrated high-pressure switch tripped at 41.5 bar (g) - Insufficient energy output via the relevant capacitors 	<ul style="list-style-type: none"> - Purging the building circuit - Insufficient volume flow as a result of closing individual room controls in an underfloor heating system - Check the existing dirt filter for penetrability - Refrigerant flow rate too low (e.g. electronic expansion valve defective, filter blocked)
F.732	Compressor outlet temperature too high	<p>The compressor outlet temperature is above 115 °C:</p> <ul style="list-style-type: none"> - Application limits exceeded - EEV does not work or does not open correctly - Refrigerant volume too low 	<ul style="list-style-type: none"> - Check the low-pressure sensor, compressor inlet sensor and compressor outlet sensor - Check the EEV (does the EEV move to the limit stop? Use the sensor/actuator test) - Check the refrigerant volume (700 g) - Carry out a leak-tightness test
F.733	Evaporation temperature too low	<ul style="list-style-type: none"> - No flow rate in the environment circuit (heating mode) - Energy input too low in the environment circuit (heating mode) or building circuit (cooling mode) 	<ul style="list-style-type: none"> - Check the flow rate in the environment circuit - Check the dimensioning of the environment circuit (heating mode) - If the building circuit contains thermostatic valves, check that they are suitable for cooling mode (cooling mode) - Check the low-pressure sensor and compressor inlet sensor
F.734	Condensation temperature too low	<ul style="list-style-type: none"> - Temperature in the building circuit (heating mode) or environment circuit (cooling mode) too low for compressor operation - Refrigerant volume too low 	<ul style="list-style-type: none"> - Check the EEV (does the EEV move to the limit stop? Use the sensor/actuator test) - Check the compressor inlet sensor, high-pressure sensor and low-pressure sensor - Check the refrigerant volume (700 g) - Leak-tightness test

Code	Meaning	Cause	Remedy
F.735	Evaporation temperature too high	<ul style="list-style-type: none"> - Temperature in the environment circuit (heating mode) or building circuit (cooling mode) too high for compressor operation - Feed-in of external heat into the environment circuit 	<ul style="list-style-type: none"> - Reduce or stop the external heat that is entering - Check the de-icer (does it heat up even though it is "Off" in the sensor/actuator test?) - Check the EEV (does the EEV move to the limit stop? Use the sensor/actuator test) - Check the compressor inlet sensor and low-pressure sensor
F.740	Environment cir. inlet temperature too low	<ul style="list-style-type: none"> - Inlet temperature in the environment circuit too low for the compressor to start <p>Heating:</p> <ul style="list-style-type: none"> - VWS environment circuit inlet temperature < -10 °C 	<ul style="list-style-type: none"> - Check the dimensioning of the environment circuit for VWS - Check the sensors
F.741	Building circuit inlet Return temperature too low	<ul style="list-style-type: none"> - Return temperature in the building circuit too low for the compressor to start <p>Heating:</p> <ul style="list-style-type: none"> - Return temperature < 5 °C <p>Cooling:</p> <ul style="list-style-type: none"> - Return temperature < 7 °C 	<ul style="list-style-type: none"> - Check the sensors - Checking the cooling mixer
F.742	Environment cir. inlet temperature too high	<ul style="list-style-type: none"> - Inlet temperature in the environment circuit too high for the compressor to start <p>Heating:</p> <ul style="list-style-type: none"> - Environment circuit inlet temp. > 25 °C 	<ul style="list-style-type: none"> - Check the environment circuit - Check the sensors - Checking the environment circuit pump - Checking the cooling mixer - Checking the isolation valve in the environment circuit (if present)
F.743	Building circuit inlet Return temperature too high	<ul style="list-style-type: none"> - Return temperature in the building circuit too high for the compressor to start <p>Heating:</p> <ul style="list-style-type: none"> - Return temperature > 55 °C <p>Cooling:</p> <ul style="list-style-type: none"> - Return temperature > 35 °C 	<ul style="list-style-type: none"> - Check the sensors - Checking the heating pump - Checking the non-return flap (if present) - Checking the 2-zone set (if present)

F Sensor characteristics for the VR 10 external temperature sensor

Temperature (°C)	Resistance (ohms)
-40	87879
-35	63774
-30	46747
-25	34599
-20	25848
-15	19484
-10	14814
-5	11358
0	8778
5	6836
10	5363
15	4238
20	3372

Appendix

Temperature (°C)	Resistance (ohms)
25	2700
30	2176
35	1764
40	1439
45	1180
50	973
55	807
60	672
65	562
70	473
75	400
80	339
85	289
90	247
95	212
100	183
105	158
110	137
115	120
120	104
125	92
130	81
135	71
140	63
145	56
150	50
155	44

G Sensor characteristics for the internal temperature sensors

Temperature (°C)	Resistance (ohms)
-40	332094
-35	239900
-30	175200
-25	129287
-20	96358
-15	72500
-10	55046
-5	42157
0	32554
5	25339
10	19872
15	15698
20	12488
25	10000
30	8059,1
35	6534,7
40	5329,9
45	4371,7

Temperature (°C)	Resistance (ohms)
50	3605,3
55	2988,7
60	2489,9
65	2084,4
70	1753,0
75	1480,9
80	1256,4
85	1070,3
90	915,5
95	786,4
100	678,1
105	586,8
110	509,5
115	443,9
120	388,1
125	340,3
130	299,3
135	264,0
140	233,6
145	207,2
150	184,3

H Sensor characteristic value for the VRC DCF outdoor temperature sensor

Temperature (°C)	Resistance (ohms)
-25	2167
-20	2067
-15	1976
-10	1862
-5	1745
0	1619
5	1494
10	1387
15	1246
20	1128
25	1020
30	920
35	831
40	740

Appendix

I Technical data

Technical data – General

	VWS 36/4.1 230V
Flow/return heating connections, boiler side	22 mm diameter
Boiler-side flow/return heat source connections	22 mm diameter
Product dimensions, width	440 mm
Product dimensions, height	720 mm
Product dimensions, depth	435 mm
Weight without packaging	59 kg
Weight with packaging	67 kg
Weight when ready for operation	66 kg
Heating circuit/compressor rated voltage	1/N/PE 230 V / 50 Hz
Control circuit rated voltage	1/N/PE 230 V / 50 Hz
Fuse type B, slow-blow	16 A
Optional on-site residual-current circuit breaker	RCB type A or RCB type B
In-rush current without in-rush current limiter	23 A
Min. electrical power consumption for B-10/W20	0.6 kW
Max. electrical power consumption for B20/W55	1 kW
Max. electrical power consumption in continuous operation	4.7 A
IP rating in accordance with EN 60529	IP 20
Inner sound power level (LWi) in accordance with EN 12102; heating mode at B0/W35	41.1 dB(A)
Inner sound power level (LWi) in accordance with EN 12102; heating mode at B0/W45	43.6 dB(A)
Inner sound power level (LWi) in accordance with EN 12102; heating mode at B0/W55	44.7 dB(A)
Permissible ambient temperature	7 ... 40 °C
Installation room at a refrigerant volume of 0.70 kg	1.6 m ³
Installation site	Interior/dry

Technical data – Source circuit

	VWS 36/4.1 230V
Min. brine fluid operating pressure	0.05 MPa (0.50 bar)
Max. brine fluid operating pressure	0.3 MPa (3.0 bar)
Nominal volume flow ΔT 3 K for B0/W35	600 l/h
Min. source inlet temperature (hot brine) in heating mode	-10 °C
Max. source inlet temperature (hot brine) in heating mode	20 °C
Brine content of the brine circuit in the heat pump	3.5 l
Remaining feed head at max. ΔT 3 K B0/W35	590 mbar
Electrical power consumption of the brine pump at B0/W35 ΔT 3 K with an external pressure loss of 250 mbar in the source circuit	21 W
Electrical power consumption of the brine pump	3 ... 70 W
Pump type	High-efficiency pump
Materials	<ul style="list-style-type: none"> - Cu - CuZn alloy - Stainless steel - EPDM - Brass - Fe
Brine fluid type	Ethylene glycol 30% vol.

Technical data – Heating circuit

	VWS 36/4.1 230V
Minimum operating pressure	0.05 MPa (0.50 bar)
Maximum operating pressure	0.3 MPa (3.0 bar)
Min. heating mode flow temperature	20 °C
Max. heating mode flow temperature	60 °C
Min. cooling mode flow temperature	16 °C
Heating circuit water contents in the heat pump	3.5 l
Nominal volume flow at B0 ΔT 3 K / W35 ΔT 5 K	470 l
Nominal volume flow at B0 ΔT 3 K / W55 ΔT 8 K	250 l
Max. remaining feed head B0 ΔT 3 K / W35 ΔT 5 K	400 mbar
Max. remaining feed head at B0 ΔT 3 K / W55 ΔT 8 K	680 mbar
Electrical power consumption of the heating pump	4 ... 63 W
Electrical power consumption of the heating pump at B0/W35 ΔT 5 K for a 250 mbar external pressure loss in the heating circuit	21 W
Permissible heating water condition	Only add permitted frost or corrosion protection agents to the heating water if these are approved in the installation instructions. Soften the heating water at water hardnesses from 3.0 mmol/l (16.8° dH) according to Directive VDI 2035 sheet 1.
Pump type	High-efficiency pump
Materials	– Cu – CuZn alloy – Stainless steel – EPDM – Brass – Fe

Technical data – Refrigeration circuit

	VWS 36/4.1 230V
Refrigerant type	R410A
Refrigerant content of the refrigerant circuit in the heat pump	0.7 kg
Global warming potential (GWP) in accordance with regulation (EU) no. 517/2014	2088
CO ₂ equivalent	1.46 t
Expansion valve design	Electronic
Permissible operating pressure (relative)	4.15 MPa (41.50 bar)
Compressor type	Rotary piston
Oil type	FV50S
Oil level	0.3 l

Technical data – Heat pump system performance data

The following performance data is applicable to new products with clean heat exchangers.

	VWS 36/4.1 230V
Heating output B0/W35 ΔT 5 K	2.50 kW
Power consumption B0/W35 ΔT 5 K	0.70 kW
Effective power consumption B0/W35 ΔT 5 K	0.63 kW
Coefficient of performance EN 14511 B0/W35 ΔT 5 K	4.00
Heating output B0/W45	2.30 kW
Power consumption B0/W45	0.8 kW
Effective power consumption B0/W45 ΔT 8 K	0.74 kW

Appendix

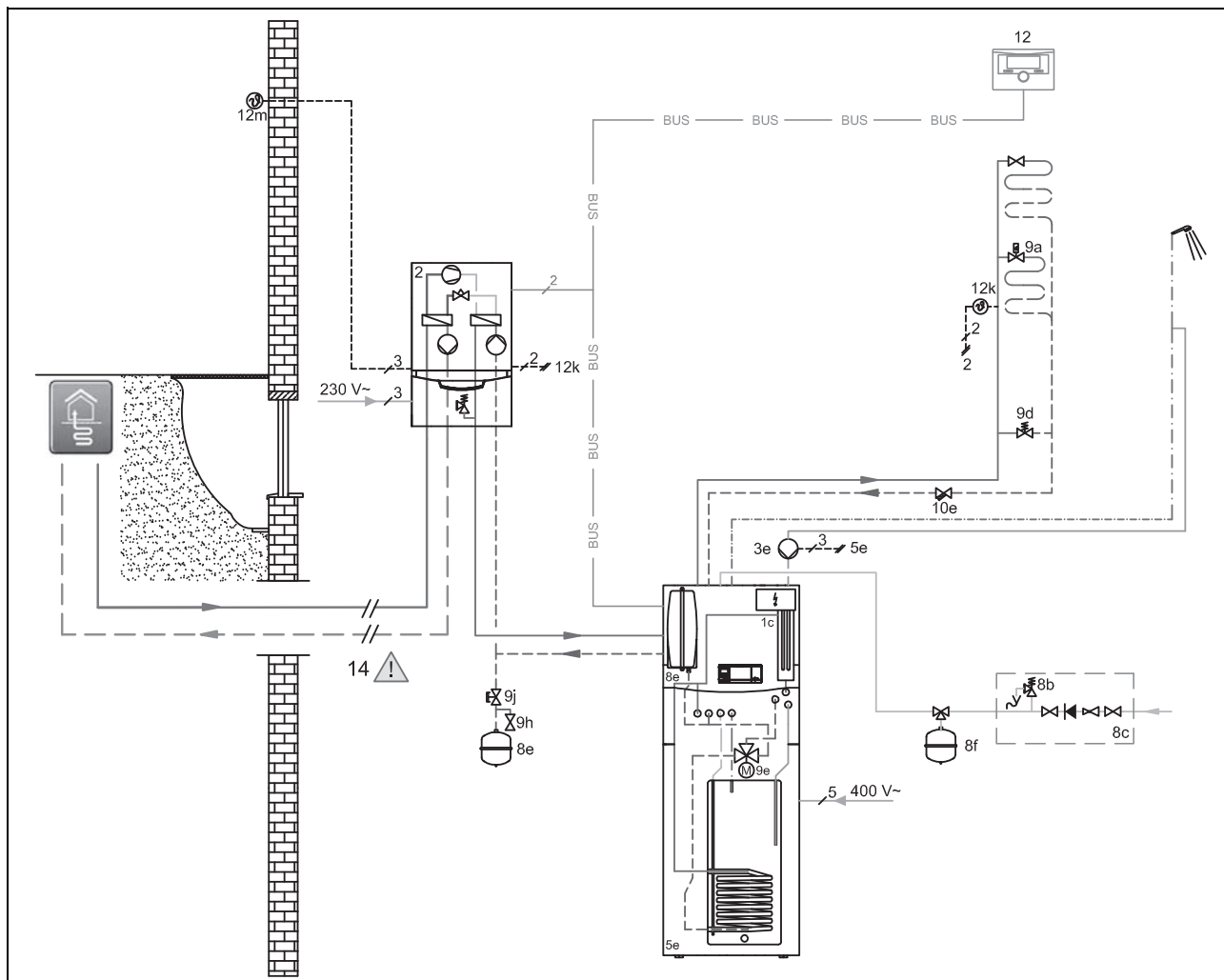
	VWS 36/4.1 230V
Coefficient of performance EN 14511 B0/W45	3.10
Heating output B0/W55 ΔT 8 K	2.20 kW
Power consumption B0/W55 ΔT 8 K	0.90 kW
Effective power consumption B0/W55 ΔT 8 K	0.88 kW
Coefficient of performance EN 14511 B0/W55 ΔT 8 K	2.50
Cooling output B10/W18(22), passive	5 kW

Application limits for the heat pump: Heating (heat source = brine)

- At the same volume flow rates in the heating circuit (ΔT 5 K or ΔT 8 K) and the brine circuit (ΔT 3 K) as for the nominal heat output test under standard nominal conditions. Operation of the pump outside the application limits results in the heat pump being switched off by the internal control and safety devices.
- Application limits for the heat pump: Heating:
 - B-10/W20
 - B-10/W55
 - B-3/W60
 - B20/W60
 - B20/W20
- To be able to achieve the B-10/W20 and B-10/W55 operating limits, you must change the freeze protection in the configuration from the factory setting to -13 °C.

J Basic hydraulic diagram

J.1 Basic hydraulic diagram 0020232108



2 Heat pump

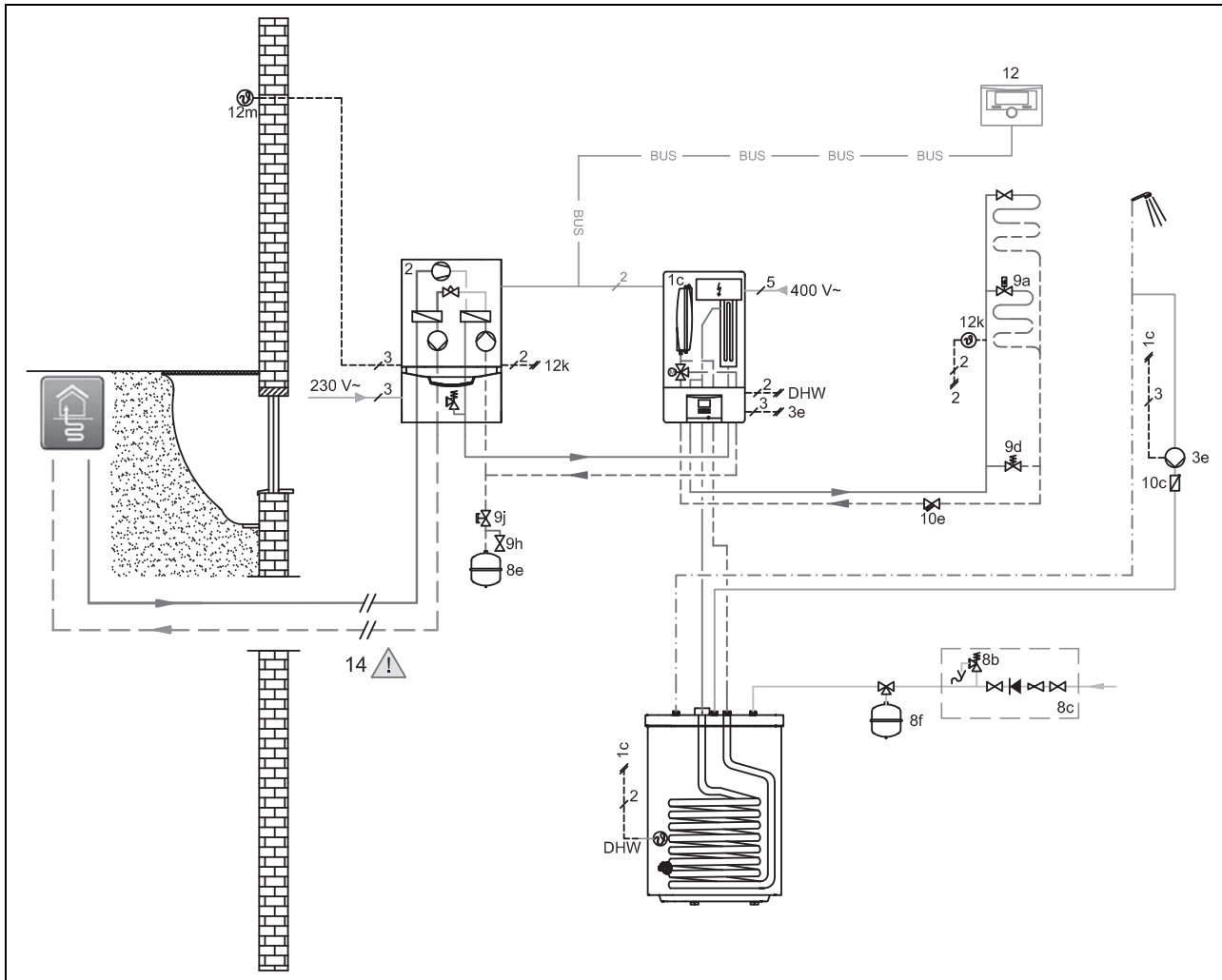
3e Circulation pump

5e Hydraulic tower

8b Potable water expansion relief valve

8c	Safety group – drinking water connection	9h	Filling/draining cock
8e	Heating diaphragm expansion vessel	9j	Tamper-proof capped valve
8f	Diaphragm expansion vessel – potable water	12	System control
9a	Single-room temperature control valve (thermo-static/motorised)	12k	Limit thermostat
9d	Bypass valve	12m	Outdoor temperature sensor

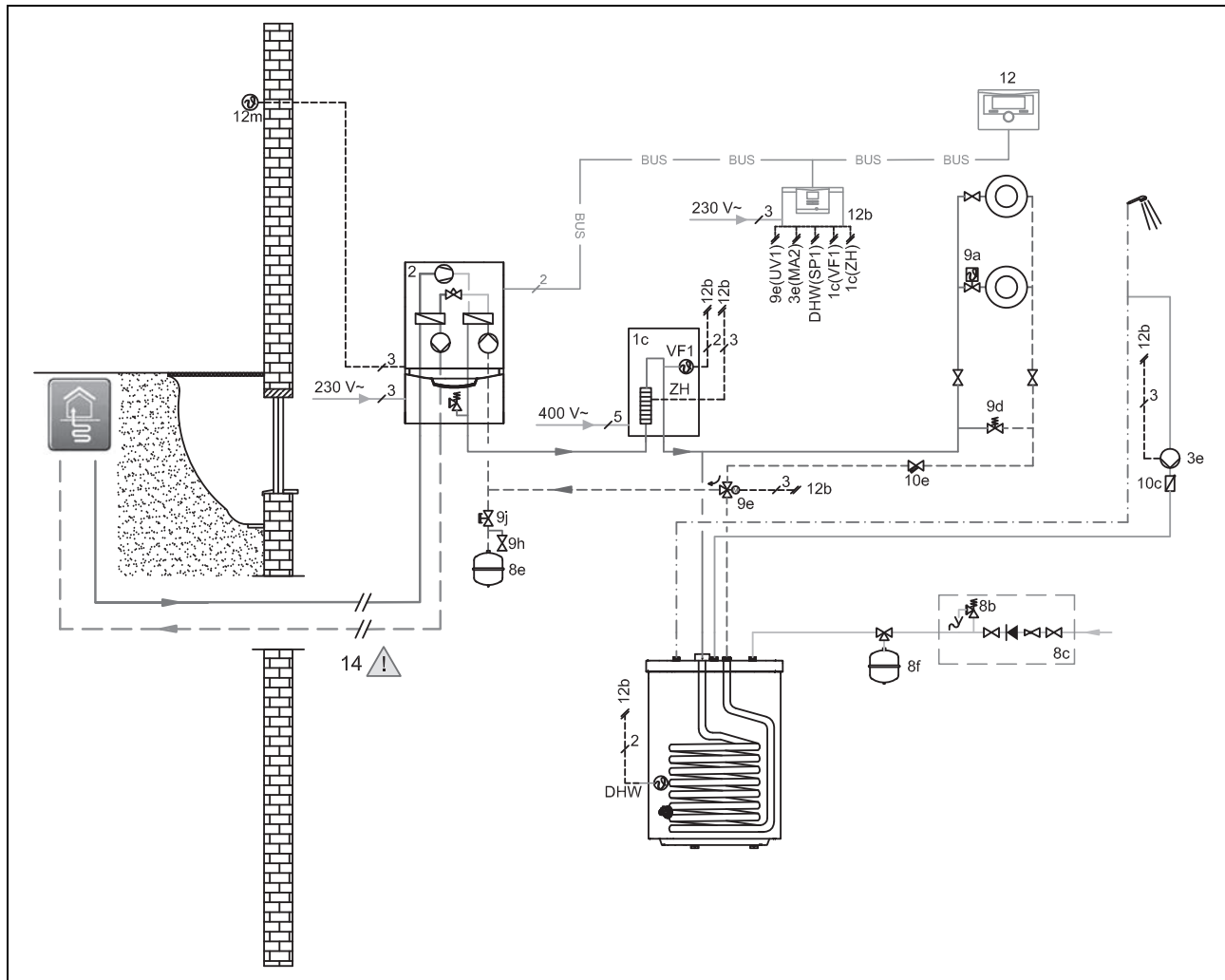
J.2 Basic hydraulic diagram 0020235577



1c	Heating/domestic hot water back-up boiler	9d	Bypass valve
2	Heat pump	9h	Filling/draining cock
3e	Circulation pump	9j	Tamper-proof capped valve
5	Monovalent domestic hot water cylinder	10c	Non-return valve
8b	Potable water expansion relief valve	12	System control
8c	Safety group – drinking water connection	12k	Limit thermostat
8e	Heating diaphragm expansion vessel	12m	Outdoor temperature sensor
8f	Diaphragm expansion vessel – potable water	DHW	Cylinder temperature sensor
9a	Single-room temperature control valve (thermo-static/motorised)		

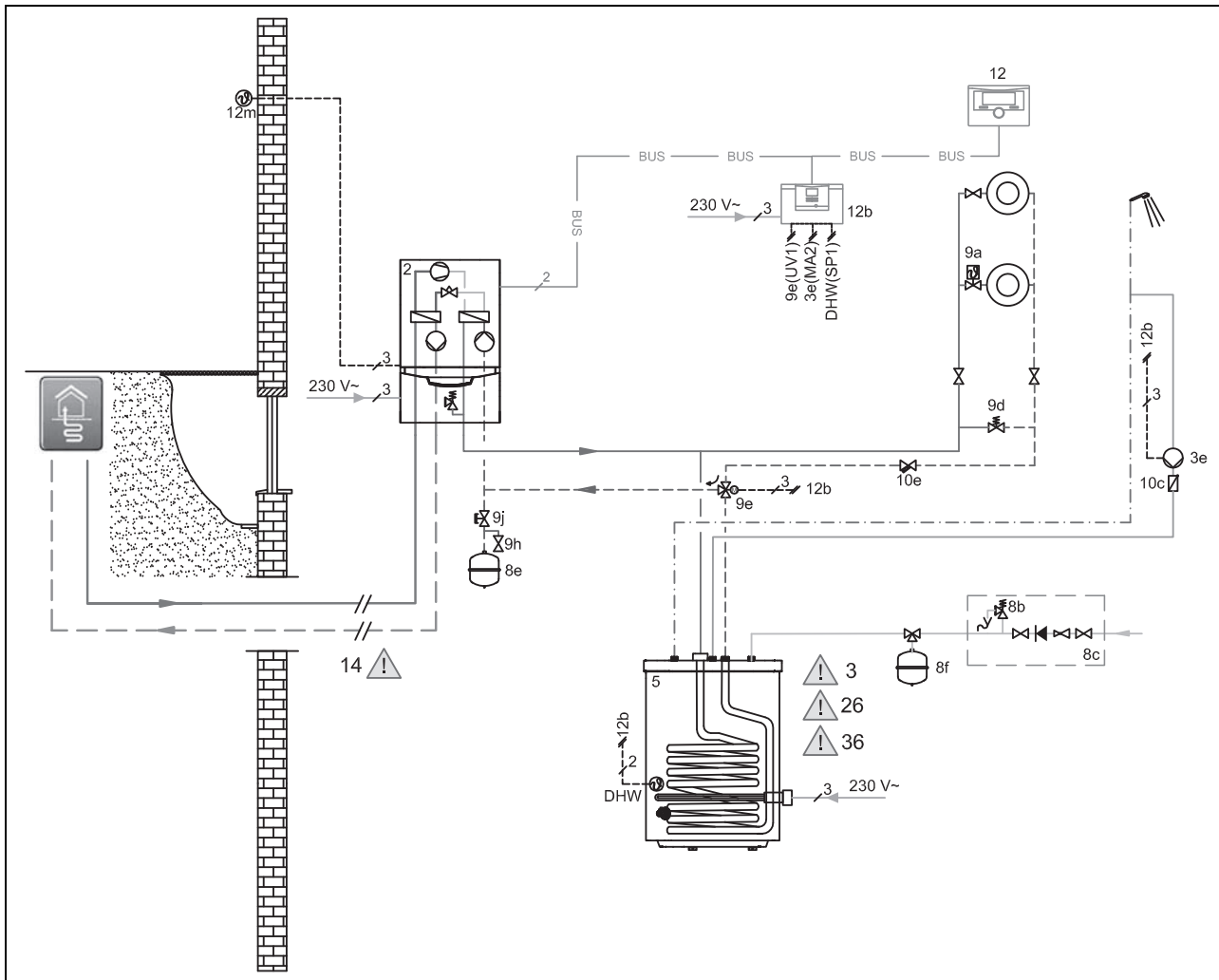
Appendix

J.3 Basic hydraulic diagram 0020235580



1c	Heating/domestic hot water back-up boiler	9e	Domestic hot water generation prioritising diverter valve
2	Heat pump	9h	Filling/draining cock
3e	Circulation pump	9j	Tamper-proof capped valve
5	Monovalent domestic hot water cylinder	10c	Non-return valve
8b	Potable water expansion relief valve	12	System control
8c	Safety group – drinking water connection	12b	Remote heat pump expansion module
8e	Heating diaphragm expansion vessel	12m	Outdoor temperature sensor
8f	Diaphragm expansion vessel – potable water	DHW	Cylinder temperature sensor
9d	Bypass valve	MA	Multi-function output

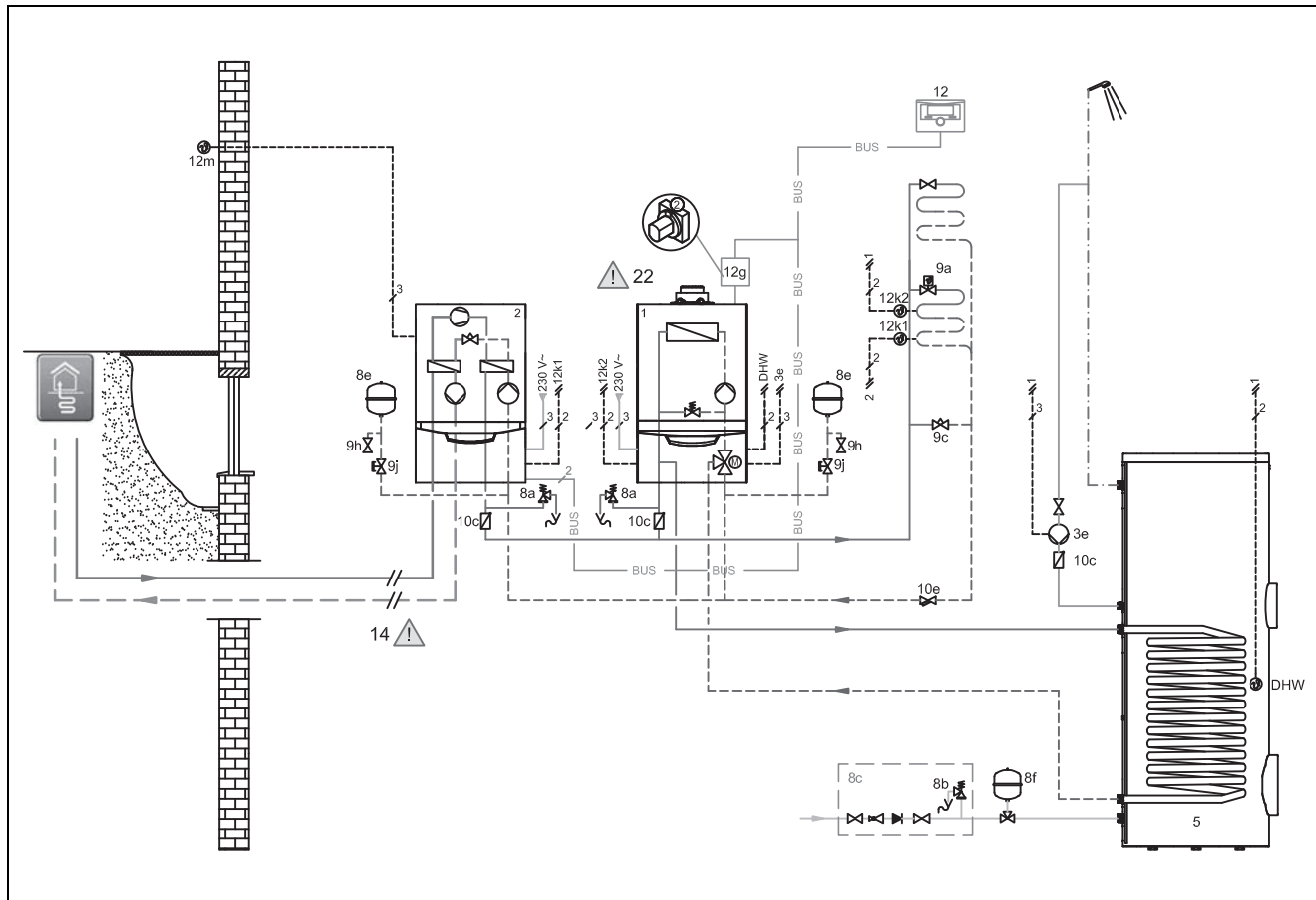
J.4 Basic hydraulic diagram 0020249867



2	Heat pump	9h	Filling/draining cock
3e	Circulation pump	9j	Tamper-proof capped valve
5	Monovalent domestic hot water cylinder	10c	Non-return valve
8b	Potable water expansion relief valve	12	System control
8c	Safety group – drinking water connection	12b	Remote heat pump expansion module
8e	Heating diaphragm expansion vessel	12m	Outdoor temperature sensor
8f	Diaphragm expansion vessel – potable water	DHW	Cylinder temperature sensor
9d	Bypass valve	MA	Multi-function output
9e	Domestic hot water generation prioritising diverter valve		

Appendix

J.5 Basic hydraulic diagram 0020185684



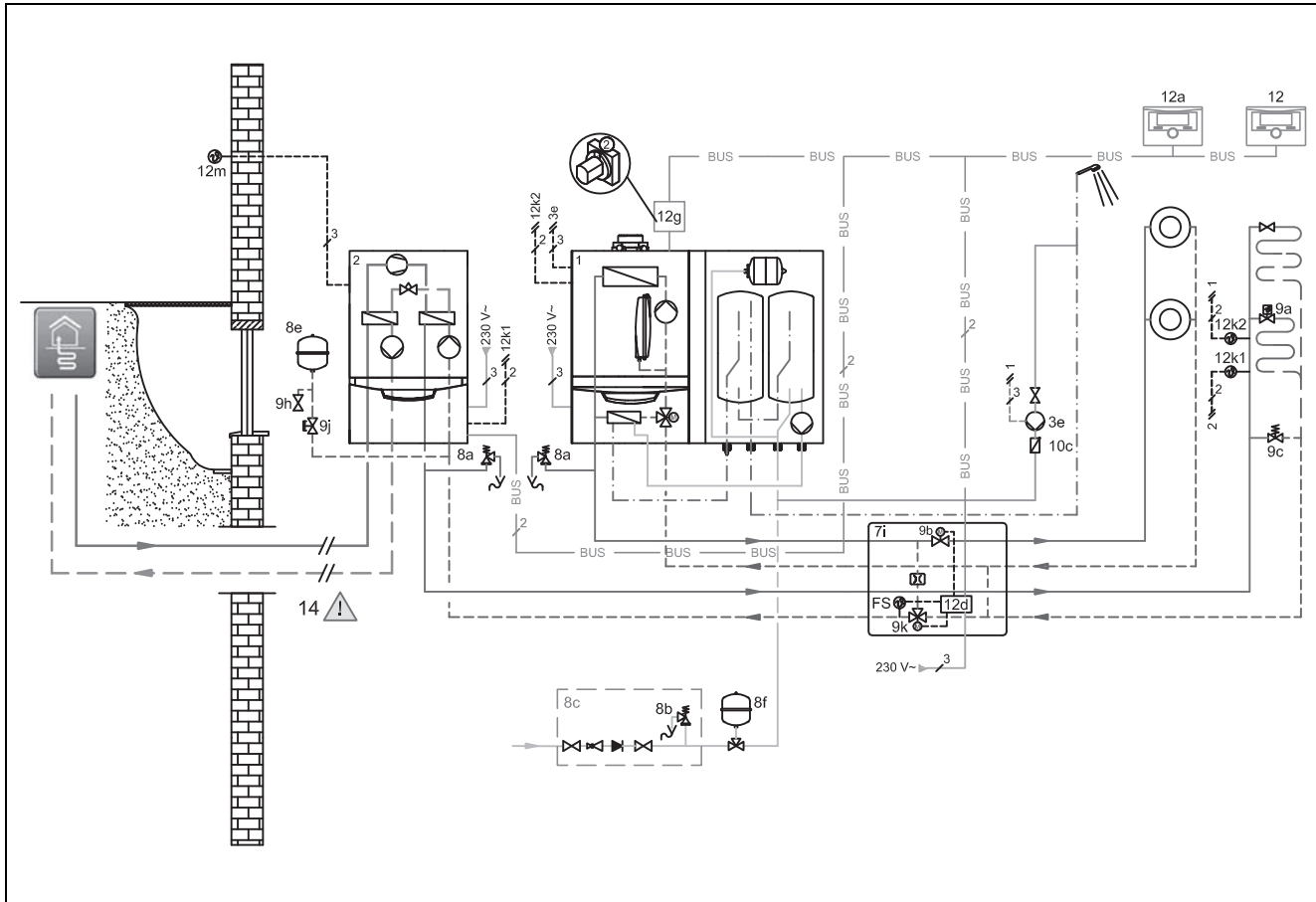
1	Heat generator	9c	Flow regulator valve
2	Heat pump	9h	Filling/draining cock
3e	Circulation pump	9j	Tamper-proof capped valve
5	Monovalent domestic hot water cylinder	10c	Non-return valve
8a	Expansion relief valve	10e	Line strainer with magnetite separator
8b	Potable water expansion relief valve	12	System control
8c	Safety group – drinking water connection	12g	eBUS bus coupler
8e	Heating diaphragm expansion vessel	12k	Limit thermostat
8f	Diaphragm expansion vessel – potable water	12m	Outdoor temperature sensor
9a	Single-room temperature control valve (thermo-static/motorised)	DHW	Cylinder temperature sensor

Either the heat pump or the gas-fired boiler are active in heating mode. It is not possible to operate the units in parallel.

The domestic hot water is only generated by the gas-fired boiler.

- Connect the underfloor heating circuits directly to the heat pump.
- Connect two limit thermostats to guarantee the underfloor heating protection function for the heat pump and the gas-fired boiler.
- Ensure that a minimum circulation water volume (40% of the nominal volume flow) is guaranteed.
- Install one of the supplied non-return flaps in the flow of both the heat pump and the gas-fired boiler. The flow direction is from the product towards the heating installation; the backflow to the product is blocked
- If you have installed a low loss header between the heat pump and the heating installation, the VF2 system sensor in the flow of the low loss header must be attached to the heating installation.
- Install the control in the living room.

J.6 Basic hydraulic diagram 0020180635



1	Heat generator	9c	Flow regulator valve
2	Heat pump	9d	Bypass valve
3e	Circulation pump	9h	Filling/draining cock
5	Monovalent domestic hot water cylinder	9j	Tamper-proof capped valve
7i	2-zone module	9k	3-port mixing valve
8a	Expansion relief valve	10c	Non-return valve
8b	Potable water expansion relief valve	12	System control
8c	Safety group – drinking water connection	12a	Remote control unit
8e	Heating diaphragm expansion vessel	12d	Expansion/wiring centre
8f	Diaphragm expansion vessel – potable water	12g	eBUS bus coupler
9a	Single-room temperature control valve (thermo-static/motorised)	12k	Limit thermostat
9b	Zone valve	12m	Outdoor temperature sensor

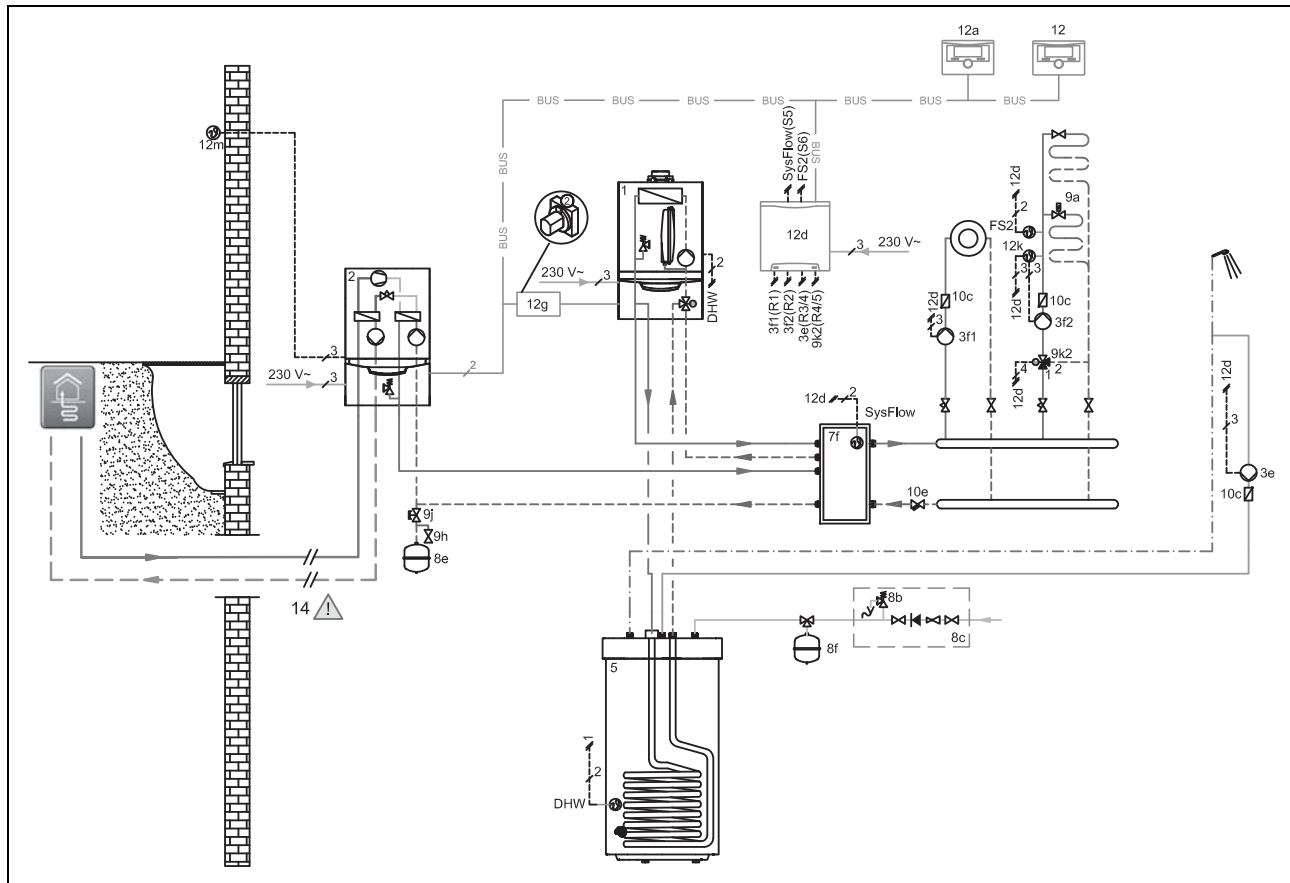
Using a 2-zone set and the appropriate information in the VRC 700 system control also makes the parallel heating mode possible for parallel operation of different temperature levels in the heating system with the different heat generators.

For the parallel heating mode, the 2-zone kit (Vaillant accessory) must be installed. The heat pump, the gas-fired boiler and the required heating circuits are connected to the 2-zone kit. When using a 2-zone kit (Vaillant accessory), the two non-return flaps are not required.

- Connect two limit thermostats to guarantee the underfloor heating protection function for the heat pump and the gas-fired boiler
- Ensure that a minimum circulation water volume (40% of the nominal volume flow) is guaranteed.
- Install the control in the living room.

Appendix

J.7 Basic hydraulic diagram 0020235626

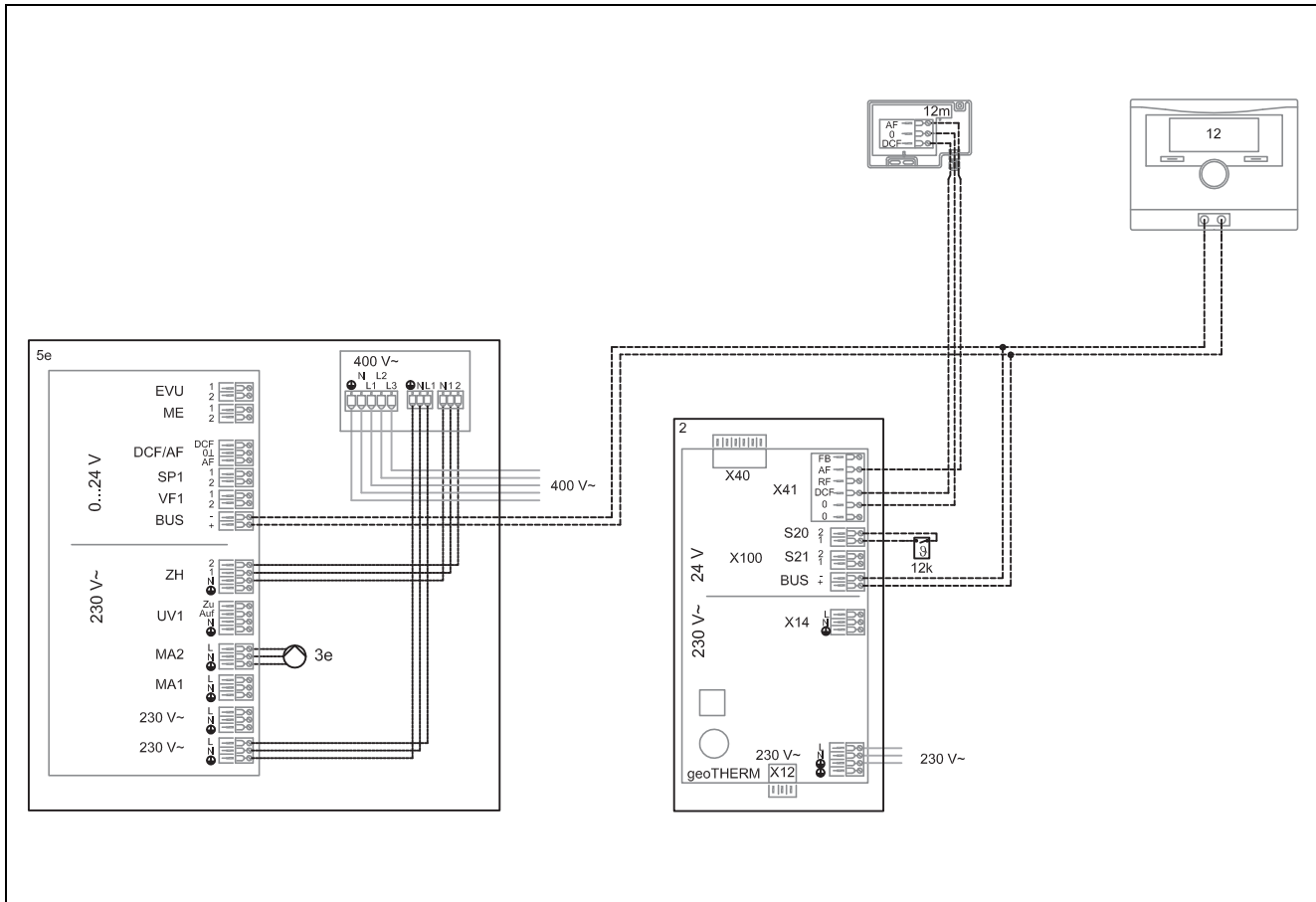


- | | | | |
|----|---|---------|--|
| 1 | Heat generator | 9j | Tamper-proof capped valve |
| 2 | Heat pump | 9k | 3-port mixing valve |
| 3e | Circulation pump | 10c | Non-return valve |
| 3f | Heating pump | 10e | Line strainer with magnetite separator |
| 5 | Monovalent domestic hot water cylinder | 12 | System control |
| 7f | Decoupler module | 12a | Remote control unit |
| 8b | Potable water expansion relief valve | 12d | Expansion/wiring centre |
| 8c | Safety group – drinking water connection | 12g | eBUS bus coupler |
| 8e | Heating diaphragm expansion vessel | 12k | Limit thermostat |
| 8f | Diaphragm expansion vessel – potable water | 12m | Outdoor temperature sensor |
| 9a | Single-room temperature control valve (thermo-static/motorised) | DHW | Cylinder temperature sensor |
| 9h | Filling/draining cock | FS | Flow temperature sensor |
| | | SysFlow | Cylinder temperature sensor |

K Wiring diagrams

K.1

Wiring diagram 0020232108

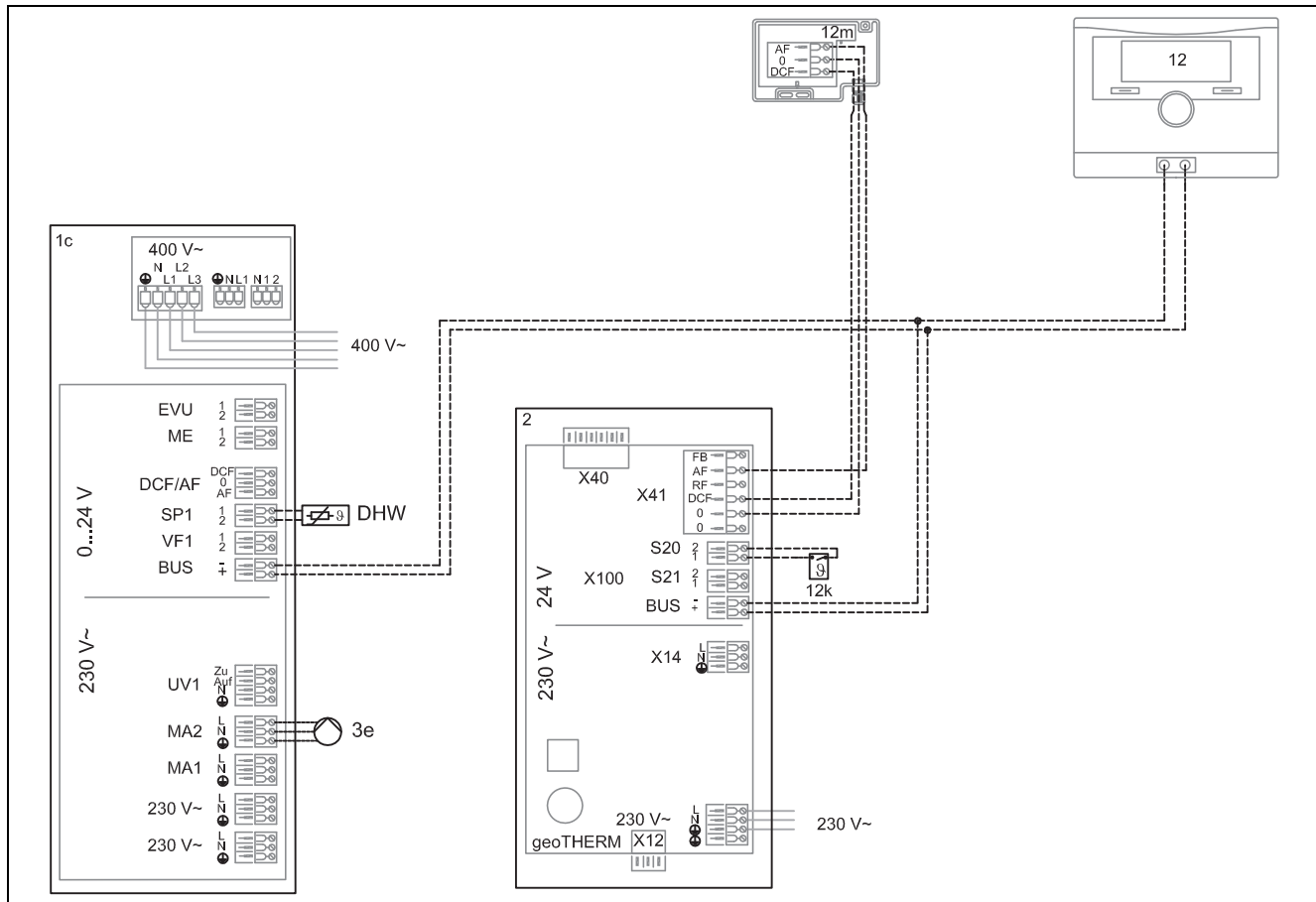


2	Heat pump	12	System control
3e	Circulation pump	12k	Limit thermostat
5c	Combi cylinder (tank in tank)	12m	Outdoor temperature sensor

Appendix

K.2

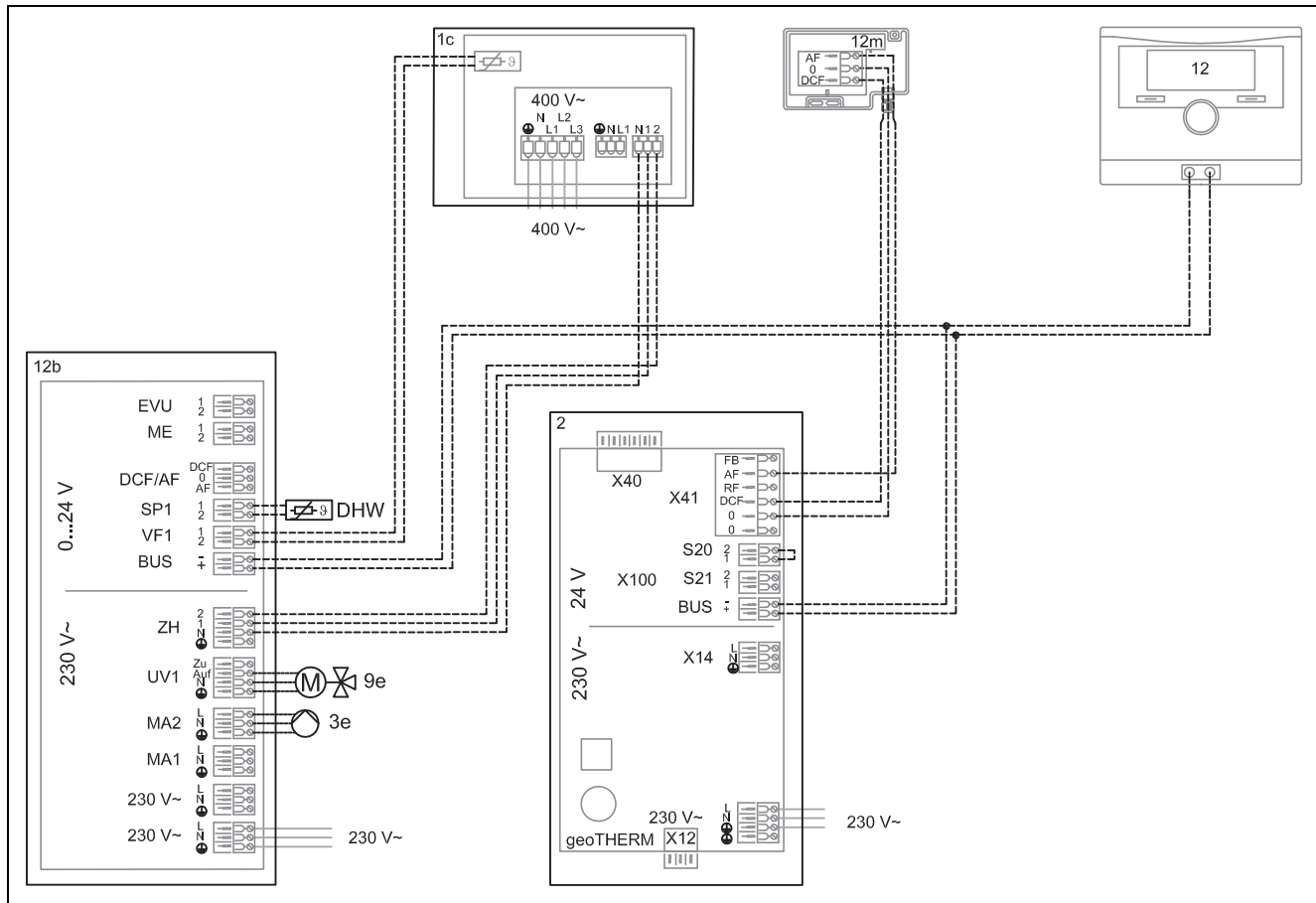
Wiring diagram 0020235577



1c	Heating/domestic hot water back-up boiler	12k	Limit thermostat
2	Heat pump	12m	Outdoor temperature sensor
3e	Circulation pump	DHW	Cylinder temperature sensor
12	System control		

K.3

Wiring diagram 0020235580

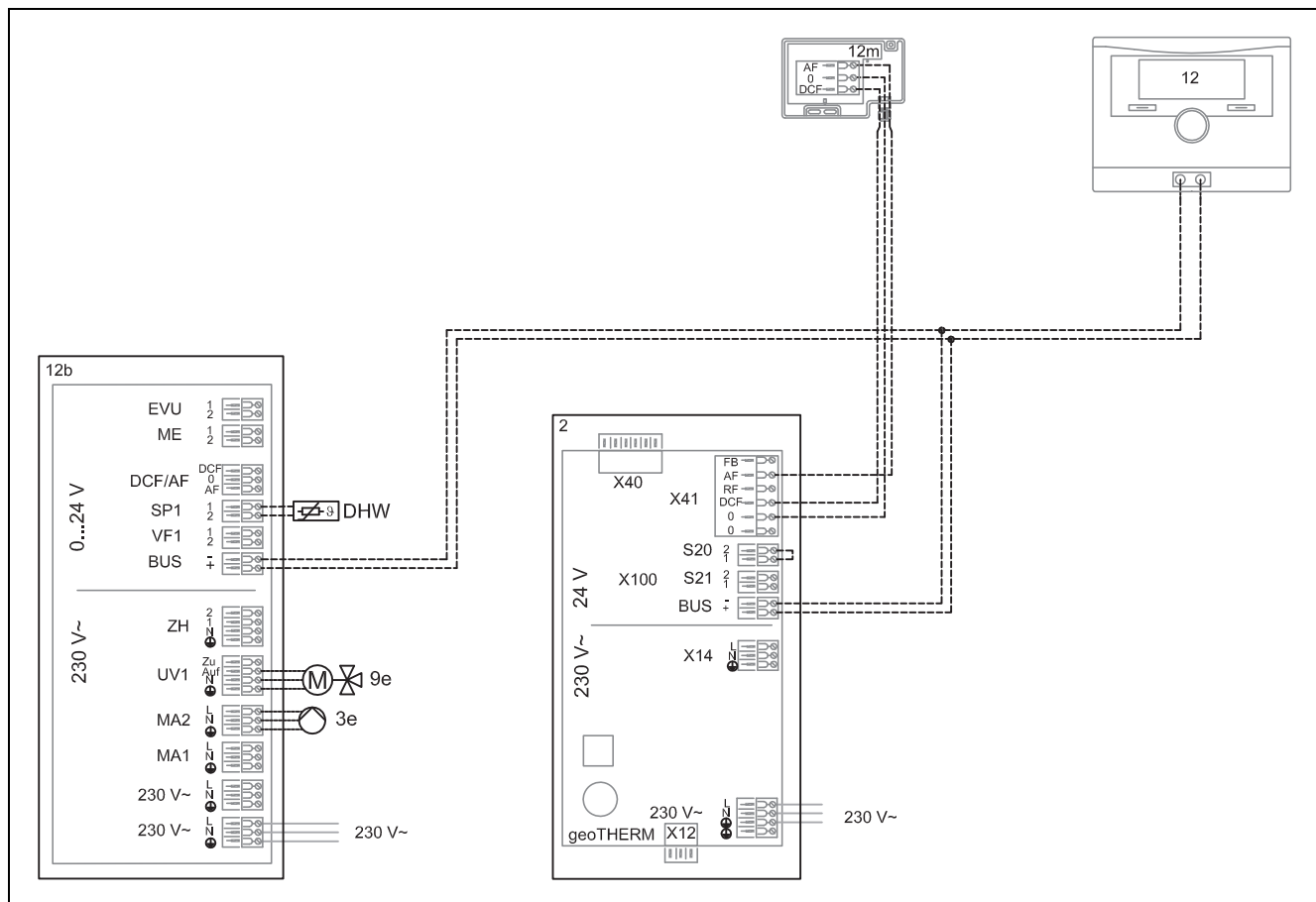


- | | | | |
|----|---|-----|-----------------------------------|
| 1c | Heating/domestic hot water back-up boiler | 12 | System control |
| 2 | Heat pump | 12b | Remote heat pump expansion module |
| 3e | Circulation pump | 12m | Outdoor temperature sensor |
| 9e | Domestic hot water generation prioritising diverter valve | DHW | Cylinder temperature sensor |

Appendix

K.4

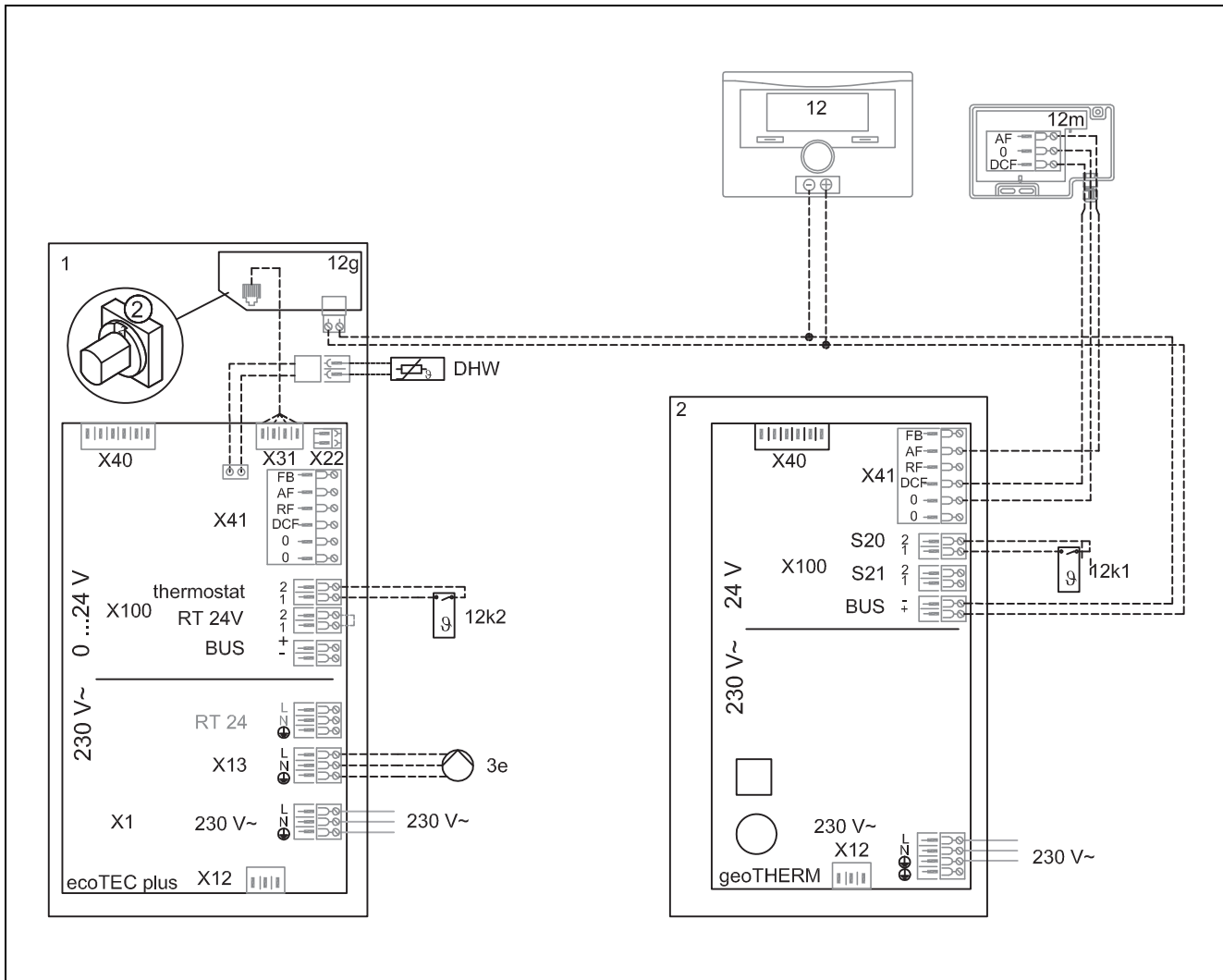
Wiring diagram 0020249867



2	Heat pump	12	System control
3e	Circulation pump	12b	Remote heat pump expansion module
9e	Domestic hot water generation prioritising diverter valve	12m	Outdoor temperature sensor
		DHW	Cylinder temperature sensor

K.5

Wiring diagram 0020185684

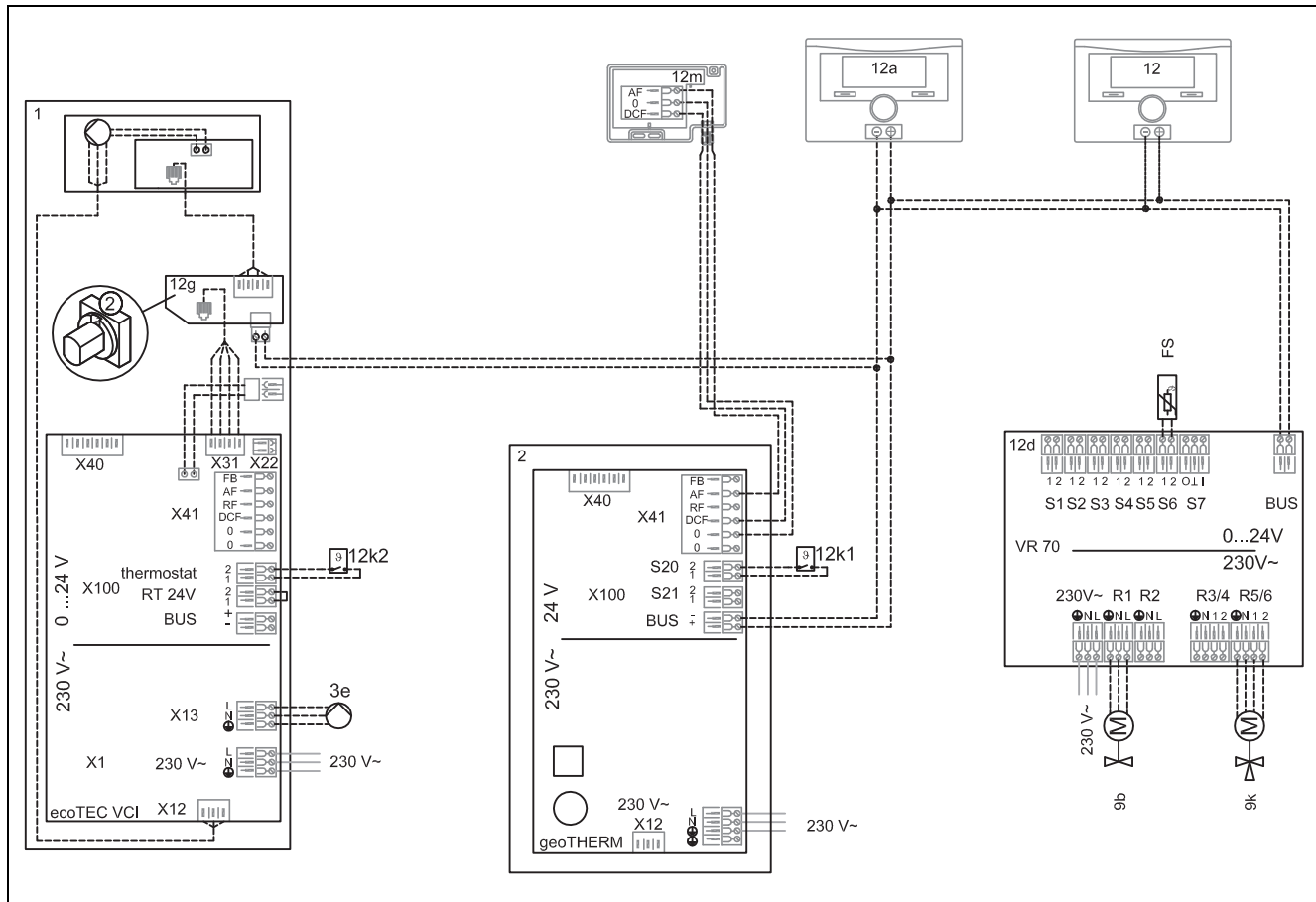


- | | | | |
|----|------------------|-----|-----------------------------|
| 1 | Heat generator | 12g | eBUS bus coupler |
| 2 | Heat pump | 12k | Limit thermostat |
| 3e | Circulation pump | 12m | Outdoor temperature sensor |
| 12 | System control | DHW | Cylinder temperature sensor |

Appendix

K.6

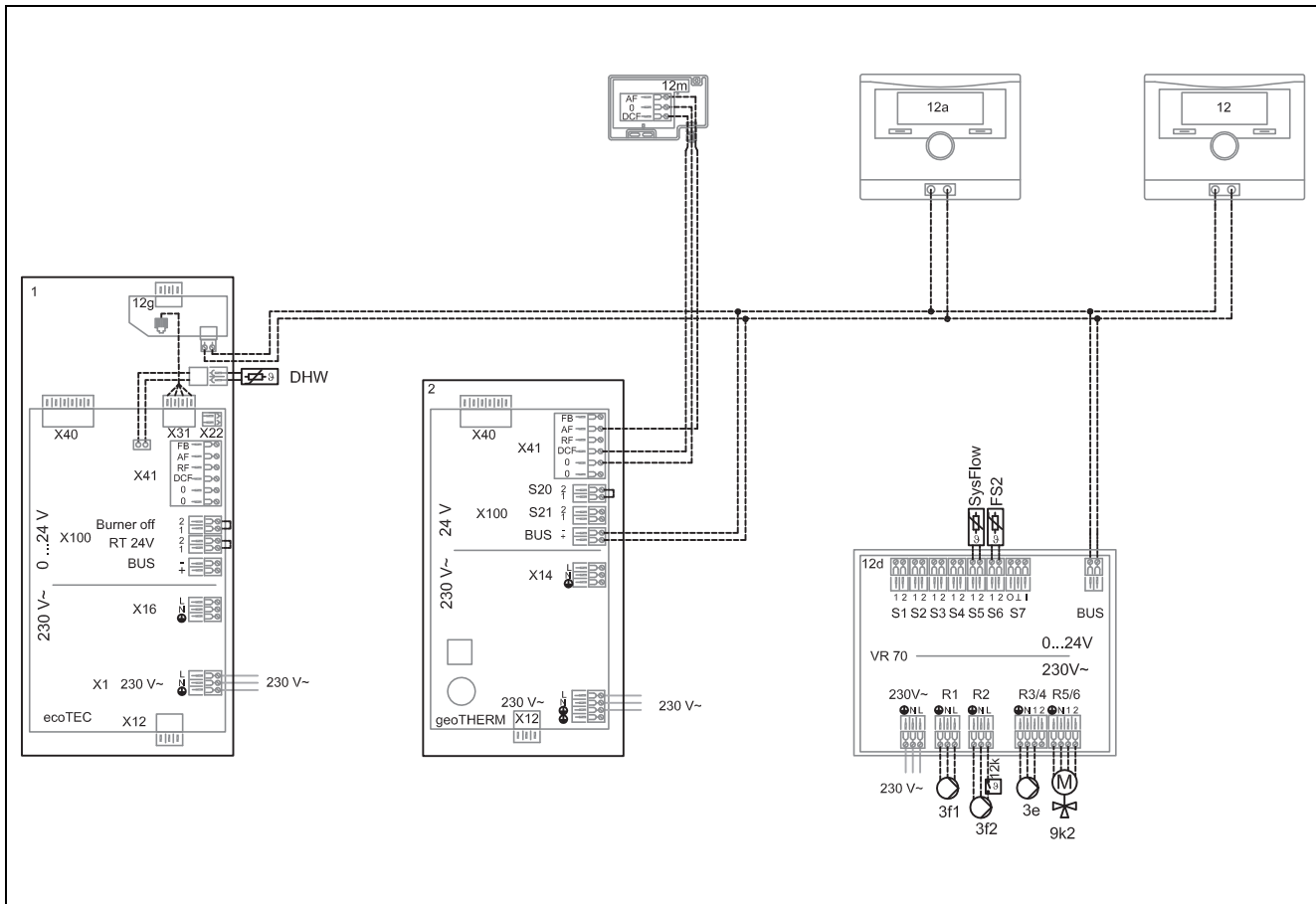
Wiring diagram 0020180635



1	Heat generator	12	System control
2	Heat pump	12d	Expansion/wiring centre
3e	Circulation pump	12g	eBUS bus coupler
5	Monovalent domestic hot water cylinder	12k	Limit thermostat
7i	2-zone module	12m	Outdoor temperature sensor
9b	Zone valve	FS	Flow temperature sensor/swimming pool sensor
9k	3-port mixing valve		

K.7

Wiring diagram 0020235626



- | | | | |
|-----|---------------------|---------|--|
| 1 | Heat generator | 12d | Expansion/wiring centre |
| 2 | Heat pump | 12g | eBUS bus coupler |
| 3e | Circulation pump | 12m | Outdoor temperature sensor |
| 3f | Heating pump | DHW | Cylinder temperature sensor |
| 9k | 3-port mixing valve | FS | Flow temperature sensor/swimming pool sensor |
| 12 | System control | SysFlow | System temperature sensor |
| 12a | Remote control unit | | |

L Commissioning Checklist

Applicability: Great Britain

Benchmark Commissioning and Servicing Section

It is a requirement that the boiler is installed and commissioned to the manufacturers instructions and the data fields on the commissioning checklist completed in full.

To instigate the boiler guarantee the boiler needs to be registered with the manufacturer within one month of the installation.

To maintain the boiler guarantee it is essential that the boiler is serviced annually by a Gas Safe registered engineer who has been trained on the boiler installed. The service details should be recorded on the Benchmark Service Interval Record and left with the householder.



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GROUND SOURCE HEAT PUMP COMMISSIONING CHECKLIST

This Commissioning Checklist is to be completed in full by the competent person who commissioned the heat pump and associated equipment as a means of demonstrating compliance with the appropriate Building Regulations and then handed to the customer to keep for future reference.

Failure to install and commission this equipment to the manufacturer's instructions may invalidate the warranty but does not affect statutory rights.

Customer name:	Telephone number:
Address:	
Heat Pump Make and Model	
Heat Pump Serial Number	
Commissioned by (PRINT NAME):	Certified Operative Reg. No. [1]
Company name:	Telephone number:
Company address:	
Commissioning date:	
Building Regulations Notification Number (if applicable) [2]	

CONTROLS - SYSTEM AND HEAT PUMP (tick the appropriate boxes)			
Time and temperature control to heating	Room thermostat and programmer/timer	Programmable Roomstat	
	Load/weather compensation	Optimum start control	
Time and temperature control to hot water	Cylinder thermostat and programmer/timer	Combined with Heat pump main controls	
Heating zone valves (including underfloor loops)	Fitted	Not required	
Hot water zone valves	Fitted	Not required	
Thermostatic radiator valves	Fitted	Not required	
Heat Pump Safety Interlock [3]	Built In	Provided	
Outdoor Sensor	Fitted	Not required	
Automatic bypass to system	Fitted	Not required	
Buffer Vessel Fitted	Yes	No	If YES Volume: Litres

ALL SYSTEMS	
The heating system has been filled and pressure tested	Yes
Expansion vessel for heating is sized, fitted & charged in accordance with manufacturer's instructions	Yes
The heat pump is fitted on a solid/stable surface capable of taking its weight	Yes
The system has been flushed and cleaned in accordance with BS7593 and heat pump manufacturer's instructions	Yes
What system cleaner was used?	
What inhibitor was used?	Quantity litres
Are all exposed external pipeworks insulated?	Yes

BORE HOLE/GROUND LOOPS	
Bore Hole	Ground Loop Length/Depth m
The ground loops/bore hole pipes have been filled and pressure tested in accordance with relevant British Standards	Yes
If more than one 1 collector has been used has the system been hydraulically balanced (Flow balancing/regulating valves fitted & adjusted)?	Yes
Has the system been vented/de-aired?	Yes
Are system filters fitted & clean?	Yes
Is the system topped up to the correct level?	Yes
Was the system cleaned & flushed prior to use?	Yes
Are isolating valves in their correct position	Yes
What system cleaner was used?	Qty litres
What antifreeze was used?	Qty litres
What temperature will the antifreeze protect to?	°C
What inhibitor was used (if not included in Antifreeze)?	Qty litres
Record incoming collector fluid temperature	°C
Record outgoing collector fluid temperature	°C

CENTRAL HEATING MODE Measure and Record	
Heating Flow Temperature °C	Heating Return Temperature °C

DOMESTIC HOT WATER MODE Measure and Record:			
Is the heat pump connected to a hot water cylinder?	Unvented	Vented	Thermal Store Not Connected
Hot water has been checked at all outlets	Yes	Have Thermostatic Blending Valves been fitted?	Yes Not required

ADDITIONAL SYSTEM INFORMATON					
Additional heat sources connected:	Gas Boiler	Oil Boiler	Electric Heater	Solar Thermal	Other:

ALL INSTALLATIONS	
The heating, hot water and ventilation systems complies with the appropriate Building Regulations	Yes
All electrical work complies with the appropriate Regulations	
The heat pump and associated products have been installed and commissioned in accordance with the manufacturer's instructions	Yes
The operation of the heat pump and system controls have been demonstrated to the customer	Yes
The manufacturer's literature, including Benchmark Checklist and Service Record, has been explained and left with the customer	Yes

Commissioning Engineer's Signature
Customer's Signature
(To confirm satisfactory demonstration and receipt of manufacturer's literature)

Notes: [1] Installers should be members of an appropriate Competent Persons Scheme. [2] All installations in England and Wales must be notified to Local Area Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer. [3] May be required for systems covered by G3 Regulations



Appendix

SERVICE RECORD

It is recommended that your heating system is serviced regularly and that the appropriate Service Interval Record is completed.

Service Provider

Before completing the appropriate Service Interval Record below, please ensure you have carried out the service as described in the manufacturer's instructions. Always use the manufacturer's specified spare part when replacing controls.

SERVICE 01		Date:	SERVICE 02		Date:
Engineer name:			Engineer name:		
Company name:			Company name:		
Telephone No:			Telephone No:		
Operative ID No:			Operative ID No:		
Comments:			Comments:		
.....				
.....				
.....				
Signature			Signature		
SERVICE 03		Date:	SERVICE 04		Date:
Engineer name:			Engineer name:		
Company name:			Company name:		
Telephone No:			Telephone No:		
Operative ID No:			Operative ID No:		
Comments:			Comments:		
.....				
.....				
.....				
Signature			Signature		
SERVICE 05		Date:	SERVICE 06		Date:
Engineer name:			Engineer name:		
Company name:			Company name:		
Telephone No:			Telephone No:		
Operative ID No:			Operative ID No:		
Comments:			Comments:		
.....				
.....				
.....				
Signature			Signature		
SERVICE 07		Date:	SERVICE 08		Date:
Engineer name:			Engineer name:		
Company name:			Company name:		
Telephone No:			Telephone No:		
Operative ID No:			Operative ID No:		
Comments:			Comments:		
.....				
.....				
.....				
Signature			Signature		
SERVICE 09		Date:	SERVICE 10		Date:
Engineer name:			Engineer name:		
Company name:			Company name:		
Telephone No:			Telephone No:		
Operative ID No:			Operative ID No:		
Comments:			Comments:		
.....				
.....				
.....				
Signature			Signature		

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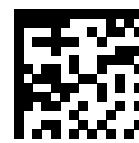
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