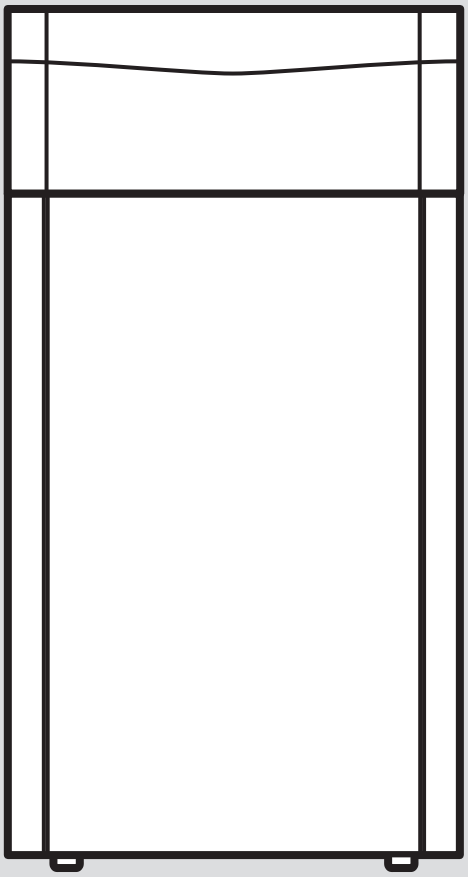
flexoTHERM exclusive

VWF 57 - 117/4 230V



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en Installation and maintenance instructions

Installation and maintenance instructions

Contents

1 Safety

1.1 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 heat pump system is intended exclusively for domestic use.

The heat pump system is intended as a heat generator with cooling function for closed heating installations and for domestic hot water generation. Operating the pump outside the application limits results in the heat pump being switched off by the internal control and safety devices.

Cooling mode with radiator heating systems is not permitted since radiators do not have an adequate heat transfer surface area.

Intended use includes the following:

– observance of accompanying operating, installation and maintenance instructions for the product and any other system components
– installing and setting up 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 code.

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.

1.2 General safety information

1.2.1 Risk caused by inadequate qualifications

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

▸ Proceed in accordance with current technology.

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

The product weighs over 50 kg.

▸ Make sure that the product is carried by at least two people.
▸ Use suitable transport and lifting equipment, in accordance with your job safety analysis.
▸ Use suitable personal protective equipment: Gloves, safety footwear, protective goggles, protective helmet.

1.2.3 Risk of death due to lack of safety devices

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

▸ Install the necessary safety devices in the installation.
▸ Observe the applicable national and international laws, standards and directives.

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:

▸ Disconnect the product from the power supply by switching off all power supplies at all poles (electrical partition in overvoltage category III for full partition, 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 Risk of burns due to hot and cold components

There is a risk of burns from any uninsulated pipelines and from the electric back-up heater.

- ► Only carry out work on the components once they have reached environmental temperature.

1.2.6 Risk of material damage due to an unsuitable installation surface

An uneven installation surface may cause leaks in the product.

If the installation surface does not have sufficient load-bearing capacity, the product may topple.

- ► 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.

1.2.7 Risk of material damage due to malfunctioning

Not rectifying faults, changing the safety devices and failing to carry out maintenance can cause malfunctioning and pose safety risks during operation.

- ► 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.

1.2.8 Risk of injury from freezing caused by touching refrigerant

The product is delivered with an operational filling of R410A refrigerant. 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 vapours 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.

1.2.9 Risk of material damage caused by using an unsuitable tool

- ► Use the correct tool.

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 lines in the building circuit are so cold that condensate may 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 Risk of material damage caused by frost

- ► Do not install the product in rooms prone to frost.

1.2.12 Risk of environmental damage caused by refrigerant

The product contains a refrigerant with considerable GWP (GWP = Global Warming Potential).

- ► Ensure that the refrigerant does not escape into the atmosphere.
- ► If you are a competent person who is qualified to work with refrigerants, you must wear appropriate protective equipment when servicing the product, and access the refrigerant circuit, if required. Recycle or dispose of the product in accordance with the applicable regulations.

1.3 Regulations (directives, laws, standards)

- Observe the national regulations, standards, directives, ordinances and laws.

2 Notes on the documentation

2.1 Observing other applicable documents

► Always 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 end user.

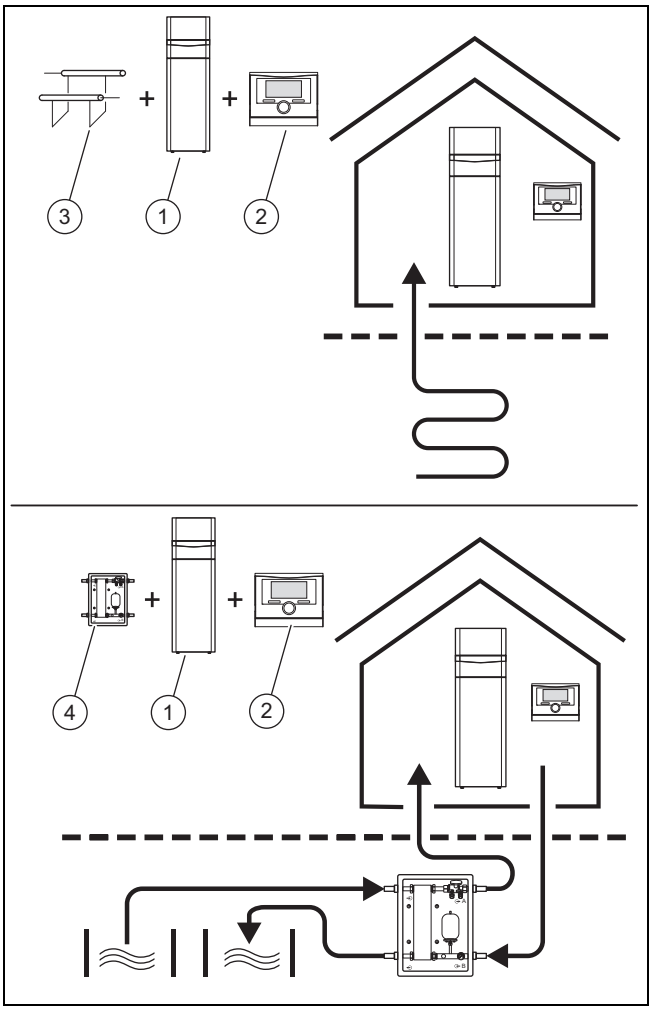
2.3 Validity of the instructions

These instructions apply only to:

Product
VWF 57/4 230V
VWF 87/4 230V
VWF 117/4 230V

3 System overview

3.1 Heat pump system design



The heat pump system consists of the following components:

– Heat pump **(1)**
– System control **(2)** (from VRC 700)
– Outdoor temperature sensor with DCF receiver
– System sensor, if required
– With ground heat source: Ground collector **(3)**
– With well water heat source: Ground water module **(4)**

The heat pump system generates heat for heating installations and in domestic hot water generation by extracting the thermal energy from a heat source circuit and releasing this into the heating circuit via the internal refrigerant circuit. The heat pump can be connected to two different types of heat source (geothermal energy and ground water with a transfer station between them). At the same time, there is an opportunity for active cooling to take place via circulation reversal.

3.1.1 Heat pump

– Fulfils the heating demand of the system control down to a minimum outdoor temperature and up to a maximum target flow temperature.
– Fulfils the cooling demands of the system control up to a maximum source temperature.
– Domestic hot water generation with external domestic hot water cylinder

3.1.2 Ground water module

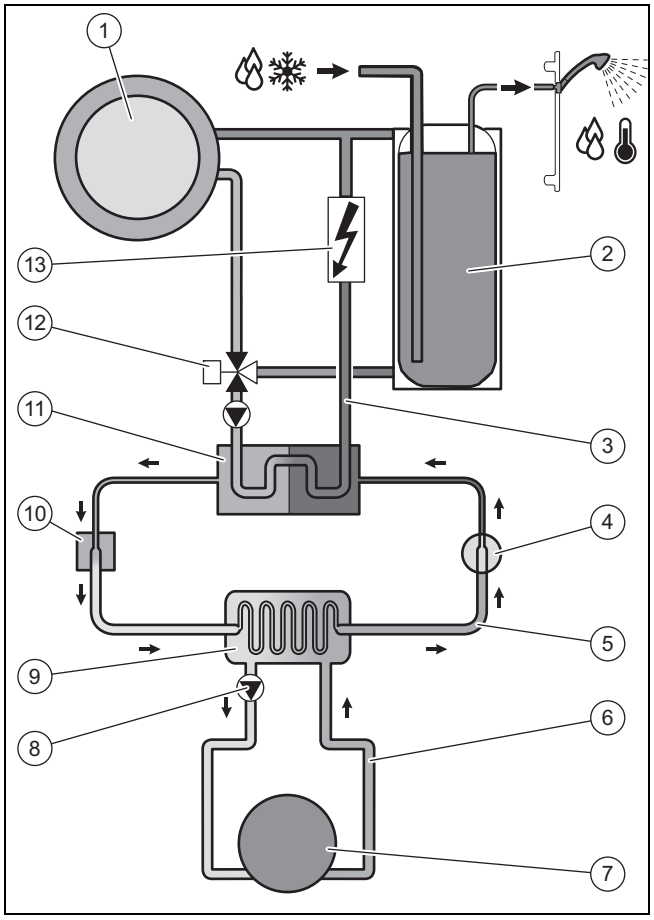
Heat transfer from the ground water to the brine heat transfer medium in the heat pump.

3.1.3 Passive cooling module (optional)

When using ground or ground water as a heat source, the heat of the heating water is transferred to the heat source medium purely using circulation pumps and valve switching.

3.2 Functionality

3.2.1 Heat pump



1 Heating installation
2 Domestic hot water cylinder (optional)

3	Heating circuit	9	Evaporator
4	Compressor	10	Electronic expansion valve
5	Refrigerant circuit	11	Condenser
6	Brine circuit	12	Heating/cylinder charging diverter valve
7	Heat source	13	Electric back-up heater
8	Brine pump		

The heat pump system uses geothermal energy or ground water as the 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 heat energy from the ground or the ground water and transfers it to the refrigerant circuit
– The refrigerant circuit, which is used to bring the heat energy from the heat source 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

The refrigerant circuit is connected via the evaporator to the heat source, from which it extracts heat energy. At the same time, the physical state of the refrigerant changes; it evaporates. The refrigerant circuit is connected via the condenser to the heating installation, to which it releases the heat energy again. In so doing, the refrigerant becomes liquid again; it condenses.

As heat energy can only pass from a body at a higher temperature to a body at a lower temperature, the refrigerant in the evaporator must have a lower temperature than the heat source. On the other hand, the temperature of the refrigerant in the condenser must be higher than that of the heating water in order to be able to release the heat energy to it.

These different temperatures are produced in the refrigerant circuit by means of a compressor and an expansion valve, which are located between the evaporator and condenser. The refrigerant flows in vapour form from the evaporator into the compressor, where it is compressed. This causes the pressure and temperature of the refrigerant vapour to rise sharply. After this process, it flows through the condenser, where it releases its heat energy to the heating water by condensation. It flows as a liquid into the expansion valve, where it expands significantly and, in so doing, loses much of its pressure and temperature. This temperature is now lower than that of the brine that flows through the evaporator. The refrigerant can thus absorb more heat energy in the evaporator, turning into vapour in the process and flowing to the compressor. The cycle starts again.

The evaporator and parts of the refrigerant circuit inside the heat pump are cold-insulated, meaning that no condensate can accumulate. Any small amounts of condensate which may form evaporate as a result of the heat generated inside the heat pump.

The heating water, which, when supplied, is colder in the flow than the room temperature, absorbs heat energy from the rooms and is pumped by the heating pump to the condenser (which works as an evaporator when in cooling mode). This heat energy is absorbed by the refrigerant and heated to a higher temperature level using the compressor. The heat energy is then delivered to the brine in the evaporator (which works as a condenser when in cooling mode). The cooled refrigerant is guided to the expansion valve to enable heat energy to be absorbed from the condenser again. The brine pump transports the hot brine into the earth, where the heat energy is dissipated.

During the installation, it may be useful to exclude some rooms (e.g. the bathroom) from the cooling function and to actuate isolation valves especially for this. The heat pump electronics system emits a signal that can be used for actuating these.

A passive cooling module is also available as an alternative, whereby heat energy is transported via underfloor heating, for example, from the rooms to the ground without the compressor operating and therefore without the refrigerant circuit operating.

If required, the integrated electric back-up heater can be activated at different output levels via the heat pump display. The electric back-up heater is then actuated by the system control.

3.2.2 Weather-compensated system control

The heat pump system is equipped with a weather-compensated system control that provides the heating, cooling and domestic hot water mode depending on the control type and controls this in automatic mode.

The control changes the target flow temperature based on the outdoor temperature. The outdoor temperature is measured by a separate sensor which is installed outdoors, and the results are transmitted to the control. The room temperature depends only on the preset values. The system compensates for the effect of the outdoor temperature. Domestic hot water generation is not affected by the weather compensation. The instructions for the system control describe how to install and operate the product.

3.2.3 Display of the energy consumption, energy yields and efficiencies

The product, the system control and the app show approximate values for energy consumption, energy yields and efficiencies, which are extrapolated based on calculation algorithms.

The values that are displayed in the app may differ from the other display options due to staggered transfer intervals.

The determined values depend on:

– Installation and system of the heating installation
– User behaviour
– Seasonal weather effects
– Various tolerances of unit-internal components

The recording of the values only includes the product in the factory-delivered condition. Supplementary accessories, even if they are installed on the product, as well as any other components in the heating system and other external consumers, are not part of the data recording.

Deviations between the determined values and the actual values may be significant. The determined values are therefore not suitable for creating or comparing energy billing, for example.

When replacing the PCB, the values for energy consumption, energy yields and efficiencies are reset in the heat pump's control panel.

3.3 Safety devices

3.3.1 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.

3.3.2 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. If the water pressure falls below the minimum pressure, an analogue pressure sensor switches off the heat pump and switches the other modules, where these exist, to standby mode. The pressure sensor switches the heat pump on again if the water pressure reaches the operating pressure.

– Min. heating circuit pressure: ≥ 0.05 MPa (≥ 0.50 bar)
– Min. heating circuit operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)

3.3.3 Brine pressure detector

The brine pressure detector continuously monitors the fluid pressure in the environment circuit in order to prevent a possible shortage of fluid. If the fluid pressure falls below the minimum pressure, an analogue pressure sensor switches off the heat pump and switches the other modules, where these exist, to standby mode. The pressure sensor switches the heat pump on again if the fluid pressure reaches the operating pressure.

– Minimum brine fluid pressure: ≥ 0.05 MPa (≥ 0.50 bar)
– Min. brine fluid operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)

3.3.4 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 a row, it is switched off and a fault message is displayed.

3.3.5 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.

3.3.6 High-pressure pressure switch in the refrigerant circuit

The high-pressure pressure switch shuts down the heat pump if the pressure in the refrigerant circuit is too high. Following a waiting period, the heat pump attempts to start once more. After three failed start attempts in succession, a fault message is displayed.

– Max. refrigerant circuit pressure: 4.60 MPa (g) (46.00 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

3.3.7 Hot gas thermostat in the refrigerant circuit

The hot gas thermostat shuts down the heat pump if the temperature in the refrigerant circuit is too high. Following a waiting period, the heat pump attempts to start once more. After three failed start attempts in succession, a fault message is displayed.

– Max. refrigerant circuit temperature: 135 °C
– 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

3.3.8 Safety cut-out (SCO) in the heating circuit

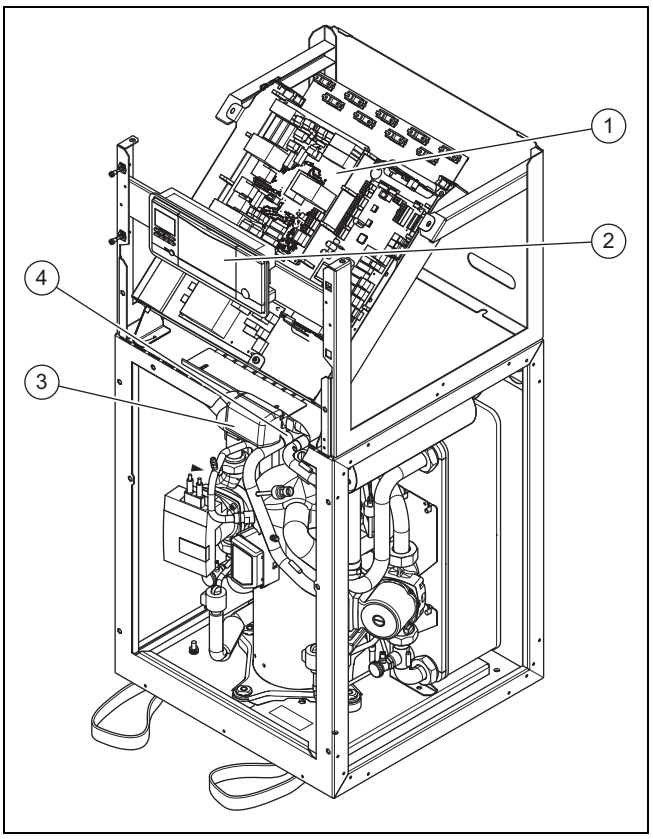
If the temperature in the heating circuit of the internal electric back-up heater exceeds the maximum temperature, the safety cut-out shuts down the electric back-up heater as a securing measure. Following a waiting period, another attempt is made to start the electric back-up heater. A fault message is displayed that can only be reset by pressing the Reset button or by switching the heat pump off and on again.

– Max. heating circuit temperature: 85 °C

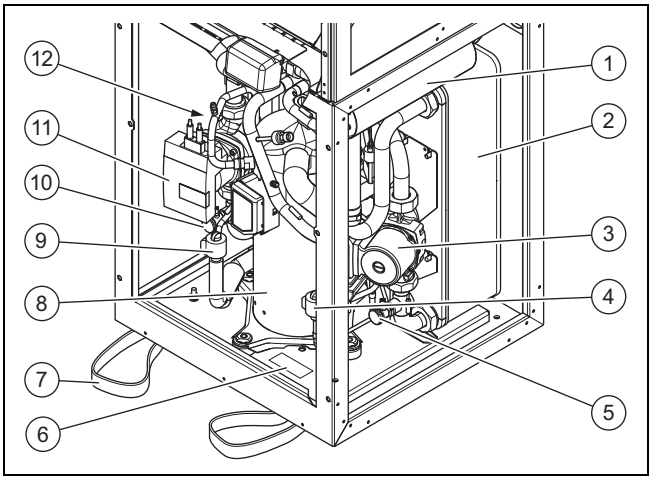
4 Product description

4.1 Product design

4.1.1 Front view, open

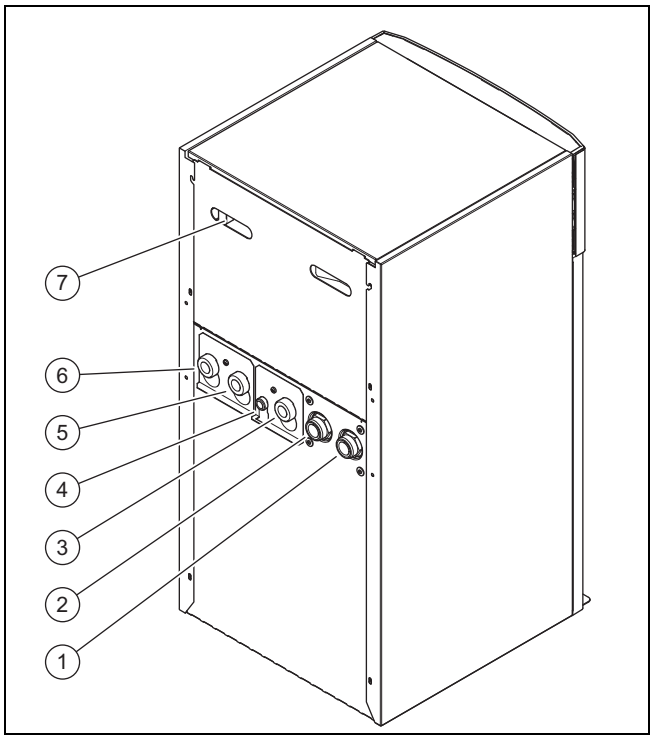


1	Electronics box	3	Heating/cylinder charging diverter valve
2	Control panel	4	4-port valve



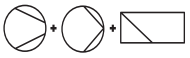
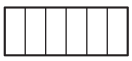
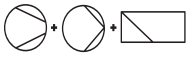
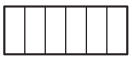
1	Electric back-up heater	7	Carrying straps for transport
2	Condenser	8	Compressor
3	Heating pump	9	Electronic expansion valve
4	Electronic expansion valve EVI (intermediate circuit injection)	10	Brine circuit filling/draining cock
5	Heating circuit filling/draining cock	11	Brine circuit pump
6	Data plate	12	Evaporator (not visible)

4.1.2 Rear view



1	Connection: From the heat pump to the heat source (cold brine, B)	4	Heating circuit diaphragm expansion vessel connection
2	Connection: From the heat source to the heat pump (hot brine, A)	5	Heating return
3	Hot water return	6	Heating flow
		7	Recessed handles and grommet

4.2 Information on the data plate

Information on the data plate	Meaning
	Rated voltage of the compressor, pumps and control
	Back-up heater rated voltage
P Max 	Max. rated power of the compressor, pumps and control
P Max 	Max. rated power of the back-up heater
I +  + 	In-rush current
	Refrigerant type, fill quantity, permissible rated excess pressure
COP B0/W35 /W45 /W55	Coefficient of performance at a brine temperature of 0 °C and a heating flow temperature of 35/45/55 °C
B0/W35 /W45 /W55	Heat output at a brine temperature of 0 °C and heating flow temperature of 35/45/55 °C
COP W10/W35 /W45 /W55	Coefficient of performance at a ground-water temperature of 10 °C and a heating flow temperature of 35/45/55 °C

Information on the data plate	Meaning
W10/W35 /W45 /W55	Heat output at a ground-water temperature of 10 °C and a heating flow temperature of 35/45/55 °C
V	Mains voltage
Hz	Mains frequency
W	Power consumption
IP	Protection class
xxxxxxyyyyyyyyyyzzzzzzzzzzzz	Barcode with serial number, 7th to 16th digits = product article number
	Read the instructions

4.3 Explanation of product stickers

Symbol on the sticker	Meaning
	Heating flow connection
	Heating return connection
	Heating diaphragm expansion tank connection
A	Connection from the heat source to the heat pump (hot brine)
B	Connection from the heat pump to the heat source (cold brine)
	Brine heat source
	Energy supply company anti-cycling time

4.4 Type designation and serial number

The type designation and serial number can be found on a plate behind the front flap and on the main data plate. The 7th to 16th digits of the serial number form the article number.

4.5 CE marking

CE

The CE marking shows that the products comply with the basic requirements of the applicable directives as stated on the declaration of conformity.

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

4.6 Benchmark

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.

benchmark
COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

For more information visit www.centralheating.co.uk

5 Set-up

5.1 Checking the scope of delivery

1. Carefully remove the packaging and padding without damaging the parts of the product.
2. Check that the scope of delivery is complete.

Quantity	Description
1	Heat pump
1	Installation set comprising – 3 x flat seal (yellow/green) for heating circuit – 1 x 3/4" flat seal for the heating expansion vessel connection – 2 x O-ring seals for brine circuit
1	Expansion relief valve for brine circuit, 1/2", 3 bar
1	Enclosed documentation

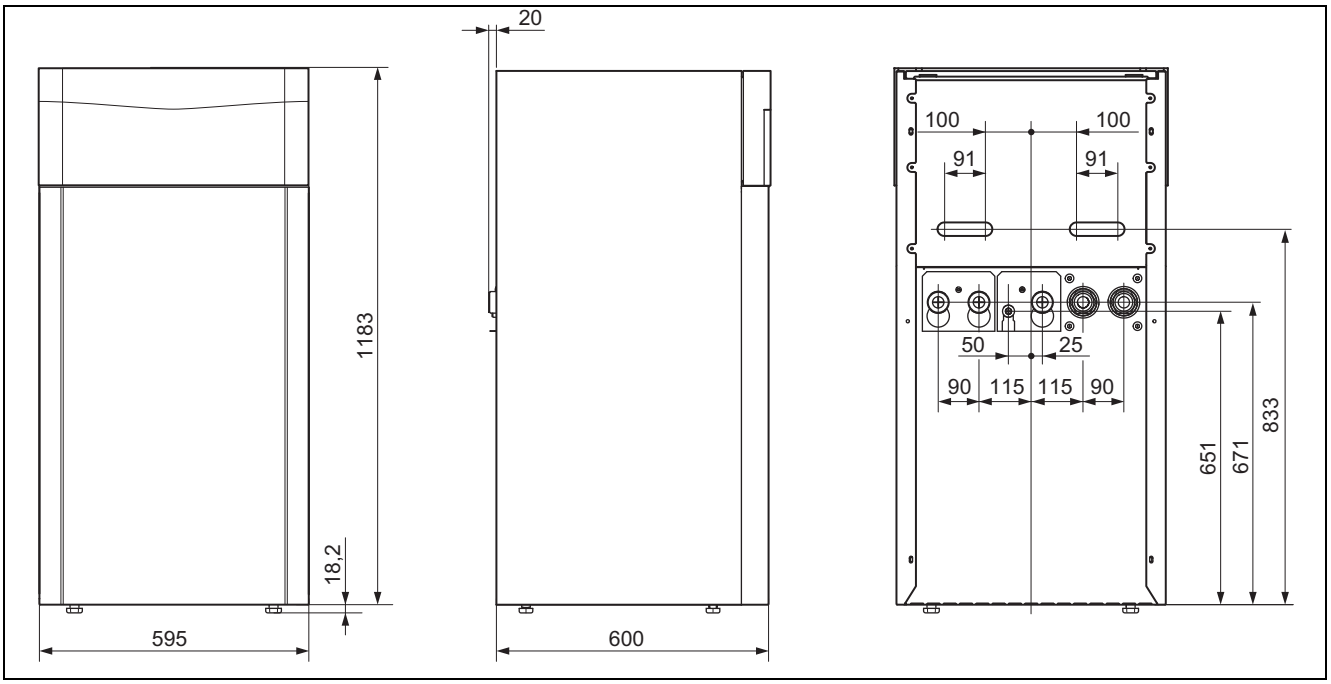
5.2 Selecting the installation site

- Select a dry room that is frost-proof throughout and in which the permissible environmental temperature is neither above nor below the permitted range.
  - Permissible environmental temperature: 7 to 25 ℃
  - Permissible relative air humidity: 40 to 75 %
- Ensure that the installation room has the required minimum volume.

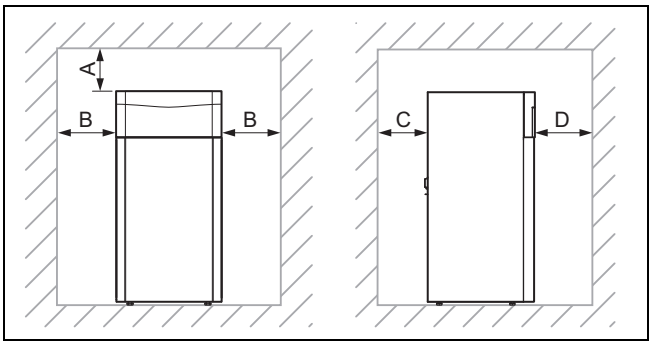
Heat pump	R410A refrigerant filling volume	Minimum installation room volume
VWF 57/4 230V	1.50 kg	3.41 m³
VWF 87/4 230V	2.40 kg	5.45 m³
VWF 117/4 230V	2.50 kg	5.68 m³

- Ensure that the required minimum clearances can be maintained.
- When selecting the installation site, you must take into consideration that when the heat pump is in operation, it will transfer vibrations to the floor and the nearby walls.
- Ensure that the floor is level and has sufficient load-bearing capacity to bear the weight of the heat pump and a domestic hot water cylinder.
- Ensure that cables can be easily routed (on the brine, domestic hot water and heating side).

5.3 Dimensions



5.4 Minimum clearances



	Minimum clearance
A	50 mm
B	300 mm
C	250 mm
D	300 mm

► Comply with the minimum clearances specified above in order to facilitate maintenance work.

5.5 Transporting 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 defect in the whole installation.

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

► Transport the product to the installation site. Use the recessed handles on the rear and the carrying straps at the front on the underside of the product as an aid.

► Transport the product using a suitable sack truck. Only position the sack truck at the rear so that the weight distribution is as even as possible. Secure the product using a retaining strap.

► Use a ramp to move the product from the pallet using the sack truck, e.g. a piece of square timber and a sturdy board.

5.5.1 Using the carrying straps

1. Remove the front casing. (→ Section 5.8)

Danger!

Risk of injury due to repeated use of the carrying straps.

Due to material ageing, the carrying straps are not designed to be reused during any subsequent transportation.

► Once the product has been started up, cut off the carrying straps.

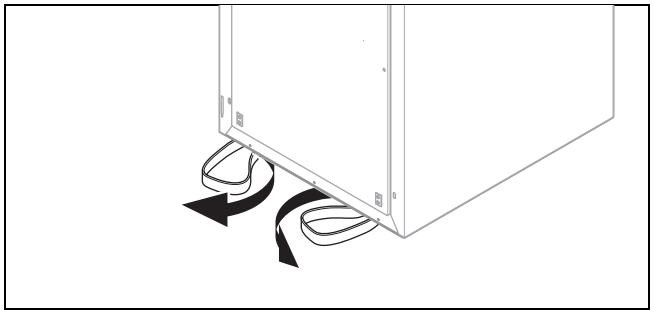
Danger!

Risk of injury when transporting due to the carrying straps breaking away.

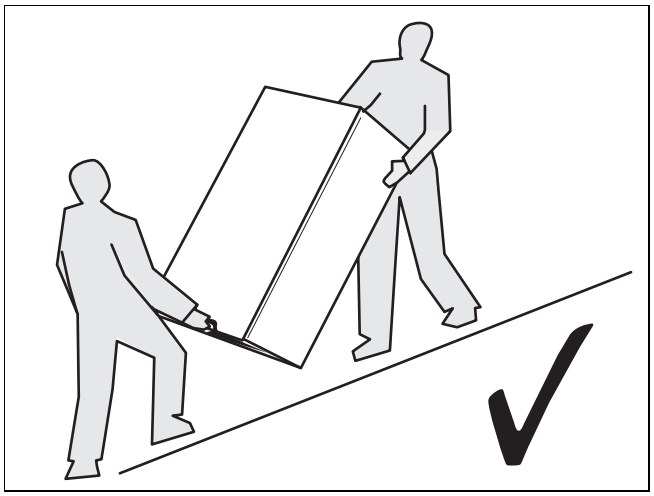
The carrying straps may break away during transport if the front casing is fitted.

► Remove the front casing before you use the carrying straps.

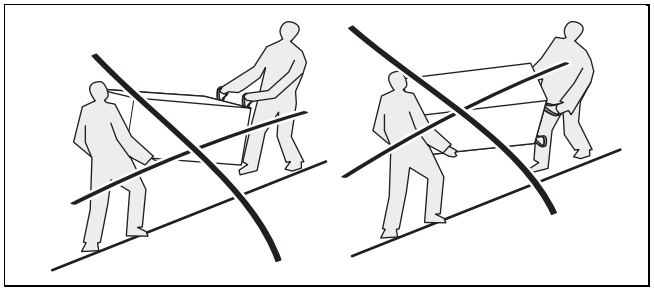
2. To transport the unit safely, use the two carrying straps on the two front feet of the product.



3. The carrying straps are located underneath the product – pull them out to the front.
4. Ensure that the feet are screwed in fully so that the carrying straps are held properly.

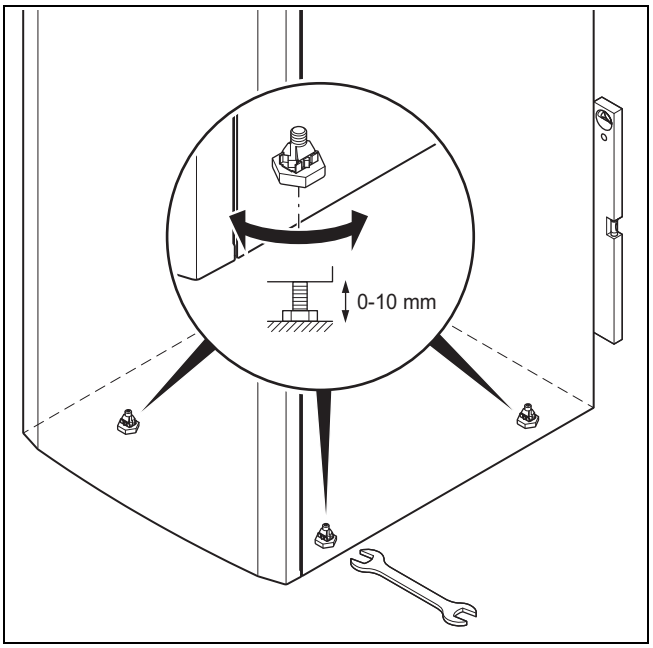


5. Always transport the product as illustrated above.



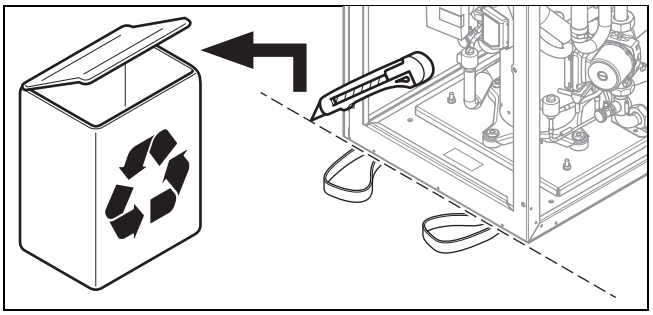
6. Never transport the product as illustrated above.

5.6 Installing the product



► Orientate the product horizontally by adjusting the adjustable feet.

5.7 Removing the carrying straps



Danger!

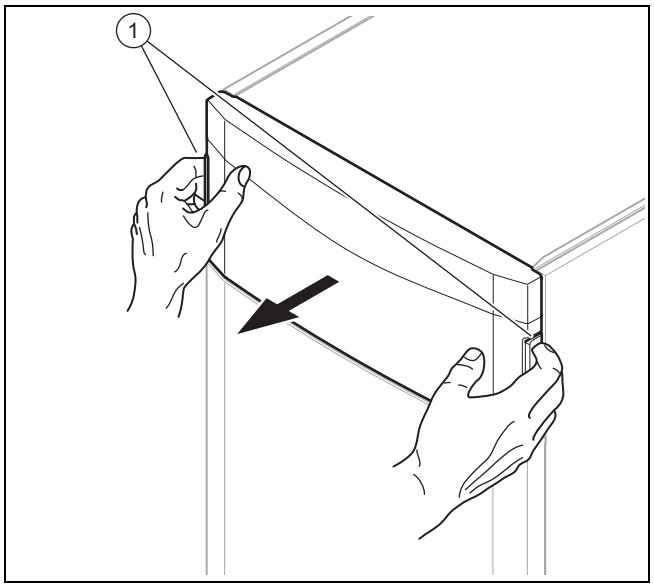
Risk of injury caused by reusing the transport straps

The transport straps that are attached to the product may become brittle over time and then tear under load.

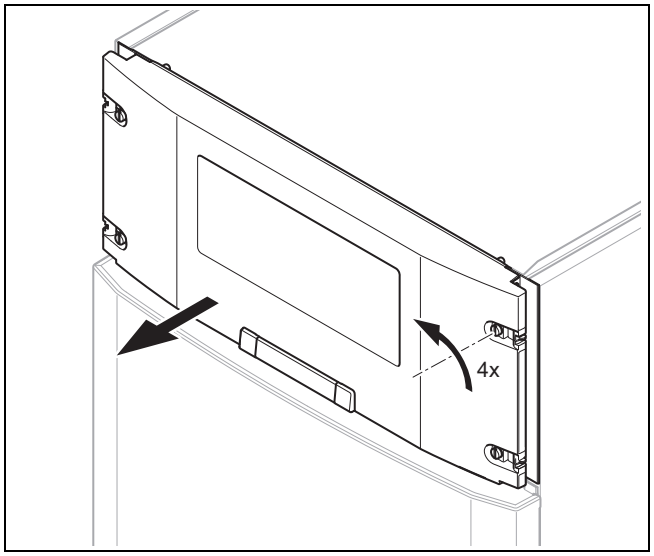
- ► After installing the product, render all of the retaining straps unusable.
- ► To transport the product again at a later time, use suitable transport harnesses instead of the attached transport straps.

► Once the product has been installed, cut off the carrying straps.

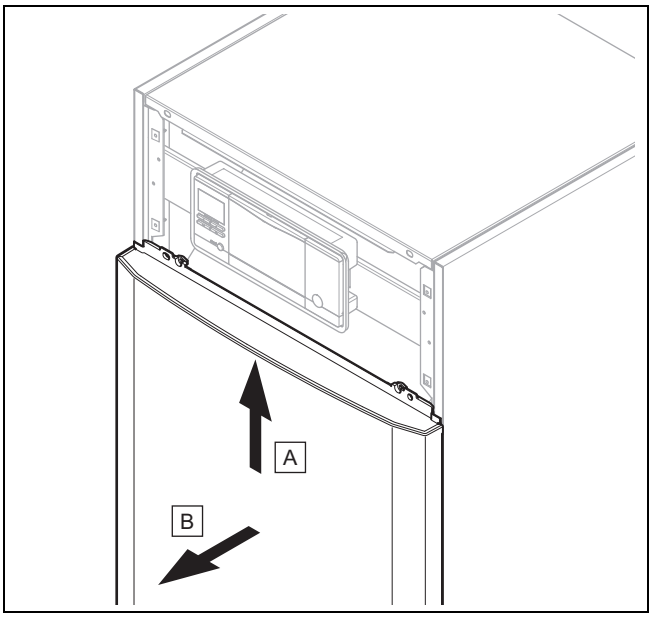
5.8 Removing the front casing



1. Remove the front flap on the control panel by taking hold of the recessed handles with both hands and lifting off the front flap towards you.

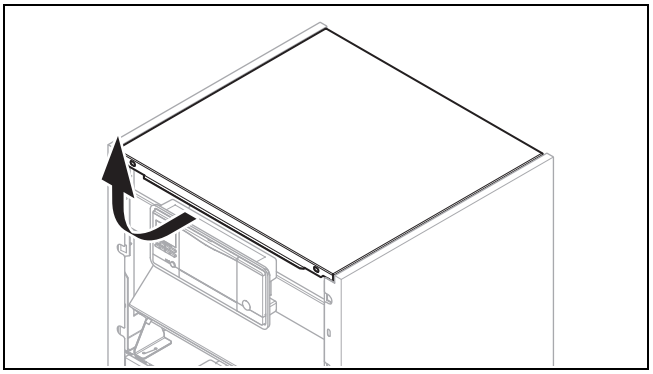


2. Turn the four screws by a quarter turn and lift off the cover on the control panel towards you.

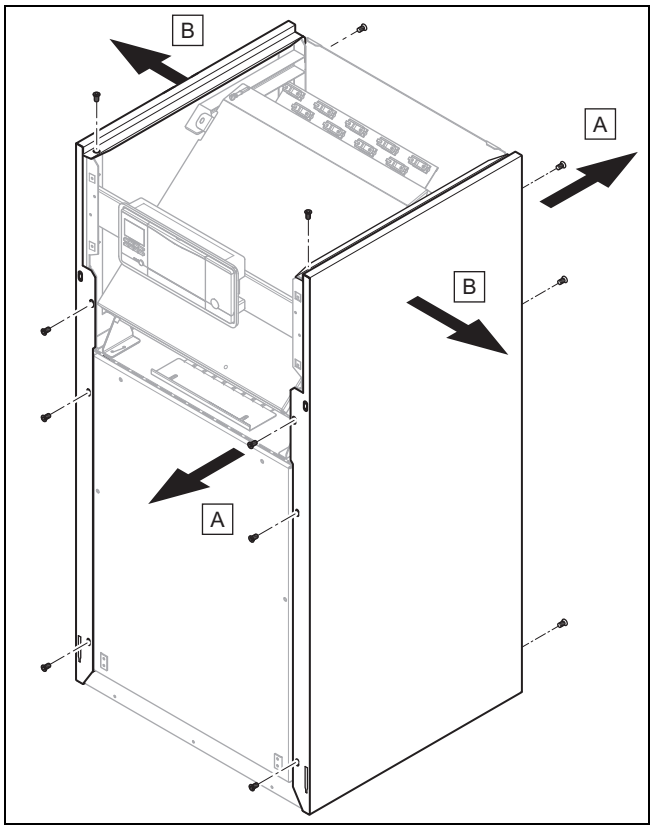


3. Pull each part of the front casing forwards slightly and remove it by lifting it upwards.

5.9 Removing the casing top and side casings

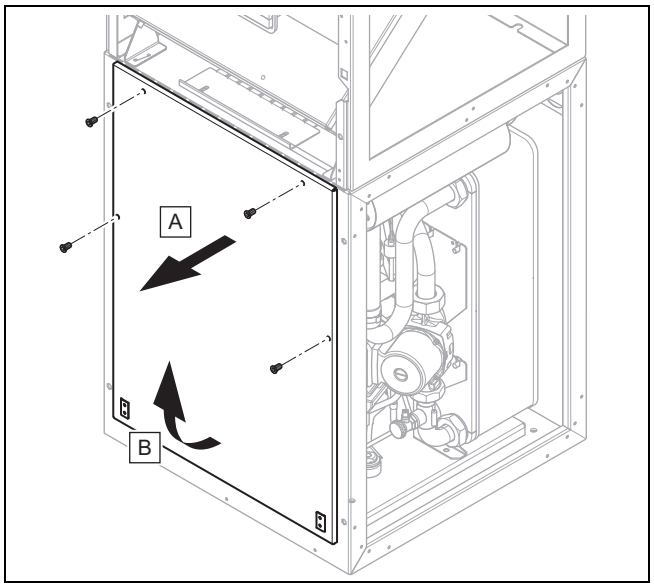


1. Pull the casing top forwards slightly and remove it by lifting it upwards.



2. To remove a side casing, remove the four screws at the front and the three screws at the back.
3. Remove the side casing.

5.10 Removing the refrigerant circuit cover, if required



1. Remove the four screws.
2. Pull the top of the refrigerant circuit cover forwards and lift it out of the guide.

6 Carrying out the hydraulics installation

Note
You can find the basic system diagrams in the → basic diagram book.

1. Flush the heating installation through thoroughly before connecting the heat pump in order to remove any residue which could be deposited in the heat pump and lead to damage.
2. Install the connection pipes free from mechanical stress in accordance with the dimension and connection drawings.
   – Position the cable holders 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.
   – If required, instead of cable holders, use cold insulation brackets with additional rubber insulation and, in some cases, reinforced hoses (armoured rubber hoses).
   – To prevent excessive pressure losses, do not use stainless steel flexible hoses.
   – If required, use horizontal or right-angled connection adapters from the accessories.

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

3. Attach automatic purging valves to the heating installation.

6.1 Requirements for the heating circuit

In all heating installations, the minimum volume of circulating heating water (35% of the nominal volume flow; see technical data table) must be guaranteed.

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.

6.2 Connecting the heat pump to the heating circuit

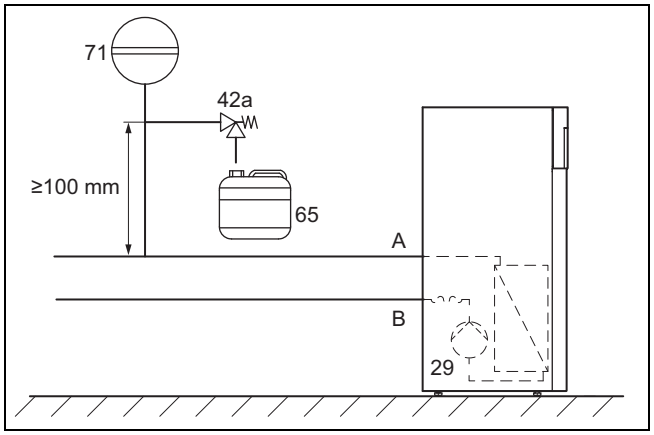
Caution.
Risk of damage from magnetite deposition.

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

- ► Insert a magnetic filter to protect the pump inside the product.
- ► Take the pressure loss in the magnetite filter into account when making your selection.
- ► You must position the filter in direct proximity to the return line to the heat pump.

1. Install a diaphragm expansion vessel at the heat pump connection provided.
2. Install an expansion relief valve (at least DN 20, opening pressure of 3 bar) with manometer.
3. Install the expansion relief valve hose in a frost-free environment and ensure that its routing ends in an open tundish where it is then visible.
4. Install an air/dust separator in the return of the heating circuit.
5. Connect the heating flow to the heating flow connection of the heat pump.
6. Connect the heating return to the heating return connection of the heat pump.
7. 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.

6.3 Connecting the heat pump to the brine circuit



29	Brine pump	A	From the heat source to the heat pump (hot brine)
42a	Brine expansion relief valve	B	From the heat pump to the heat source (cold brine)
65	Brine collecting vessel		
71	Brine diaphragm expansion vessel		

1. Install a brine diaphragm expansion vessel.
2. Check the pre-charge pressure in the brine diaphragm expansion vessel and then adjust it if required.
3. Install an expansion relief valve for the brine circuit (3 bar opening pressure).
4. Install an automatic air separator in the brine circuit.
5. Install a brine collecting vessel.
6. Remove the blind caps from the brine connections. These are no longer required and can be properly disposed of.
7. Connect the brine lines to the heat pump.
8. Insulate all of the brine lines and the connections of the heat pump so that they are vapour diffusion-tight.

Note
Vaillant recommends that you install the Vaillant heat pump brine filling unit (not required when installing the ground water module). By doing this, it is then possible to carry out a preparatory partial bleed of the brine circuit, e.g. for the flow and return of the brine circuit up to the product.

6.4 Hydraulic wiring in the system

6.4.1 Installing heating circuits with direct connection

1. Install the hydraulic components in accordance with the local requirements as shown in the basic system diagram example (→ Installation instructions for the system).
2. Connect the underfloor heating circuits or heating manifolds directly to the heat pump.
3. Connect a limit thermostat to ensure that the heat pump's underfloor protection works correctly. (→ Section 8.4.4)
4. Ensure that a minimum circulation water volume is guaranteed.
   – Minimum circulation water volume: 35% of the nominal volume flow

6.4.2 Installing heating circuits with direct connection and domestic hot water cylinder

1. Install the heating circuits for direct operation. (→ Section 6.4.1)
2. Secure the cylinder temperature sensor, which is available from the range of accessories, in the domestic hot water cylinder and connect it to the heat pump.

7 Filling and purging the installation

7.1 Filling and purging the heating circuit

7.1.1 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-inhibition measures (e.g. fit a magnetite separator).
► 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 rules when treating the filling and supplementary water.

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

You must treat the filling and supplementary 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.

Total heating output	Water hardness at specific system volume[1)]					
	≤ 20 l/kW		> 20 l/kW ≤ 40 l/kW		> 40 /kW	
kW	ppm $CaCO_3$	mol/m³	ppm $CaCO_3$	mol/m³	ppm $CaCO_3$	mol/m³
< 50	< 300	< 3	150	≤ 1.5	5	0.05
> 50 to ≤ 200	200	< 2	150	≤ 1.5	5	0.05
> 200 to ≤ 600	150	< 1.5	5	0.05	5	0.05
> 600	5	0.05	5	0.05	5	0.05

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

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 antifreeze and corrosion inhibitors, 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

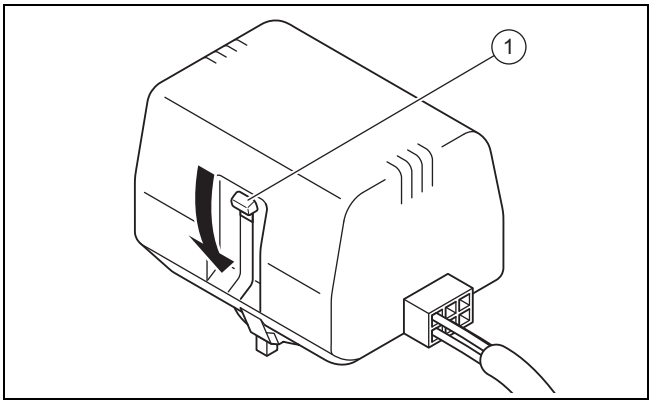
– Adey MC ZERO

– 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.

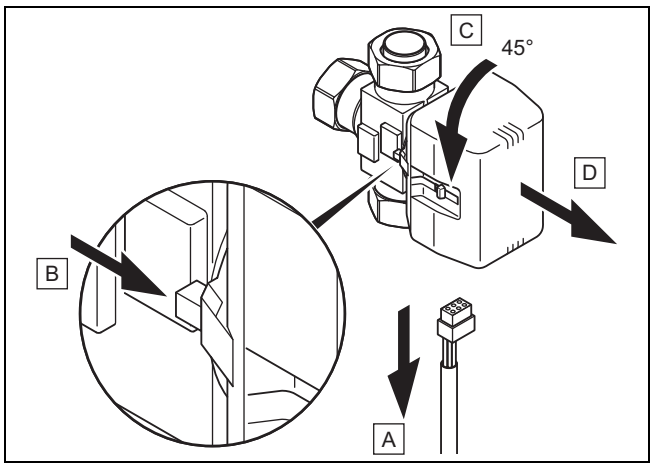
7.1.2 Filling and purging the heating installation

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. Push the white switching lever **(1)** on the motor head of the diverter valve until it engages in its mid-position in order to move the heating/cylinder charging diverter valve into the mid-position.
   ◁ Both valves are open and the filling procedure is improved since the air in the system can escape.
4. Connect a filling hose to the heating water supply.
5. Unscrew the screw cap from the heating circuit's filling/draining valve and secure the free end of the filling hose to here.
6. Open the filling/draining valve for the heating circuit.
7. Open the heating water supply slowly.
8. Fill with water until the manometer (on-site) shows that the heating installation has reached a pressure of approx. 1.5 bar.
9. Close the filling/draining valve for the heating circuit.
10. Purge the heating circuit at the locations provided for this.
11. Purge the heating pump using the heating pump's drain screw.
12. Check the heating installation pressure again (if required, repeat the filling procedure).
13. Remove the filling hose from the filling/draining valve and screw the screw cap back on.

Moving the heating/cylinder charging diverter valve into the starting position



14. Remove the power supply cable from the motor head of the diverter valve **(A)**.
15. Push the locking lever **(B)**.
16. Turn the motor head 45° **(C)**.
17. Remove the motor head **(D)**.

Note
This moves the spring in the valve body back into the starting position.

18. Turn the motor head back towards the valve body and reconnect the power supply cable.

Note
The white switch lever on the motor head of the diverter valve should now be in the starting position.

7.2 Filling and purging the brine circuit

7.2.1 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 the brine fluids named here are authorised by Vaillant for operating the heat pump; operating the heat pump with other fluids, e.g. pure water is not permitted.

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

► Use a sufficiently large mixing container.
► Carefully mix ethylene glycol with water.

	Approved environment source
	Ground/ground water module
Brine content	30% vol.
Water content	70% vol.
* Cloud point ** Cold protection	Above this temperature, the first ice crystals start to form in the brine fluid. At this temperature, half of the fluid volume has frozen; there is slush ice.

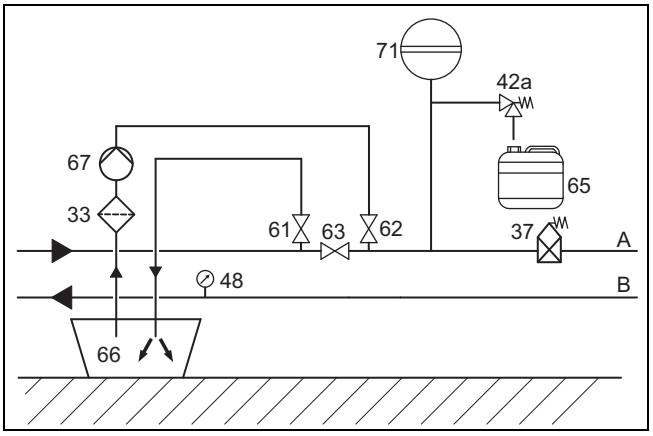
	Approved environment source
	Ground/ground water module
Cloud point* of the aqueous ethylene glycol mixture	-16 °C
Cold protection** of the aqueous ethylene glycol mixture	-18 °C
* Cloud point ** Cold protection	Above this temperature, the first ice crystals start to form in the brine fluid. At this temperature, half of the fluid volume has frozen; there is slush ice.

► Check the mixture ratio of the brine fluid.
  – Working materials: Refractometer

In the event of special requirements, the following heat transfer media are also authorised by Vaillant for the ground heat sources:

– Aqueous solution with 33% ± 1% vol. propylene glycol

7.2.2 Filling the brine circuit



33	Dirt filter	66	Brine container
37	Automatic air separator	67	Filling pump
42a	Brine expansion relief valve	71	Brine diaphragm expansion vessel
48	Manometer (optional)	A	From the heat source to the heat pump (hot brine)
61	Isolation valve	B	From the heat pump to the heat source (cold brine)
62	Isolation valve		
63	Isolation valve		
65	Brine collecting vessel		

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

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.

7.2.3 Purging the brine circuit

1. Start up the filling pump **(67)** in order to fill and rinse the brine circuit.
2. Decrease the output of the filling pump to reduce the amount of air entering the brine circuit.
3. Allow the filling pump **(67)** to run for at least 10 minutes in order to fill and rinse the circuit sufficiently.
4. Then close the isolation valves **(61)** and **(62)** and switch off the filling pump **(67)**.
5. If required, repeat this rinsing process.
6. Open the isolation valve **(63)**.

7.2.4 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 0.17 MPa (1.7 bar) is required. The expansion relief valve opens at 0.3 MPa (3 bar).

2. Read off the pressure on a manometer (on-site).
   – Brine fluid operating pressure range: 0.07 to 0.20 MPa (0.70 to 2.00 bar)
3. Build up the pressure in the brine circuit by opening the isolation valve **(62)** and using the filling pump to top up the brine fluid.
4. If required, reduce the pressure in the brine circuit by opening the isolation valve **(61)** to drain brine fluid.
5. Check the brine circuit's filling pressure in the heat pump's display.
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. Label the container that holds the remaining brine fluid with information about the type of brine fluid and the set concentration.
10. Pass the vessel with the remaining brine fluid on to the end user to be stored. Point out to the end user that there is a risk of injury when handling brine fluid.

8 Electrical installation

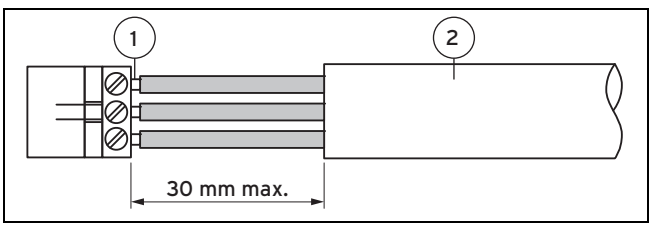
Danger!
Risk of death from electric shock caused by a residual-current circuit breaker not working.

In certain cases, residual-current circuit breakers may not work.

► If it is stipulated for the installation site, for the product, install a pulse-current-sensitive type A residual-current circuit breaker or a universal-current-sensitive type B residual-current circuit breaker.

Only qualified electricians may carry out the electrical installation.

► Observe the technical connection conditions for connecting to the energy supply company's low-voltage network.
► Use the values for the maximum rated power that are specified in the technical data to determine the required cable cross-sections.
► In each case, take into consideration the (on-site) installation conditions.
► Connect the product using a fixed connection and an electrical partition with a contact gap of at least 3 mm (e.g. fuses or power switches).
► Install the electrical partition right next to the heat pump.
► Connect the product to the power supply according to the data plate.
► Fuse-protect this connection using the exact values that are specified in the technical data.
► If the local energy supply company requires that the heat pump is controlled using a blocking signal, install a corresponding contact switch as prescribed by the energy supply company.
► Ensure that the sensor cables, e. g. for the VRC DCF receiver, do not exceed the maximum line length of 50 m.
► At lengths of 10 m or more, mains voltage connection cables must be laid separately from sensor or bus lines. Minimum clearance for the extra low voltage wire and power supply cable at a line length of > 10 m: 25 cm. If this is not possible, use shielded cables. Lay the shielding on one side of the sheet for the product's electronics box.
► Do not use free terminals on the heat pump as base terminals for further wiring.



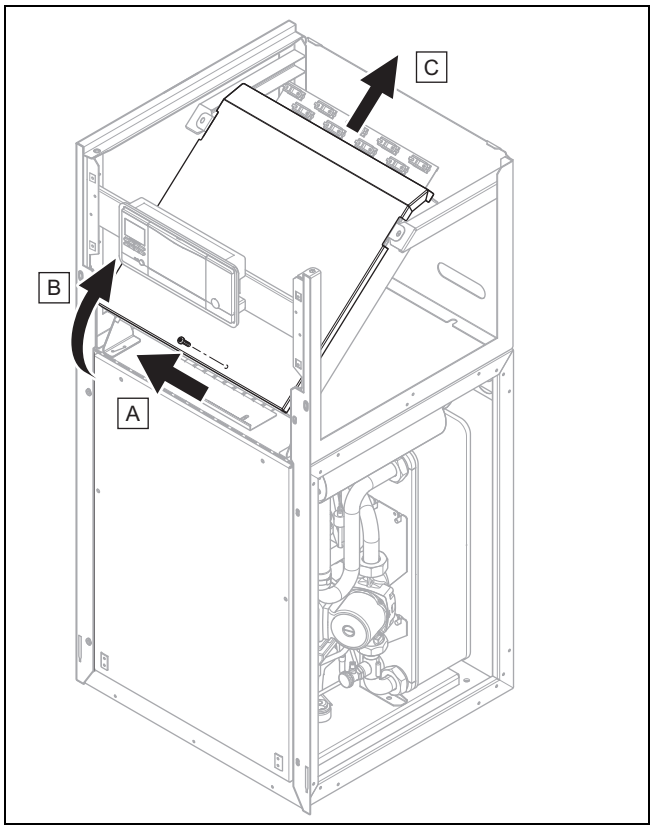
1 Connecting wires 2 Insulation

► Only strip a maximum of 3 cm from the outer sheathing of the flexible ducts.
► Secure the conductors in the connection terminals.
– Max. torque of the connection terminals: 1.2 Nm

8.1 Routing eBUS lines

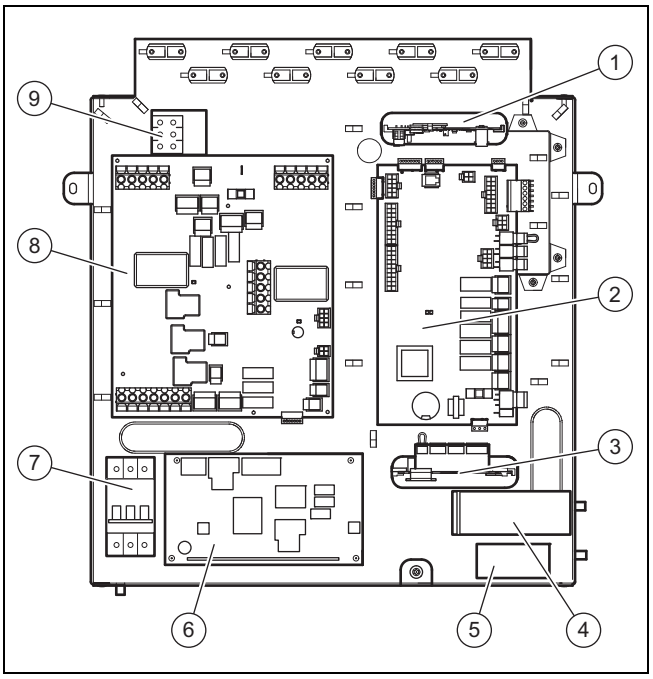
1. Route the eBUS lines in a star formation from a junction box to the individual products.
2. Ensure that you do not route the eBUS lines parallel to the power supply cables.
   – Piping diameter: ≥ 0.75 mm²

8.2 Opening the electronics box



1. Unscrew the screw.
2. Pull the bottom of the cover forwards and lift it upwards.

8.3 Electronics box



1 VR 32 modulating bus coupler (optional)*
* If the basic system diagram selected on the system control makes provision for this accessory, it can be connected here.
2 Control PCB
3 VR 40 multi-functional module (2 in 7) (optional)**
** Relay 1 is used as a fault contact connection/alarm output for the heat pump. The function of relay 2 can be set in the system control.
4 Operating capacitor
5 Start capacitor
6 In-rush current limiter PCB
7 Circuit breaker
8 Power supply PCB
9 Power supply terminal for the electric back-up heater

8.4 Establishing the power supply

1. Route the power supply line(s) through the holes in the back wall of the product.
2. Guide the lines through the product, through the appropriate strain reliefs and to the terminals of the power supply and control PCB.
3. Wire the connections as illustrated in the connection diagrams below.

Note
There is no provision for using a wiring diagram on the control or on the heat pump control panel.

4. Tighten the strain reliefs.

8.4.1 Connecting the continuous power supply for the compressor and control system

► Connect the continuous power supply to the mains connection (X101). (→ Appendix C)

8.4.2 Connecting the blockable power supply for the back-up heater

► Connect the power supply to the X102 power supply. (→ Appendix D)

8.4.3 Connecting an external brine pressure switch

In some cases (e.g. in potable water protection areas), local authorities require the installation of an external brine pressure switch that switches off the refrigerant circuit if the pressure in the brine circuit falls below a certain level. If the circuit is switched off by the brine pressure switch, a fault message is shown on the display.

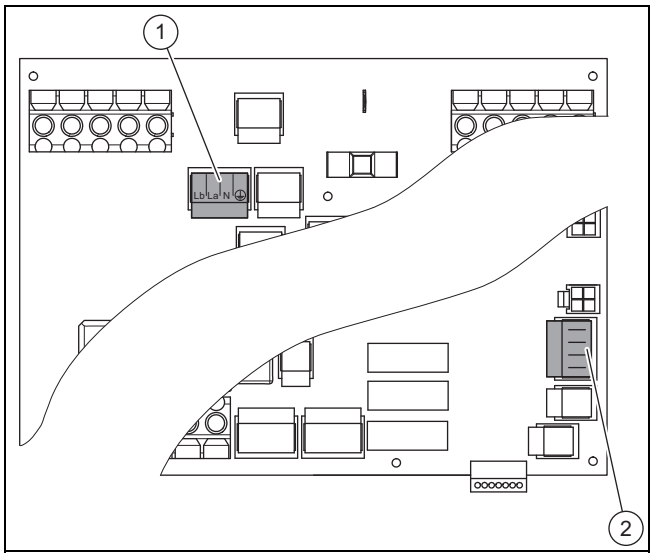
► Pull out the X131 plug for the bypass line (source monitoring) on the power supply PCB.
► Connect an external brine pressure switch to the two X131 terminals (Source Monitoring) on the power supply PCB.
  – Rated voltage of external brine pressure switch: 230 V 50 Hz
  – Power range for external brine pressure switch (rms): 1 to 5 mA

8.4.4 Connecting a limit thermostat

In some cases where the underfloor heating has a direct power supply, a limit thermostat (on-site) is essential.

► Pull out the S20 plug for the bypass line at terminal X100 on the control PCB.
► Connect the limit thermostat at this terminal.

8.4.5 Connecting an external well pump



A changeover contact connection X143 **(1)** with the assignment Lb, La, N, PE is provided for connecting a cut-off relay for the external well pump.

Lb is the opening contact. If the cut-off relay contact to the well pump is closed, there is no voltage at Lb.

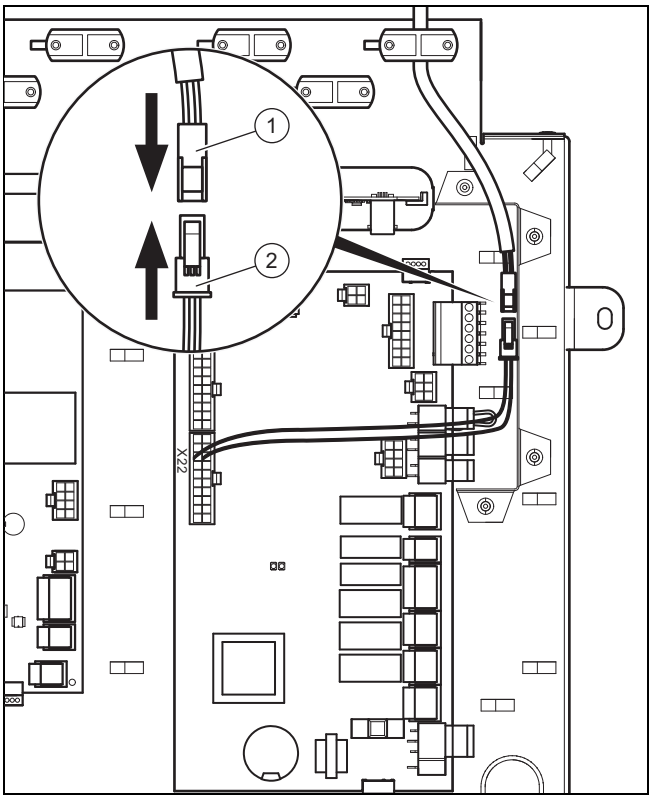
La is the closing contact. If the cut-off relay contact to the well pump is closed, there is no voltage at La.

The X200 **(2)** connection for the optional VR 11 temperature sensors, which are available as accessories, is labelled RR for return connections and VV for flow connections.

- ► Connect a cut-off relay for the external well pump to the X143 connection.
  - – Max. switching capacity at plug output: 1 A
- ► Connect the temperature sensors to the VV (suction well) and RR (injection well) terminals.
  - – Terminal assignment for terminal X200 on the power supply PCB
  - – Terminal 1 + 2: Well inlet temperature
  - – Terminal 3 + 4: Well outlet temperature

Note
No functions are coupled to these temperature sensors for monitoring the heat source. They are simply shown on the display.

8.4.6 Connecting the temperature sensor for an external domestic hot water cylinder (optional)

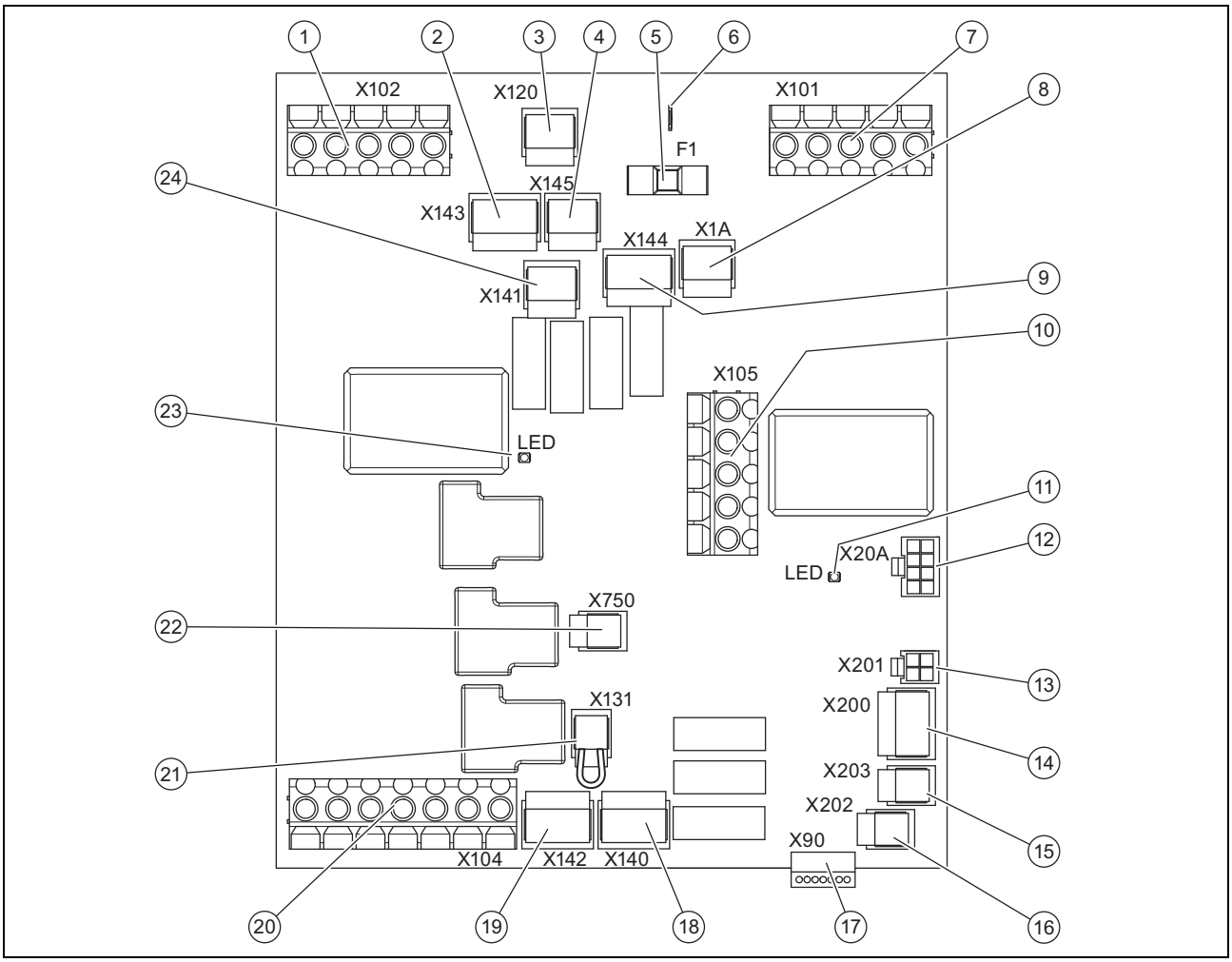


- ► Connect the cable for the cylinder temperature sensor, which is available as an accessory, to the bush **(1)** on the plug **(2)**. Use a strain relief which does not have a power supply cable running through it.

8.5 Power supply PCB

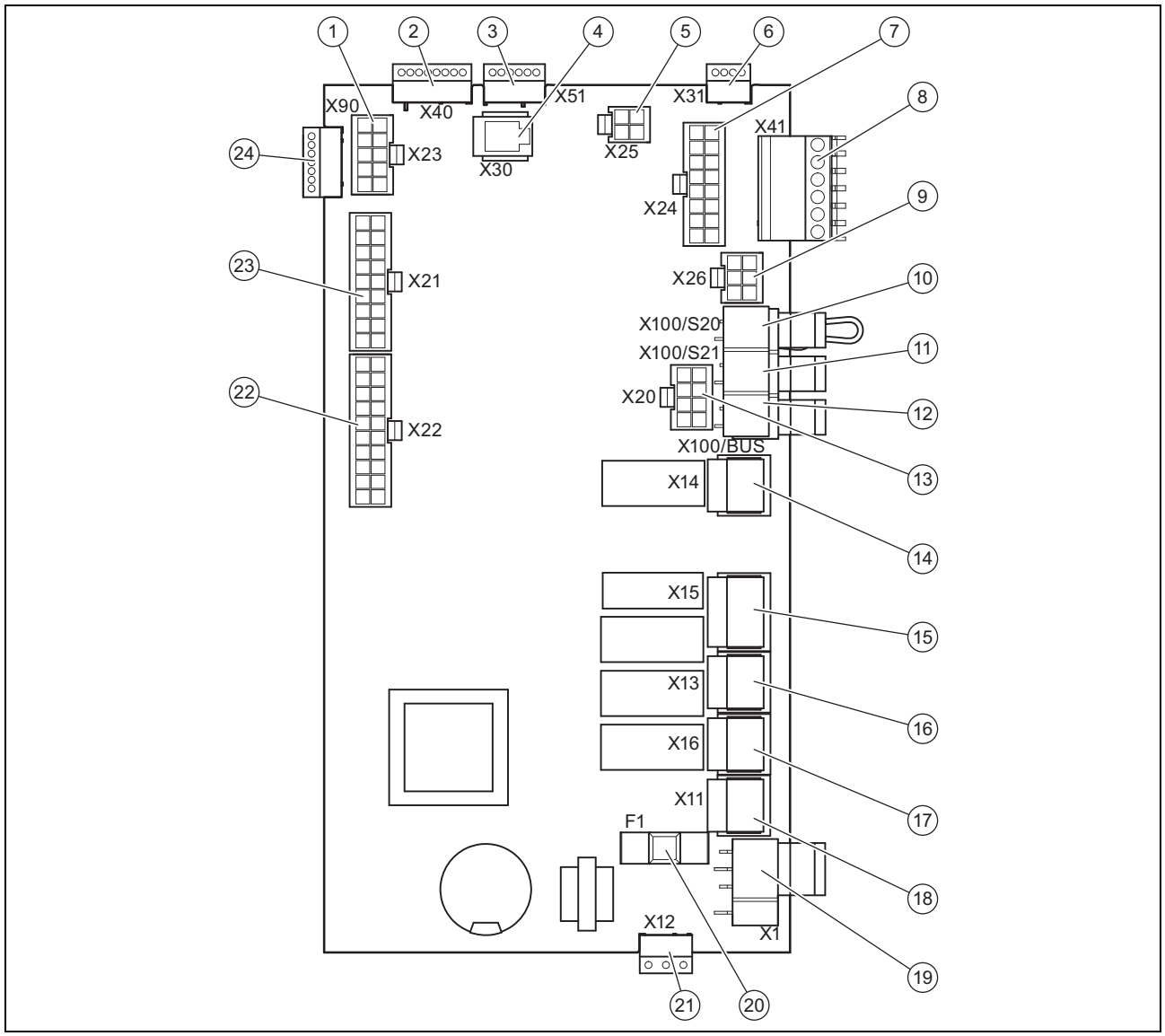
Note

The total current consumption of all connected external consumers (including X141, X143, X144, X145) must not exceed 2.4 A.



1	[X102] Power supply for internal electric back-up heater
2	[X143] Well pump
3	[X120] Optional 230 V supply for protection anode
4	[X145] External back-up heater
5	[F1] F1 T 4A/250 V fuse (protects 230 V loads on power supply PCB)
6	Protective earth connection for the electronics box
7	[X101] Power supply for compressor and 230 V electronics system – power supply PCB (TB) and control PCB (HMU)
8	[X1A] 230 V supply for control PCB
9	[X144] External 3-port valve
10	[X105] Connection for compressor with in-rush current limiter
11	LED safety switch for compressor
12	[X20A] Connection for control PCB communication line
13	[X201] (not used)
14	[X200] Optional temperature sensors for ground water module
15	[X203] Optional flow temperature sensor for heating circuit with passive cooling module
16	[X202] (not used)
17	[X90] (not used)
18	[X140] Connection for 3-port diverter valve for passive cooling module
19	[X142] 3-port mixing valve for passive cooling module
20	[X104] Connection for internal electric back-up heater
21	[X131] Optional external brine pressure switch connection
22	[X750] Safety cut-out for internal electric back-up heater
23	LED safety switch for electric back-up heater
24	[X141] Signal output for active cooling mode

8.6 Control PCB



1	[X23] EEV connection (electrical expansion valve)
2	[X40] VR40 edge connector (electrical lines)
3	[X51] Edge connector for display connection
4	[X30] eBUS connection/diagnostics interface
5	[X25] Modbus plug for controlling the in-rush current limiter
6	[X31] (not used)
7	[X24] (not used)
8	[X41] Edge connector for external sensors (outdoor temperature sensor, DCF, system sensor, multi-function input (can be adjusted in the system control))
9	[X26] Sensor cable harness, 230 V, L N PE
10	[X100/S20] Limit thermostat
11	[X100/S21] ESCO contact
12	[X100/BUS] Bus connection (**VR 900**)
13	[X20] Data connection to power supply PCB and power supply for the in-rush current limiter
14	[X14] Circulation pump connection
15	[X15] Connection for internal 3-port valve for domestic hot water (DHW)
16	[X13] Internal brine pump connection
17	[X16] Internal heating pump connection
18	[X11] Connection for internal 4-port valve
19	[X1] 230 V supply for control PCB
20	[F1] F1 T 4A/250 V fuse
21	[X12] Edge connector for 230 V supply for optional VR 40
22	[X22] Connection for sensor cable harness (including connection for cylinder temperature sensor and EVI valve)
23	[X21] Connection for sensor cable harness
24	[X90] (not used)

8.7 Connection terminals

8.7.1 X100/S21 ESC contact

A potential-free normally open contact with a breaking capacity of 24 V/0.1 A. The function of this contact must be configured in the system control, e.g. switching off the electric back-up heater when the contact is closed.

8.7.2 X141 signal output for active cooling mode

A contact for connecting a pump for the cooling circuit and/or an isolation valve for circuits that are not supposed to be cooled (e.g. bathroom). Max. permitted current: 2 A

8.7.3 X144 external 3-port valve

Contact L has a continuous voltage of 230 V; contact S is a normally open contact (operated at 230 V) for switching to the domestic hot water circuit. Max. permitted current at both connections: 0.2 A

8.7.4 X145 external back-up heater

A contact with potential in order to switch the external heater on/off on-site via a relay or a contactor. Max. permitted current at X145: 0.2 A

8.8 Connecting the system control and accessories to the electronics system

1. Install the system control in accordance with the installation instructions supplied.
2. Open the electronics box. (→ Section 8.2)
3. Carry out the wiring. (→ Section 8.9)
4. Connect controls and accessories in accordance with the relevant basic system diagrams and installation instructions.
5. Install the VRC DCF receiver.
6. Close the electronics box.

8.9 Carrying out the wiring

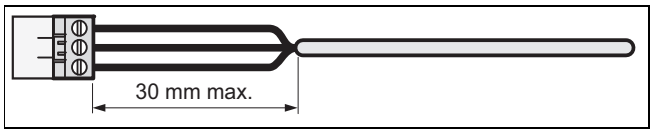
Caution.

Risk of material damage caused by incorrect installation.

Mains voltage at incorrect terminals and plug terminals may destroy the electronics.

- ► Do not connect any mains voltage to the eBUS terminals (+/-).
- ► Only connect the power supply cable to the terminals marked for the purpose.

1. Route the connection cables of the components to be connected through the grommet provided on the rear of the product on the left.
2. Use the cable trunking on the top of the product.
3. Use strain reliefs.
4. Shorten the connection cables as necessary.



5. To prevent short circuits if a strand accidentally comes loose, only strip the outer sheathing of flexible lines to a maximum of 30 mm.
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. To avoid short circuits resulting from loose individual wires, fit conductor end sleeves on the stripped ends of the conductors.
9. Screw the respective plug to the supply line.
10. Check whether all conductors are sitting mechanically securely in the terminals of the plug. Remedy this if necessary.
11. Plug the plug into the associated PCB slot.

8.10 Installing the VRC DCF

► Install the VRC DCF receiver in accordance with the installation instructions for the system control.

8.11 Installing optional accessories

1. Route the lines through the ducts in the back wall of the product.
2. Open the electronics box. (→ Section 8.2)
3. Connect the connection cable to the corresponding plugs or slots on the power supply PCB or control PCB.
4. Use the strain reliefs to secure the lines in the product.

8.12 Connecting the circulation pump

1. Carry out the wiring. (→ Section 8.9)
2. Connect the 230 V connection cable to the plug from slot X14 and plug it into the slot.
3. Connect the connection cable for the external button using terminals 1 (0) and 6 (functional drawing) on the X41 edge connector, which is supplied with the control.
4. Plug the edge connector into slot X41 on the control PCB.

8.13 Connecting the heat pump system to the photovoltaic installation

1. You require the following components for the connection:
   – External relay box with a relay with one N/O contact with gold contacts for 24 V/20 mA
2. Connect the relay contact to the **FB** multi-function input and to the neutral-ground**0T** on terminal block **X41** on the heat pump's control PCB.
   ◁ Contact closed: System saves energy.
   ◁ Contact open: Heat pump in normal operating mode
3. In the basic diagram book, select the **flexoTHERM**/ **flexoCOMPACT** basic system diagram and the photovoltaic interface.
4. Configure the relevant settings on the system control (System control installation instructions).

8.14 Checking the electrical installation

1. After the installation is complete, check the electrical installation to ensure that the connections that have been established are secured properly and are sufficiently insulated.
2. Install the cover of the electronics box. (→ Section 8.2)

8.15 Completing installation

8.15.1 Fitting the casing

1. Fit the side casings and screw in the screws.
2. Place the top casing on the side casings and slide it back into the recesses provided for this in the back panel.
3. Hook the upper part of the front casing, using the retaining brackets, into the recesses in the side casings and lower it down.
4. Hook the lower part of the front casing, using the retaining brackets, into the recesses in the side casings and fold it up.
5. Install the panel on the control panel.
6. Attach the control panel cover and check that the cover can move easily when it is opened from either side.

8.15.2 Checking the system pressure and leak-tightness

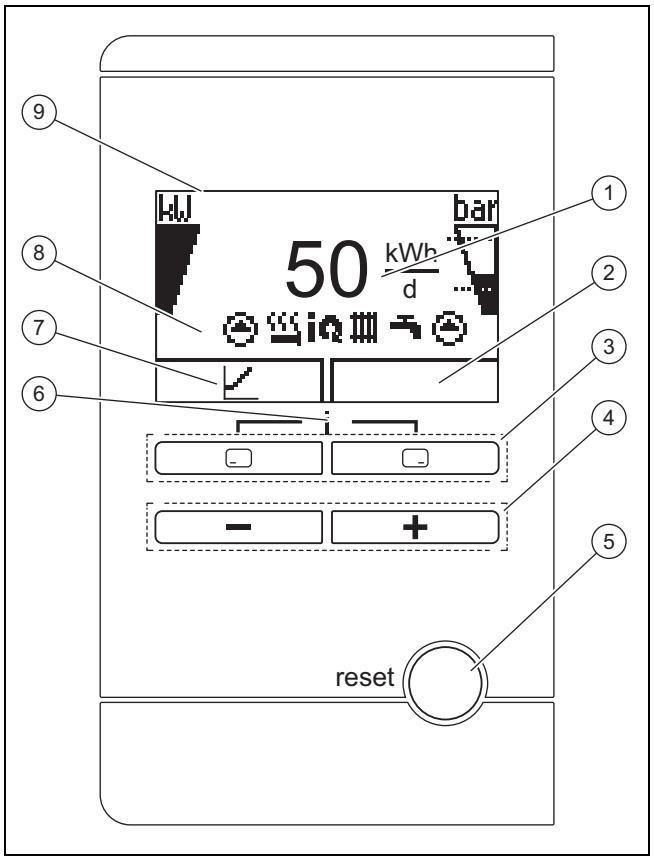
1. After completing the installation, carry out a check of the system.
2. Start up the product in accordance with the relevant operating instructions.
3. Check the filling pressure of the heating installation and check for leaks.

9 Start-up

9.1 Operating concept

→ Operating instructions

9.2 Starting up the heat pump system



1	Displays the daily environmental energy yield	6	Access to the menu for additional information (press both selection buttons at the same time)
2	Display of the current assignment of the right-hand selection button	7	Display of the current configuration of the left-hand selection button
3	Left- and right-hand selection buttons	8	Displays the symbols for the current operating mode of the heat pump
4	⊖ and ⊕ button	9	Display
5	Reset button (restarts the heat pump and system control)		

1. Use the partition that is installed on-site (e.g. fuses or power switches) to switch on the product.
   ◁ The display shows the basic display.

Note

In the case of a restart following a loss of voltage or a shutdown of the power supply, the current date and time are automatically reset by the DCF receiver or, if there is no DCF reception, you must reset these values yourself.

2. When you start up the heat pump system for the first time after electrical installation, the installation assistants for the system components will start automatically. Set the required values on the control panel of the heat pump first, then on the system control and the other system components.

9.3 Running the installation assistants

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

Menu → Installer level Configuration

► Press ⊟ to confirm that you wish to start the installation assistant.
  ◁ All heating, cooling and domestic hot water demands are blocked whilst the installation assistant is active.

Note
You cannot exit the installation assistant until the environment circuit type has been set.

► To access the next point, confirm by pressing ⊟ in each case.

9.3.1 Setting the language

► To confirm the set language and to avoid unintentionally changing it, press ⊟ twice.

9.3.2 Setting the environment circuit type

The following environment circuit types can be set:

– Ground/brine
– Air/brine
– Ground water/brine

9.3.3 Setting the cooling technology

You must set the installed cooling technology.

Note
Using the active cooling with the ground heat source is generally prohibited.

9.3.4 Enabling auxiliary electric heating

On the system controller, you can select whether the auxiliary electric heating is to be used for heating mode, hot water handling mode or both modes. Set the maximum output for the auxiliary electric heater at the heat pump's operator control panel here.

► Activate the internal auxiliary electric heating with one of the following output levels.
► Make sure that the maximum output of the auxiliary electric heating does not exceed the power of the fuse protection installed in the domestic electrical system (see technical data for measuring currents).

Note
Otherwise the domestic circuit breaker may be triggered later if the output of the heat source is insufficient and the auxiliary electric heating (which has a higher output) is switched off.

Output levels for the 230 V auxiliary electric heating (when connecting one phase; see Appendix A):

– External
– 2.0 kW
– 3.5 kW
– 5.5 kW

Output levels for the 230 V auxiliary electric heating (when connecting three separate phases; see Appendix B):

– 7 kW
– 9 kW

9.3.5 Purging the building circuit

► Start the check programme **P.05** in order to purge the building circuit. (→ Section 11.6)

9.3.6 Purging the environment circuit

► Start the check programme **P.06** in order to purge the environment circuit. (→ Section 11.6)

Condition: Air/brine heat source

– Programme duration of approx. 1 hour. In addition to purging, the programme includes a self-test of the air/brine collector which checks the following points: Phase errors, communication with outdoor unit, brine pressure, safety cut-out of the defroster heater, brine pump operation, brine circuit flow rate, fan, sensor faults, temperature balancing, calibration of the heat pump brine sensor, calibration of the air/brine collector brine sensor, inversion of brine lines, brine circuit purging function

9.3.7 Telephone number for the competent person

You can store your telephone number in the appliance menu.

The user 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 ⊟.

All of the digits to the right will be deleted.

9.3.8 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.

9.4 Calling up the installer level

1. Press ⊟ and ⊟ at the same time.
2. Navigate to **Menu → Installer level** and confirm by pressing ⊟ (**OK**).
3. Set the value **17** (code) and confirm by pressing ⊟.

9.5 Changing the set language

1. Press and hold ⊟ and ⊞ at the same time.
2. Also briefly press reset.
3. Press and hold ⊟ and ⊞ until the display shows the language setting option.
4. Select the required language.
5. Press ⊟ twice to confirm this change.
6. To confirm the set language and to avoid unintentionally changing it, press ⊟ twice.

9.6 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. 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 volume 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 the gas-fired boiler operation to heat pump mode).

Time conditions for compressor operation

The following shall always apply for operation:

– Minimum running time: 3 minutes
– Minimum rest period: 7 minutes
– Minimum time from start to start: 20 minutes

9.7 Activating cooling mode

► Go to the heat pump's control panel.
► Navigate to: **Menu → Installer level → Configuration → Cooling technology**.
► Select: Active cooling, Pass. cooling accessories or Pass. cooling on-site.
► If this involves a heat pump cascade, implement this setting for every heat pump with cooling function.
► Go to the system control.
► Activate cooling mode (→ Installation instructions for the system control).

9.8 Calling up statistics

Menu → Installer level → Test menu → Statistics

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

9.9 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 menu → Check programmes**.
3. Check the heating mode.
4. Check the domestic hot water mode.
5. Check the cooling mode.

10 Adapting the unit to the heating installation

10.1 Setting parameters

The installation assistant is launched when the product is switched on for the first time. When the installation assistant is complete, you can further adjust the parameters of the installation assistant, for example, in the **Configuration** menu.

Menu → Installer level Configuration

10.2 Setting the high-efficiency pumps

10.2.1 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 building circuit pump because the pump speed is adjusted to the hydraulic resistance of the system. Vaillant recommends that you retain this setting.

Manual mode

Menu → Installer level → Configuration → Conf. heat. build. pump

Menu → Installer level → Configuration → Conf. cool. build. pump

Menu → Installer level → Configuration → Conf. DHW build. pump

If you do not want to operate the pump in automatic mode, you can set it to manual mode in the **Configuration** menu for different operating modes. The diagrams below show 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.

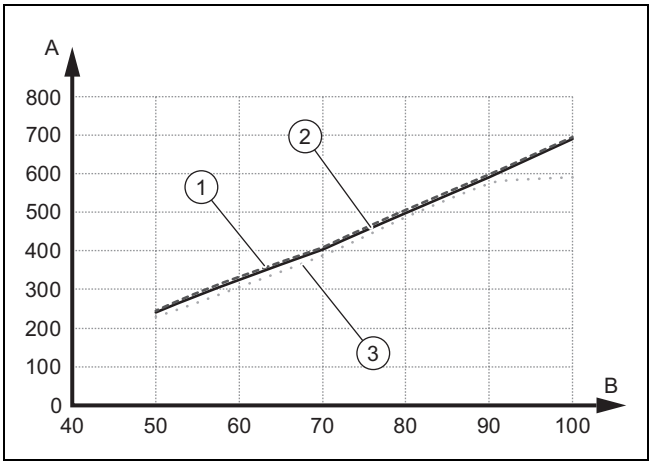
Setting the maximum differential pressure in the building circuit

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

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 0.1 MPa (200 to 1000 mbar).

10.2.2 Remaining feed head of building circuit pump

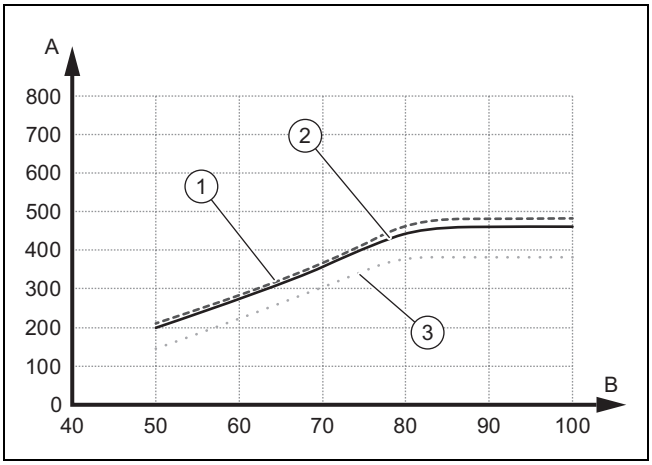
10.2.2.1 Remaining feed head for VWF 5x/4 building circuit pump at nominal volume flow



1 Air heat source
2 Ground heat source
3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

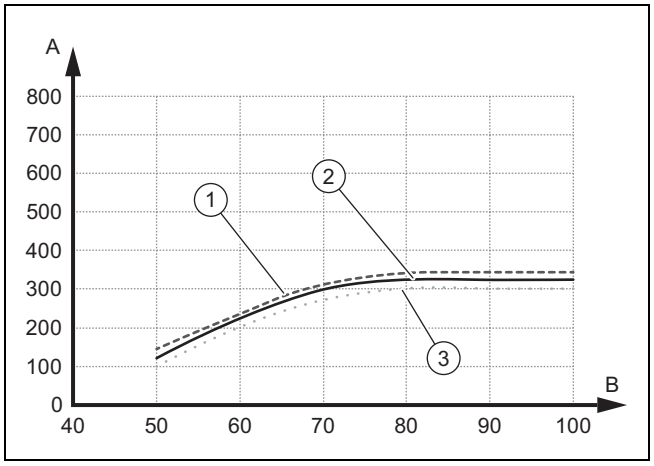
10.2.2.2 Remaining feed head for VWF 8x/4 building circuit pump at nominal volume flow



1 Air heat source
2 Ground heat source
3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

10.2.2.3 Remaining feed head for VWF 11x/4 building circuit pump at nominal volume flow



1 Air heat source
2 Ground heat source
3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

10.2.3 Setting the environment circuit pump

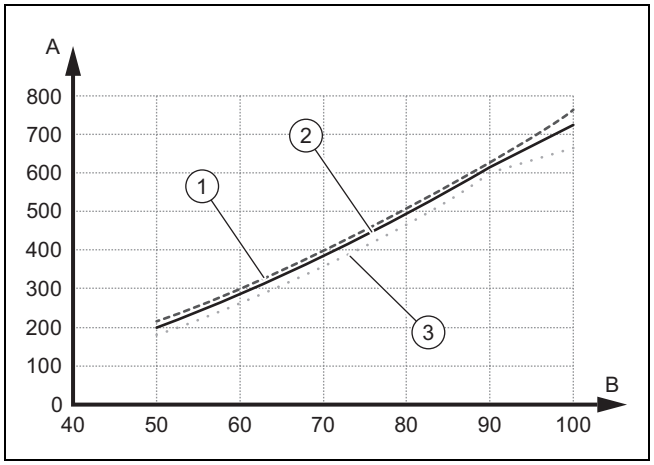
If the heat source temperature spread lies below 2 K due to low pressure losses (large pipe cross-sections, small drilling depth, with air as the heat source: Short distance to the air/brine collector) in continuous operation, you can adjust the pump output. The following diagram shows how setting the pump actuation affects the remaining feed heads at nominal volume flows for a heat source temperature spread of 3 K.

The factory setting on the environment circuit pump depends on the environment circuit type set and the output range.

► Navigate to the **Menu** → **Installer level** → **Configuration** → **Target env. pump val.** menu item.
► If necessary, change the factory setting and confirm by pressing ⊡.

10.2.4 Remaining feed head of environment circuit pump

10.2.4.1 Remaining feed head for VWF 5x/4 environment circuit pump at nominal volume flow

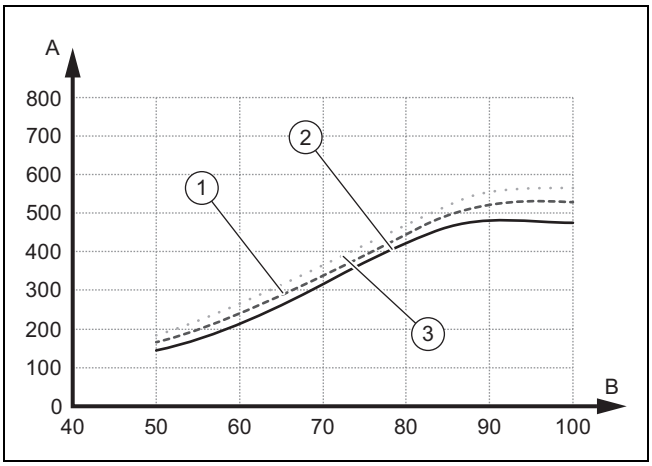


1 Air heat source
2 Ground heat source

3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

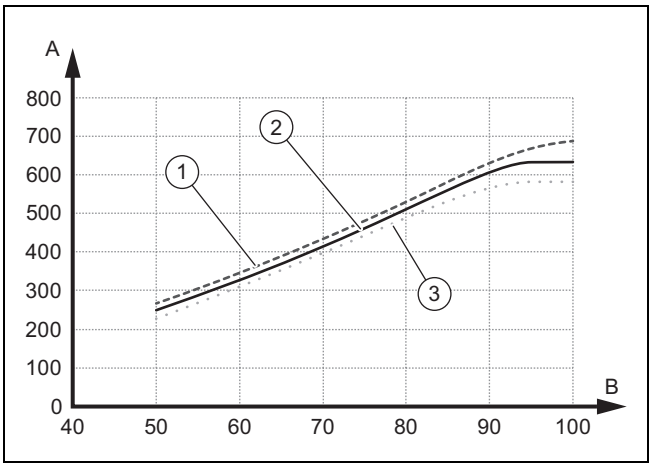
10.2.4.2 Remaining feed head for VWF 8x/4 environment circuit pump at nominal volume flow



1 Air heat source
2 Ground heat source
3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

10.2.4.3 Remaining feed head for VWF 11x/4 environment circuit pump at nominal volume flow



1 Air heat source
2 Ground heat source
3 Ground water heat source

A Remaining feed head in hPa (mbar)
B Pump output in %

10.3 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 display shows the flow temperature in heating mode.
3. Change the flow temperature in heating mode by pressing ⊖ or ⊕.
   – Max. heating mode target flow temperature: 75 °C
4. Confirm this change by pressing ⊟ (**OK**).

10.4 Setting the flow temperature in cooling mode (with no control connected)

1. Activate manual operation.
   – **Menu → Installer level → Configuration → Enable limp home mode**
2. Press ⊟ twice.
   ◁ The display shows the value of the flow temperature in cooling mode.
3. Change the flow temperature in cooling mode by pressing ⊖ or ⊕.
4. Confirm this change by pressing ⊟ (**OK**).

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

10.5 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 warnings 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.

11 Troubleshooting

11.1 Displaying the Live Monitor (current product status)

Menu → Live Monitor

– You can use the Live Monitor to display the current status of the product.

Status codes – Overview (→ Appendix F)

11.2 Checking fault codes

The display shows a fault code **F.xxx**. A plain text display explains the displayed fault code.

Fault codes have priority over all other displays.

Fault codes (→ Appendix H)

If multiple faults occur at the same time, the display shows the corresponding fault codes for two seconds each in sequence.

- ► Eliminate the fault.
- ► To restart the product, press reset (→ Operating instructions).

11.3 Querying the fault memory

Menu → Installer level Fault list

The product 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 will also be displayed.

Display views

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

11.4 Resetting the fault memory

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

11.5 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

11.6 Using check programmes

Menu → Installer level → Test menu → Check programmes

You can use this function to start check programmes.

Note
If a fault has occurred, the check programmes are not run.

You can terminate the check programmes by pressing ⊟ (**Cancel**) at any time.

11.7 Carrying out the actuator test

Menu → Installer level → Test menu → Sensor/actuator test

You can check that the components of the heating installation are functioning correctly using the sensor/actuator test. You can actuate more than one actuator at a time.

If you do not select anything to change, you can have the current control values for the actuators and the sensor values displayed.

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

Characteristic values, external cylinder temperature sensor (→ Appendix I)

Characteristic values, internal temperature sensors (refrigerant circuit) (→ Appendix J)

Characteristic values for the VRC DCF outdoor temperature sensor (→ Appendix K)

11.8 Electric back-up heater circuit breaker

A circuit breaker is used to secure the internal electric back-up heater against short circuits. If the circuit breaker has been triggered, the electric back-up heater remains switched off until the short circuit has been eliminated and the circuit breaker in the electronics box has been manually reset.

11.8.1 Resetting the circuit breaker in the electric back-up heater

1. Check the supply line to the power supply PCB.
2. Check that the power supply PCB is working correctly.
3. Check the connection cables for the electric back-up heater.
4. Check that the electric back-up heater is working correctly.
5. Eliminate the short circuit.
6. Reset the circuit breaker in the electronics box.

12 Inspection and maintenance

12.1 Inspection and maintenance information

12.1.1 Inspection

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

12.1.2 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.

12.2 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 result in the product no longer meeting the applicable standards, thereby voiding the conformity of the product.

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 back page of these instructions.

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

12.3 Checking maintenance messages

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

- ► To obtain further information, call up the **Live Monitor**. (→ Section 11.1)
- ► Carry out the maintenance work that is listed in the table. (→ Appendix G)

Condition: **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 sensors for the building circuit outlet, environment circuit inlet or environment circuit outlet fail, the product continues to run with replacement values.

- ► To determine which component is defective, read the fault memory. (→ Section 11.3)

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.

12.4 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 of the product and that it is leak-tight.	x	x
2	Check the pressure in the heating circuit and, if required, top up the heating water.	x	x
3	Check and clean the dirt filters in the heating circuit.	x	x
4	Check the volume and concentration of the brine fluid and the pressure in the brine circuit. Top up with brine fluid if required.	x	x
5	Check that the expansion vessel and the expansion relief valve in the brine circuit are working correctly.	x	x
6	Check that the expansion vessel and the expansion relief valve in the heating circuit are working correctly.	x	x
7	Check for leaks in the brine and heating circuit, and repair these leaks if necessary.	x	x
8	Check that the circuit breaker in the electronics box is working correctly.	x	x

Warning.

Risk of ignition when performing soldering work on the refrigerant circuit

When performing soldering work on the refrigerant circuit as part of a repair, flammable oil in the refrigerant circuit poses a risk of ignition.

- ► Before performing soldering work, drain the refrigerant circuit and flush it with inert gas.

12.5 Checking and correcting the filling pressure of the heating installation

If the filling pressure falls below the minimum pressure, a maintenance message is shown on the display.

– Min. heating circuit pressure: ≥ 0.05 MPa (≥ 0.50 bar)

- ► Top up the heating water to start up the heat pump again. (→ Section 7.1.2)
- ► If you notice frequent pressure losses, determine and eliminate the cause.

12.6 Checking and correcting the brine circuit's filling pressure

If the filling pressure falls below the minimum pressure, the heat pump is automatically switched off and a maintenance message is shown in the display.

– Minimum brine fluid pressure: ≥ 0.05 MPa (≥ 0.50 bar)

- ► Top up with pre-mixed brine fluid in order to start the heat pump up again (→ Section 7.2.2). Never top up with pure water.
  – Min. brine fluid operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)
- ► If you notice frequent pressure losses, determine and eliminate the cause.

12.7 Carrying out a restart and test operation

Warning.

Risk of burns due to hot and cold components.

There is a risk of burns from any uninsulated pipelines and from the electric back-up heater.

- ► Before starting up the unit, install any casing sections that have been removed.

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

13 Decommissioning

13.1 Temporarily decommissioning the product

1. Use the partition that is installed on-site (e.g. fuses or power switches) to disconnect the product from the power supply.
2. Observe the requirements for the installation site regarding frost protection. (→ Section 5.2)

13.2 Decommissioning the product

1. Use the partition that is installed on-site (e.g. fuses or power switches) to disconnect the product from the power supply.
2. Drain the product.
3. Dispose of the product and the operating materials in accordance with the national regulations.

14 Recycling and disposal

Disposing of the packaging

- ► Dispose of the packaging correctly.
- ► Observe all relevant regulations.

Disposing of the product and accessories

- ► Do not dispose of the product or the accessories with household waste.
- ► Dispose of the product and all accessories correctly.
- ► Observe all relevant regulations.

14.1 Disposing of 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.

14.2 Arranging disposal of refrigerant

The product is filled with R410A refrigerant.

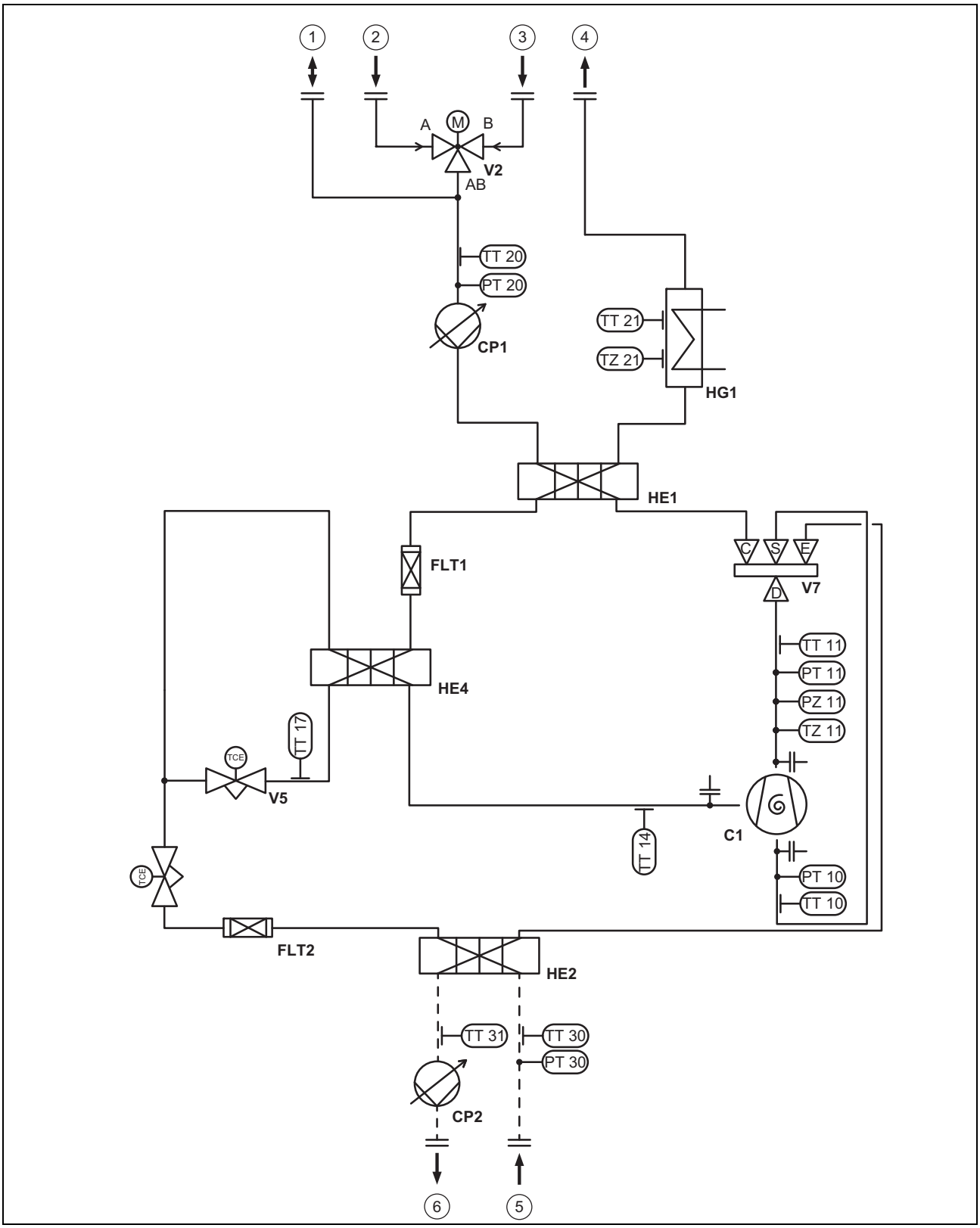
- ► Refrigerant must only be disposed of by a qualified competent person who holds a refrigerant-handling certificate.

15 Customer service

For contact details for our customer service department, you can write to the address that is provided on the back page, or you can visit www.vaillant.co.uk.

Appendix

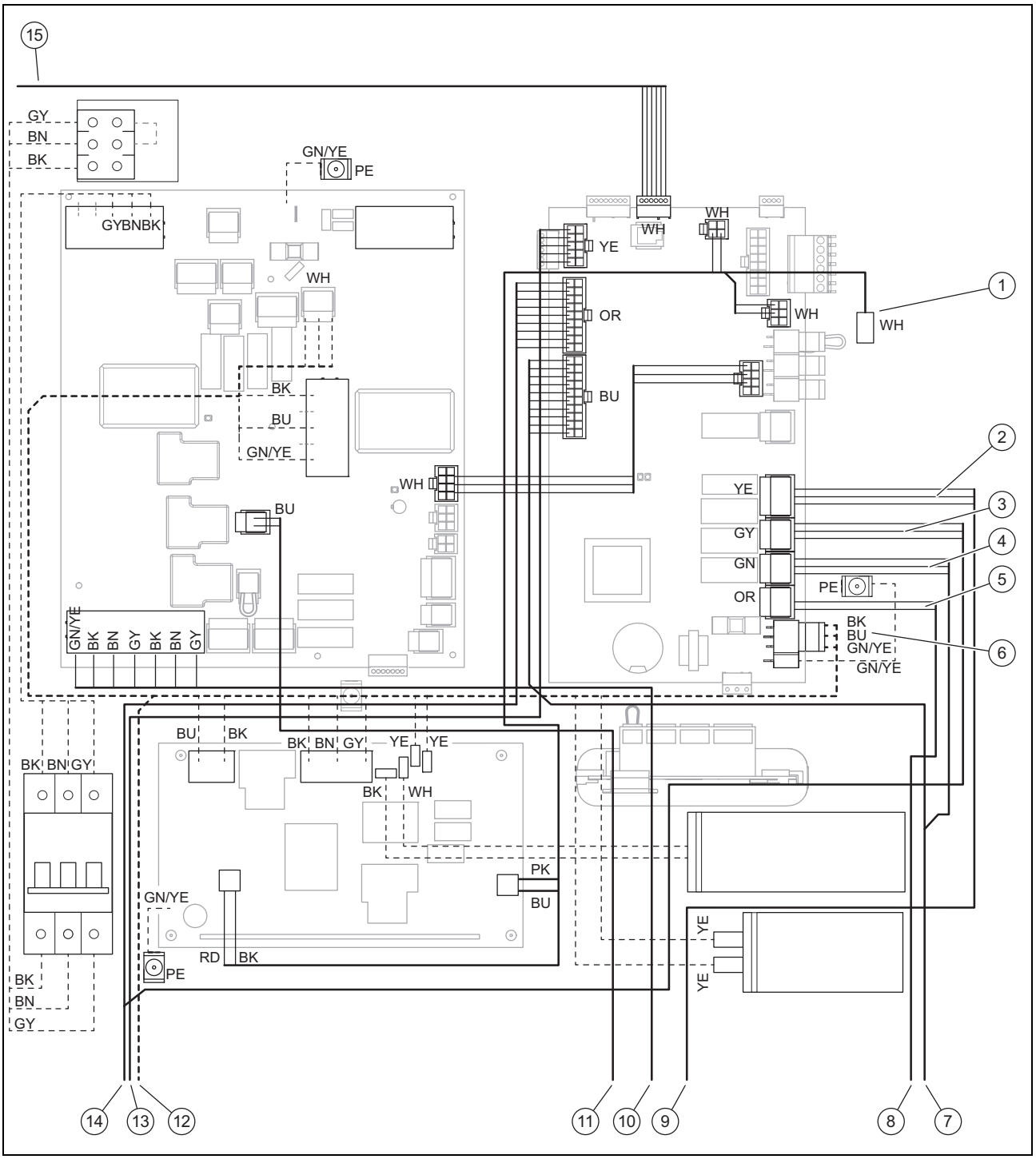
A Heat pump schematic



1	Heating circuit diaphragm expansion vessel connection	C1	Compressor
2	Circulation connection	CP1	Heating pump
3	Heating return	CP2	Brine pump
4	Heating flow	FLT1	Filter
5	Hot brine	FLT2	Filter
6	Cold brine	HE1	Condenser

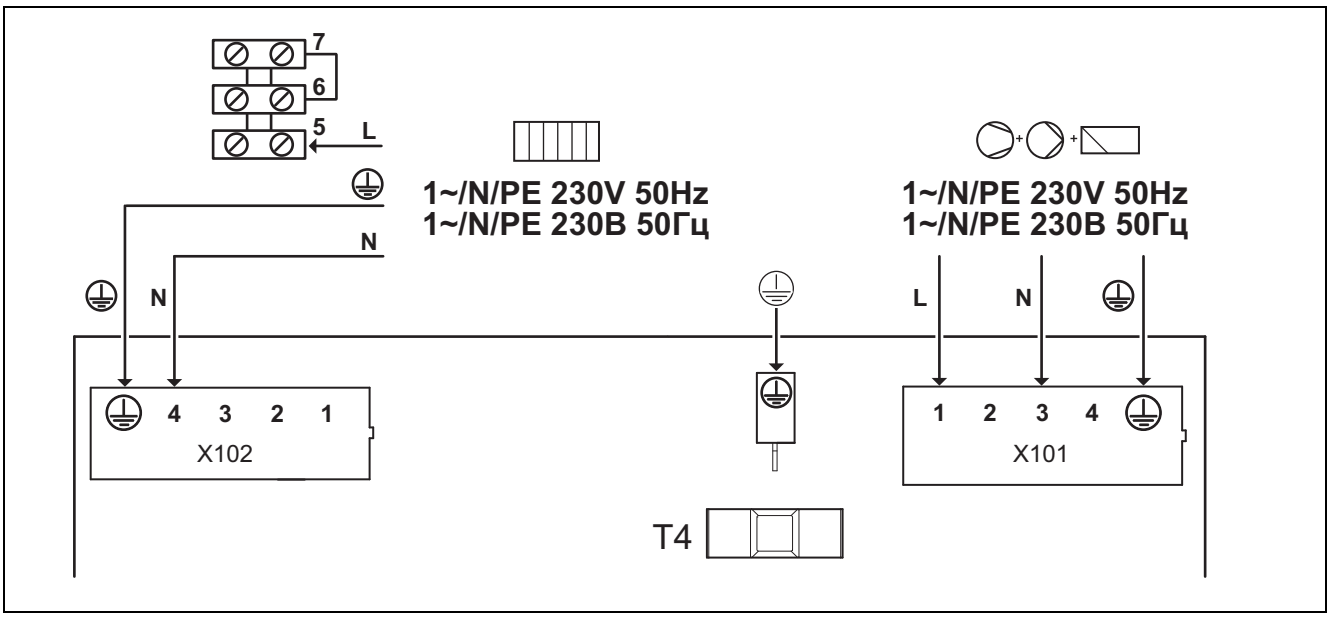
HE2	Evaporator
HE4	Evaporator for intermediate injection
HG1	Electric back-up heater
PT10	Low-pressure sensor
PT11	High-pressure sensor
PT20	Heating circuit pressure sensor
PT30	Brine pressure sensor
PZ11	High-pressure switch
TT10	Compressor inlet temperature sensor
TT11	Compressor outlet temperature sensor
TT14	Intermediate injection compressor inlet temperature sensor
TT17	Electronic expansion valve outlet temperature sensor
TT20	Heating return temperature sensor
TT21	Heating flow temperature sensor
TT30	Source inlet temperature sensor
TT31	Source outlet temperature sensor
TZ11	Compressor outlet temperature switch
TZ21	Safety cut-out temperature switch
V1	Electronic expansion valve
V2	3-port valve for domestic hot water
V5	Electronic expansion valve for intermediate injection
V7	4-2-port valve

B Circuit diagram



1	Cylinder temperature sensor connection	9	To the 3-port diverter valve (heating/cylinder charging diverter valve)
2	X15 internal 3-port diverter valve	10	To the electric back-up heater
3	X13 internal brine pump	11	To the safety cut-out for the electric back-up heater
4	X16 internal heating pump	12	Power supply to the electric back-up heater, to the compressor
5	X11 internal 4-port diverter valve	13	To the sensors, switches and valves
6	230 V supply to control PCB	14	To the brine pump
7	To the heating pump	15	To the control panel
8	To the 4-port diverter valve		

C Power supply 1~/N/PE 230 V (wiring diagram 1 = 1)

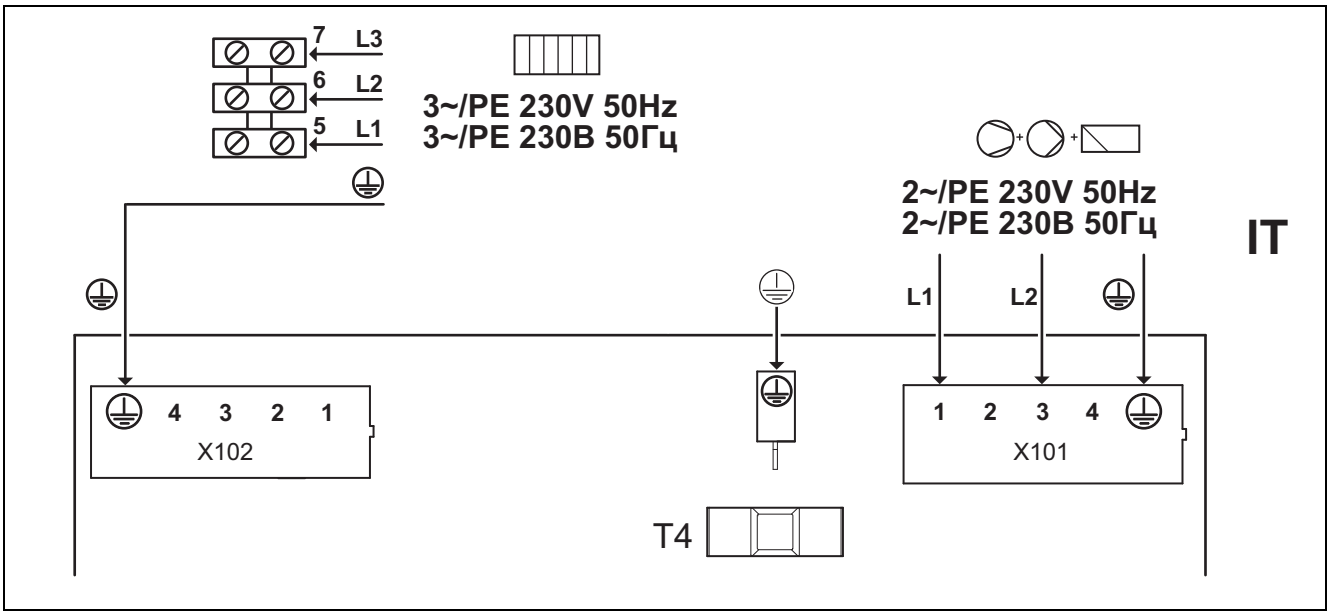


1	Power supply for internal electric back-up heater	X101	Mains connection for compressor
2	Continuous power supply	X102	Power supply for internal electric back-up heater

This wiring corresponds to its as-delivered condition.

In this case, the heat pump is operated using two electricity tariffs (two consumption meters). The X101 connection for the compressor and electronics is continuously supplied with power. The internal electric back-up heater at X102 is permanently supplied with power via a separate connection, or it can be locked.

D Power supply 3~/PE 230 V (wiring diagram 2 = 2)



1	Blockable power supply for internal electric back-up heater	X101	Mains connection for compressor
2	Blocked power supply for the compressor and control system	X102	Power supply for internal electric back-up heater

In this case, the heat pump is operated using two electricity tariffs (two consumption meters). The X101 connection for the compressor and electronics is continuously supplied with power. The internal electric back-up heater at X102 is permanently supplied with power via a separate connection, or it can be locked.

E Installer level overview

Setting level	Values		Unit	Increment, select, explanation	Factory setting	Setting
	Min.	Max.				
Installer level →						
Enter code	00	99		1 (competent person code 17)	00	
Installer level → Fault list →						
F.086 – F.1120[1)]				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					
Environ. pump hours	Current value		h			
Environm. pump starts	Current value					
4-way valve hours	Current value		h			
4-way valve switch.	Current value					
Cooling mixer steps	Current value					
EEV stepsEl. expansion valve steps	Current value					
EEV-VI stepsEl. expansion valve injection steps	Current value					
VUV DHW switchings	Current value					
Well pump hours	Current value		h			
Well pump starts	Current value					
Im. heater pwr cons.	Current value		kWh			
Im. heater switchings	Current value					
Im. heater op. hours	Current value		h			
Installer level → Test menu → Check programs →						
P.01 Heating mode				Select		
P.02 Cooling mode				Select		
P.03 Hot water handling				Select		
P.04 Immersion heater				Select		
P.05 Purge building circuit				Select		
P.06 Purge environment circuit				Select		
P.07 Purge environment and building circuit				Select		
P.08 De-icing				Select		
Installer level → Test menu → Sensor/actuator test →						
Actuators						
Building circuit actuators						
T.01 Building circuit pump power	0	100	%	5, off	Off	
T.02 DHW diverter valve	Heating	Domestic hot water		Heating, Domestic hot water	Heating	
T.03 Cooling diverter valve (for passive cooling only)	Heating	Cooling		Heating, Cooling	Heating	
Environment circuit actuators						

[1)] See overview of fault codes

Setting level	Values		Unit	Increment, select, explanation	Factory setting	Setting
	Min.	Max.				
T.14 Env. circuit pump power	0	100	%	5	0	
T.16 Cooling mixer position (for passive cooling only)	Closes	Opens		Closes, Stops, Opens	Stops	
T.17 Well pump	Off	On		Off, On	Off	
Refrigerant circuit actuators						
T.32 4-way valve (for active cooling only)	Open	Closed		Open, closed	Closed	
T.33 Position: EEV	0	100	%	5	0	
T.34 Position: EEV-VI	0	100	%	5	0	
Further actuators						
T.45 Fault outlet	Off	On		Off, On	Off	
T.46 MPO2 output	Off	On		Off, On	Off	
T.47 System pump power	0	100	%	5	0	
T.48 Circulation pump	Off	On		Off, On	Off	
T.49 Relay: Cooling active (for passive or active cooling only)	Off	On		Off, On	Off	
Sensors						
Building circuit sensors						
T.79 Flow temperature	-40	90	°C	0.1		
T.80 Cooling flow temperature (for passive cooling only)	-40	90	°C	0.1		
T.81 Return temperature	-40	90	°C	0.1		
T.82 Building circuit: Pressure	0	4.5	bar	0.1		
T.83 Building circuit: Flow rate	0	4000	l/h	1		
T.84 Lockout contact S20	Open	Closed		Open, closed	Closed	
T.85 Safety cut-out immersion heater	Closed	Open		Closed, Open	Closed	
T.86 Cylinder temperature	-40	90	°C	0.1		
Environment circuit sensors						
T.97 Environment circuit: Inlet temperature	-40	90	°C	0.1		
T.98 Environment circuit: Outlet temperature	-40	90	°C	0.1		
T.99 Well inlet temperature (for the well environment circuit type only)	-40	90	°C	0.1		
T.100 Well outlet temperature (for the well environment circuit type only)	-40	90	°C	0.1		
T.101 Environment circuit: Pressure	0	4.5	bar	0.1		
T.102 Fault contact: Env. circuit pump	Closed	Open		Closed, Open	Closed	
T.103 Environment circuit: Pressure monitor (for the ground-to-brine environment circuit type only)	Closed	Open		Closed, Open	Closed	
Refrigerant circuit sensors						
T.121 Compressor outlet temperature	-40	135	°C	0.1		
T.122 Compressor inlet temperature	-40	90	°C	0.1		
T.123 EEV-VI inlet temperature	-40	90	°C	0.1		
T.124 EEV-VI outlet temperature	-40	90	°C	0.1		

[1] See overview of fault codes

Setting level	Values		Unit	Increment, select, explanation	Factory setting	Setting
	Min.	Max.				
T.127 High pressure	0	47	bar (abs)	0.1		
T.128 Condensation temperature	-40	70	°C	0.1		
T.129 Low pressure	0	22	bar (abs)	0.1		
T.130 Evaporation temperature	-40	90	°C	0.1		
T.131 Superheating target value	-40	90	K	0.1		
T.132 Superheating actual value	-40	90	K	0.1 to 20 K are normal operating parameters		
T.134 High-pressure switch	Closed	Open		Closed, Open	Closed	
T.135 Temperature switch: Compressor outlet	Closed	Open		Closed, Open	Closed	
Further sensors						
T.146 Outside temperature	-40	90	°C	0.1		
T.147 DCF status	Current value			No DCF signal Validate DCF signal Valid DCF signal		
T.148 System temperature	-40	90	°C	0.1		
T.149 MPI input	Closed	Open		Closed, Open	Open	
Installer level → Configuration →						
Language	Current language			Languages available for selection	02English	
Contact details Telephone number	Phone number			0–9		
Compress. start from	−999	0	°min	1	−60	
Max. return temp.	30	70	°C	1	70	
Compressor hyster.	3	15		1	7	
Max. rem. feed head	200	1000	mbar	10	1000	
Conf. heat. build. pump	Auto	100	%	1	Auto	
Conf. cool. build. pump	Auto	100	%	1	Auto	
Conf. DHW build. pump	Auto	100	%	1	Auto	
Reset anti-cycl. time Anti-cycl. time after pow. supp. switch-on	0	120	min	10	0	
Im. heater outp. range	External	9	kW	230 V – External – 2 kW – 3.5 kW – 5.5 kW – 7 kW – 9 kW	5.5	
Env. pump target val.	1	100	%	1	Ground-to-brine – VWF 5x/4 230 V: 100 – VWF 8x/4 230 V: 100 – VWF 11x/4 230 V: 100 Well – VWF 5x/4 230 V: 47 – VWF 8x/4 230 V: 100 – VWF 11x/4 230 V: 100	
[1] See overview of fault codes						

Setting level	Values		Unit	Increment, select, explanation	Factory setting	Setting
	Min.	Max.				
Freeze protection	Ground-to-brine: -14 Well: +2	5	°C	1	Ground-to-brine: -7 Well: +2	
Env. circuit type	Current value			Ground-to-brine Well		
Enable emerg. mode	Off	On		Off, On	Off	
Cooling technology	No cooling	On-site pass. cooling		No cooling Active cooling Pass. cooling accessories On-site pass. cooling	0	
Device Specific No.	40	44		Current value	VWF 5x/4 230 V = 45 VWF 8x/4 230 V = 46 VWF 11x/4 230 V = 47	
Software version	Current value for the control PCB (HMU xxxx) and the display (AI xxxx) Software version of the TB power supply PCB Software version of the in-rush current limiter ICL Software version of the first fan unit OMU1 Software version of the second fan unit OMU2			xxxx.xx.xx		
Installer level → Resets →						
Cancel switch-on delay?				Yes, No	No	
Reset statistics?				Yes, No	No	
Factory settings				Yes, No	No	
Installer level → Start inst. assistant →						
Language				Languages available for selection	02English	
Env. circuit type	Select			Ground-to-brine Well		
Freeze protection	Ground-to-brine: -14 Well: +2	5	°C	1	Ground-to-brine: -7 Well: +2	
Im. heater outp. range	External	9	kW	1 230 V – External – 2 kW – 3.5 kW – 5.5 kW – 7 kW – 9 kW	5.5	
Cooling technology	No cooling	On-site pass. cooling		No cooling Active cooling Pass. cooling accessories On-site pass. cooling	No cooling	
Check program: Purge environment and building circuit	Test not active	Test active		Test not active, Test active	Test not active	
[1] See overview of fault codes						

Setting level	Values		Unit	Increment, select, explanation	Factory setting	Setting
	Min.	Max.				
Check program: Purge building circuit	Test not active	Test active		Test not active, Test active	Test not active	
Check program: Purge environment circuit	Test not active	Test active		Test not active, Test active	Test not active	
Contact details Telephone number	Phone number			0–9	Empty	
End the installation assistant?				Yes, back		

[1] See overview of fault codes

F Status codes – Overview

Note
Since the code table is used for various products, some codes may not be visible for the product in question.

Status code	Meaning
Displays relating to the heat pump system	
S.34	**Heating mode: Frost protection**
S.91	**Service message: Demo mode**
S.100	**Standby**
S.101	**Heating: Compressor shutdown**
S.102	**Heating: Compressor blocked**
S.103	**Heating: Pre-run**
S.104	**Heating: Compressor active**
S.107	**Heating: Overrun**
S.111	**Cooling: Compressor shutdown**
S.112	**Cooling: Compressor blocked**
S.113	**Cooling: Compressor mode pre-run**
S.114	**Cooling: Compressor active**
S.117	**Cooling: Compressor mode overrun**
S.118	**Cooling: Pre-run**
S.119	**Cooling: Mixer active**
S.125	**Heating: Immersion heater active**
S.131	**Hot water: Compressor shutdown**
S.132	**Hot water: Compressor blocked**
S.133	**Hot water: Pre-run**
S.134	**Hot water: Compressor active**
S.135	**Hot water: Immersion heater active**
S.137	**Hot water: Overrun**
S.141	**Heating: Immersion heater shutdown**
S.142	**Heating: Immersion heater blocked**
S.151	**Hot water: Immersion heater shutdown**
S.152	**Hot water: Immersion heater blocked**
General displays	
S.170	**Compressor: Phase failure**
S.171	**Compressor: Incorrect phase seq.**
S.172	**Compressor: ICL fault**
S.173	**Anti-cycling time for the energy supply company**
S.201	**Check program: Purging of env. circuit active**

Status code	Meaning
S.202	**Check program: Purging of building circuit active**
S.203	**Actuator test active**
Displays relating to communication	
S.211	**Connection error: Disp. not recognised**
S.212	**Connection error: Contr. not recognised**
S.215	**Connection error: TMB not recognised**
S.216	**Connection error: ICL not recognised**
Displays relating to the 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**
S.265	**Environment circuit: Pressure monitor open**
S.266	**Environment circuit: Outlet temperature too high**
Displays relating to the 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 circuit: Lockout contact S20 open**
S.277	**Building circuit: Pump fault**
Displays relating to the refrigerant circuit	
S.302	**High-pressure switch open**
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 circuit: Inlet temperature too low**
S.312	**Building circuit: Return temperature too low**
S.313	**Environment circuit: Inlet temperature too high**
S.314	**Building circuit: Return temperature too high**
S.240	**Compr. oil temp. too low, environment too cold**
Displays relating to the electric back-up heater circuit	
S.350	**Immersion heater: Safety cut-out open**
S.351	**Immersion heater: Flow temp. too high**
S.352	**Immersion heater: Pressure too low**
S.353	**Immersion heater: Flow rate too low**
S.354	**Immersion heater: Phase failure**

G Maintenance messages

Code	Meaning	Cause	Remedy
M.32	**Building circuit: Pressure low**	– Pressure loss in the building circuit due to leakages or air pockets – Building circuit pressure sensor is defective	– 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.33 Only with the heat source: Air	**Fan unit: Cleaning required**	– Air inlet or air outlet of the air-to-brine heat exchanger contaminated – Heat transfer from the air to the brine heat transfer medium is too low – Brine pipes inverted – Air in the environment circuit – Defective de-icer – Fan noise reduction mode activated	– The fan unit is de-iced more frequently than is required. The efficiency of the heat pump is reduced. Loosen and clean any dirt from the fan unit (air-to-brine heat exchanger) – Check that the connections are correctly assigned to the brine lines – Purge the environment circuit – Check de-icer (sensor/actuator test?) – Reduce noise reduction mode – Completely deactivate fan noise reduction mode
M.34	**Environment circuit: Pressure low**	– Pressure loss in the environment circuit due to leakages or air pockets – Environment circuit pressure sensor defective	– Check the environment circuit for leaks, top up with medium (brine-to-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.49 Only with the heat source: Air	**Environment circuit: Brine lines inverted**		– Check that the connections are correctly assigned to the brine lines

H Fault codes

Note
Since the code table is used for various products, some codes may not be visible for the product in question.

In the event of faults which are caused by components in the refrigerant circuit, inform customer service.

Code	Meaning	Cause	Remedy
F.070	**Fault: Invalid Device Specific Number**	– Replacing the control PCB and display PCB	– Setting the correct Device Specific Number
F.086	**Building circuit: Lockout co. S20 open**	– Contact S20 on heat pump main PCB (HMU) open – Incorrect setting of the limit thermostat – Flow temperature sensor (heat pump, gas-fired boiler, system sensor) measures values that deviate downwards	– Adjust the maximum flow temperature for the direct heating circuit via the system control (observe the upper switch-off threshold for the boilers) – Adjust the set value for the limit thermostat – Check the sensor values
F.514	**Sensor fault: Compr. inlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.517	**Sensor fault: Compr. outlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.519	**Sensor fault: Building circuit return temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness

Code	Meaning	Cause	Remedy
F.520	**Sensor fault: Building circuit flow temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
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) – Thermostatic valve(s) defective – No bypass valve available in systems without a buffer – Bypass valve incorrectly set or defective – Air in the heat pump – Pump has insufficient output or is defective – Condenser is dirty – Existing dirt filter clogged	– Check the stopcocks, thermostatic valves, bypass valve and dirt filter – Ensure that the flow rate is at least 35% of the nominal flow rate – Check that the building circuit pump functions correctly – Purging the building circuit
F.546	**Sensor fault: High pressure**	– Sensor not connected or sensor input has short-circuited	– Check the sensor (e.g. using an installation aid), and replace if necessary – Replace the cable harness
F.583	**Building circuit: Flow temp. too low**	– 4-port valve is mechanically blocked – Temperature sensor in the flow is defective – Air in the building circuit	– Check the building 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 (resistance measurement using sensor characteristic values) – Replace the sensor – Purging the building circuit
F.685	**Connection error: Contr. not recognised**	– System control was previously detected but the connection is broken	– Check the eBUS connection to the system control
F.701	**Sensor fault: Env. circuit inlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.702	**Sensor fault: Env. circuit outlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.703	**Sensor fault: Low pressure**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.704	**Sensor fault: Build. circ. pressure**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.705	**Sensor fault: Env. circuit pressure**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.707	**Connection error: Disp. not recognised**	– Cable not connected or connected incorrectly Control panel display defective	– Check the connection cable between the main PCB and the display – Replace the display

Code	Meaning	Cause	Remedy
F.710	**Env. circuit: Outlet temp. too low**	– Environment circuit pump defective – Temperature sensor for environment circuit outlet defective – Volume flow too low in the environment circuit – Air in the environment circuit – Device Specific Number (DSN) setting was not applied when replacing the control PCB (HMU) – Freeze protection setting was not applied when replacing the control PCB (HMU)	– Check the flow rate in the environment circuit – Check the quality of the plug contact on the PCB and on the cable harness – Check that the sensor is working correctly (resistance measurement using sensor characteristic values) – Replace the sensor – Check the volume flow of the environment circuit pump (optimum spread of 3 K) – Purge the environment circuit – Always check the Device Specific Number (DSN) setting – Check the set value for the freeze protection in accordance with the environment circuit type on the control panel
F.714	**Environment circuit: Pressure too low**	– Pressure loss in the environment circuit due to leakages or air pockets – Environment circuit pressure sensor defective	– Check the environment circuit for leaks – Top up the medium (brine-to-water), purge – Check the quality of the plug contact on the PCB and on the cable harness – Check that the pressure sensor is working correctly – Replace the pressure sensor
F.715	**Env. circuit: Fault contact: Pump open**	– The electronics system of the high-efficiency pump has detected a fault (e.g. dry running, blockage, dirt, overvoltage, undervoltage) and has switched off and locked the pump. – Air in the environment circuit – Brine fluid viscosity is too high	– 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 – Purge the environment circuit – Use a refractometer to check the mixture ratio of the brine fluid – Check the dirt filter/strainer for dirt – Check the air separator
F.718	**Fan unit 1: Fan blocked**	– There is no confirmation signal stating that the fan is rotating	– Check the air route and, if required, remove any blockages – Check and, if required, replace the F1 fuse on the PCB in the fan unit (OMU)

F.719	**Fan unit 1: Safety cut-out open**	– The safety cut-out on the de-icer is open due to insufficient volume flow and/or brine temperatures above 70 °C
		– When operating the de-icer outside of the permitted area of application
		  – De-icer operation when the brine circuit is not filled
		  – De-icer operation at brine temperatures above 120 °C trips the safety fuse of the safety cut-out and requires that the fuse be replaced
			– Check for circulation in the environment circuit pump
			– If required, open the stopcocks
			The safety cut-out is automatically reset as soon as the temperature at the fuse falls below 55 °C again.
			If the safety cut-out is still open at a de-icer temperature below 55 °C, temperatures above 120 °C were reached and the safety fuse tripped.
			– Check and, if required, replace the F1 fuse of the air/brine collector
			– Replace the safety cut-out

F.723	**Building circuit: Pressure too low**	– Pressure loss in the building circuit due to leakages or air pockets – Building circuit pressure sensor defective	– 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 is working correctly – Replace the pressure sensor

Code	Meaning	Cause	Remedy
F.724	**Sensor fault: Fan unit 1 fan inlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor in the fan unit, and replace if necessary – Replace the cable harness in the fan unit
F.725	**Sensor fault: Fan unit 1 brine flow temp.**		
F.731	**High-pressure switch open**	– Refrigerant pressure too high. The integrated high-pressure switch has tripped at 46 bar (g) or 47 bar (abs) – Insufficient energy output via the relevant capacitors	– Purging the building circuit – Too low a volume flow as a result of closing single room controls in an underfloor heating system – Check that the dirt filter that is in place is permeable – Refrigerant flow rate too low (e.g. electronic expansion valve defective, 4-port valve mechanically blocked, filter blocked). Inform customer service. – VWL SA (cooling mode): Check the fan unit for dirt
F.732	**Compressor outlet temperature too high**	The compressor outlet temperature is above 130 °C: – Application limits exceeded – EEV does not work or does not open correctly – Refrigerant volume too low	– Check the low-pressure sensor, compressor inlet sensor and outlet sensor – Check the EEV (does the EEV move to the limit stop? Use the sensor/actuator test) – Check the refrigerant volume (see Technical data) – Carry out a leak-tightness test

F.733	**Evaporation temperature too low**	– No flow rate in the environment circuit (heating mode)
		– Energy input too low in the environment circuit (heating mode) or building circuit (cooling mode)
			– Check the flow rate in the environment circuit
			– Check the dimensioning of the environment circuit (heating mode) for ground/brine and ground water/brine
			– If the building circuit contains thermostatic valves, check that they are suitable for cooling mode (cooling mode)
			– VWL_SA (heating mode)
			  – Check the fan unit for dirt
			  – Check the EEV (does the EEV move to the limit stop? Use the sensor/actuator test)
			– Check the low-pressure sensor and compressor inlet sensor

F.734	**Condensation temperature too low**	– Temperature in the building circuit (heating mode) or environment circuit (cooling mode) too low for compressor operation – Refrigerant volume too low	– 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 (see Technical data) – Leak-tightness test
F.735	**Evaporation temperature too high**	– 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	– 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

Code	Meaning	Cause	Remedy
F.737	**Condensation temperature too high**	– Temperature in the building circuit (heating mode) or environment circuit (cooling mode) too high for compressor operation – Refrigerant volume too high	– 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 (see Technical data)
F.740	**Environment circuit: Inlet temp. too low**	– Inlet temperature in the environment circuit too low for the compressor to start for heating: – Air/brine: Environment circuit inlet temperature < -28 °C – Ground/brine: Environment circuit inlet temperature < -7 °C – Ground water/brine: Ground water inlet temperature < 2 °C	– Check the dimensioning of the environment circuit – Check the sensors
F.741	**Building circuit: Return temp.too low**	– Return temperature in the building circuit too low for the compressor to start Heating: – Return temperature < 5 °C Cooling: – Return temperature < 10 °C	– Heating: Check that the 4-port valve functions correctly
F.742	**Environment circuit: Inlet temp. too high**	– Inlet temperature in the environment circuit too high for the compressor to start – Brine inlet temperature > 50 °C – Feed-in of external heat into the environment circuit	– Heating: Check that the 4-port valve functions correctly – Check the environment circuit – Check the sensors – Reduce or stop the external heat that is entering
F.743	**Building circuit: Return temp. too high**	– Return temperature in the building circuit too high for the compressor to start Heating: – Return temperature > 55 °C to 60 °C (depending on the brine inlet temperature) Cooling: – Return temperature > 35 °C	– Cooling: Check that the 4-port valve functions correctly – Check the sensors
F.783	**Connection error: Terminal block (TMB)**	Cable not connected or connected incorrectly	Check the connection cable between the power supply PCB and the control PCB
F.784	**Connection error: ICL**	Cable not connected or connected incorrectly	Check the connection cable between the power supply PCB and the in-rush current limiter PCB
F.787	**Environment circuit: Pressure mon. open**	– Pressure loss in the environment circuit due to leakages or air pockets – Environment circuit pressure switch defective – Cable not connected either between X110B and X110 or X110 and X110A for the power supply PCB. No 230 V voltage is present at X131. This is interpreted as an input contact being open. – Bridge at X131 (as supplied). Larger voltage fluctuations in the power supply can lead to a fault message. – T4 fuse defective	– Check the environment circuit for leaks – Top up the medium (brine-to-water), purge – Check the screwed contact on the PCB – Check that the pressure switch works correctly – Replace the pressure switch – Check that the wiring of X110B with X110 or X110A with X110 is correct – Eliminate any voltage fluctuations in the network, e.g. via the site power supply – Check the T4 fuse and replace if necessary

Code	Meaning	Cause	Remedy
F.788	**Building circuit: Pump fault**	– The electronics system of the high-efficiency pump has detected a fault (e.g. dry running, blockage, overvoltage, undervoltage) and has switched off and locked the pump.	– 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 building circuit
F.792	**Sensor fault: VI inlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.793	**Sensor fault: EEV-VI outlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.797	**Sensor fault: Cooling flow temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.798	**Sensor fault: Well inlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.799	**Sensor fault: Well outlet temp.**	– Sensor not connected or sensor input has short-circuited	– Check the sensor, and replace if necessary – Replace the cable harness
F.1100	**Immersion heater: Safety cut-out open**	The safety cut-out on the electric back-up heater is open due to: – Insufficient volume flow or air in the building circuit – The immersion heater is operated when the building circuit is not filled – Immersion heater operation at flow temperatures above 110 °C trips the safety fuse of the safety cut-out and requires that the fuse be replaced – Feed-in of external heat into the building circuit	– Check the circulation in the building circuit pump – If required, open the stopcocks. The safety cut-out is automatically reset as soon as the temperature at the fuse falls below 55 °C again. Also press reset. If the safety cut-out is still open at an electric back-up heater temperature below 55 °C, temperatures above 110 °C were reached and the safety fuse tripped. – Replace the safety cut-out – Reduce or stop the external heat that is entering
F.1117	**Compressor: Phase failure**	– In-rush current limiter defective or incorrectly connected – Defective fuse – Poorly tightened electrical connections – Mains voltage too low – Compressor/low tariff power supply not connected – Blocked by energy supply company for over three hours	– Check the fuse – Check the electrical connections – Measure voltage at the heat pump electrical connection – Reduce energy supply company anti-cycling time to under three hours
F.1118	**Compressor: Incorrect phase seq.**	– Incorrect order of phase connection to the grid feed-in – In-rush current limiter defective or incorrectly connected	– Change the phase order by switching over two phases at a time to the grid feed-in – Check the in-rush current limiter
F.1119	**Compressor: ICL fault**	– In-rush current limiter defective or incorrectly connected – Mains voltage too low	– Check all plug contacts – Checking the ICL compressor connection – Check the ICL control PCB connection – Replace the ICL
F.1120	**Immersion heater: Phase failure**	– The circuit breaker in the electronics box has been triggered. – Electric back-up heater defective – Poorly tightened electrical connections – Mains voltage too low – Blocked by energy supply company for over five hours	– Check the electric back-up heater and its power supply, and reset the circuit breaker – Check the electrical connections – Measure the voltage at the electrical connection for the electric back-up heater

I Characteristic values, external cylinder temperature sensor

Temperature (°C)	Resistance (ohms)
-10	14947
-5	11430
0	8818
5	6856
10	5373
15	4242
20	3373
25	2700
30	2176
35	1764
40	1439
45	1180
50	973.7
55	807.5
60	673.2
65	563.9
70	474.6
75	401.3
80	340.8
85	290.6
90	248.8
95	213.9
100	184.6
105	160.0

J Characteristic values, internal temperature sensors (refrigerant circuit)

Temperature (°C)	Resistance (ohms)
-40	327344
-35	237193
-30	173657
-25	128410
-20	95862
-15	72222
-10	54892
-5	42073
0	32510
5	25316
10	19862
15	15694
20	12486
25	10000
30	8060
35	6535
40	5330
45	4372
50	3605
55	2989
60	2490

Temperature (°C)	Resistance (ohms)
65	2084
70	1753
75	1481
80	1256
85	1070
90	916
95	786
100	678
105	586
110	509
115	443
120	387
125	339
130	298
135	263
140	232
145	206
150	183

K Characteristic values 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

Benchmark Commissioning & Warranty Validation Service Record

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

To instigate the warranty the heat pump needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the heat pump is serviced in line with the manufacturers' recommendations, at least annually. This must be carried out by a competent, certified operative. The service details should be recorded on the Benchmark Service and Interim Heat Pump Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.

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COLLECTIVE MARK
THE MARK OF QUALITY FOR THE INSTALLATION, COMMISSIONING AND SERVICING OF DOMESTIC HEATING AND HOT WATER SYSTEMS

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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 according to the manufacturers' instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

* All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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AIR TO WATER 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
Is the system adequately frost protected?	Yes	

OUTDOOR UNIT		
Are all external pipeworks insulated?	Yes	
Is the fan free from obstacles and operational?	Yes	
Has suitable consideration been made for waste water discharge?	Yes	

CENTRAL HEATING MODE				
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	Yes	
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

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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 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:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 02	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 03	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 04	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 05	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 06	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 07	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 08	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 09	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

SERVICE 10	Date:
Engineer name:	
Company name:	
Telephone No:	
Operative ID No:	
Comments:	
Signature	

Benchmark Commissioning & Warranty Validation Service Record

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

To instigate the warranty the heat pump needs to be registered with the manufacturer within one month of the installation. The warranty rests with the end-user (consumer), and they should be made aware it is ultimately their responsibility to register with the manufacturer, within the allotted time period.

It is essential that the heat pump is serviced in line with the manufacturers' recommendations, at least annually. This must be carried out by a competent, certified operative. The service details should be recorded on the Benchmark Service and Interim Heat Pump Work Record and left with the householder. Failure to comply with the manufacturers' servicing instructions and requirements will invalidate the warranty.

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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 according to the manufacturers' instructions and complete this Benchmark Commissioning Checklist will invalidate the warranty. This does not affect the customer's statutory rights.

* All installations in England and Wales must be notified to Local Authority Building Control (LABC) either directly or through a Competent Persons Scheme. A Building Regulations Compliance Certificate will then be issued to the customer.

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AIR TO WATER HEAT PUMP COMMISSIONING CHECKLIST

Address:			
Heat Pump make and model:			
Heat Pump serial number:			
Commissioned by (PRINT NAME):		Certified Operative Reg number (1):	
Company name:		Telephone number:	
Company email:		Company address:	
		Commissioning date:	
Heating and hot water system complies with the appropriate Building Regulations?		Yes	
DNO notification?		Yes	
Building Regulations Notification Number (if applicable) (2)			
MCS installer registration Number (if applicable)		MCS product certification number (if applicable)	
F-gas certification number (split heat pump only)			
G3 certification number (if applicable)			

Heat Pump Type (Tick)	Split	Monoblock	Peak heat loss of building kW	
Is Heat Pump Installed as part of a cascade?	Yes		Cascade Heat Pump Series	( ) of ( )
Heat Pump Refrigerant Type			Refrigerant weight (total)	kg

Electrical and Hydronic 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	
Hybrid system – synchronised control of boiler and heat pump fitted			Yes	
If Yes – boiler model switching point – (Quote Tariff or Temperature Level)				

Heating zone valves (including underfloor loops)	pre-existing		Fitted		Not required	
Hot water zone valves	pre-existing		Fitted		Not required	
Thermostatic radiator valves	pre-existing		Fitted		Not required	
Outdoor Sensor	pre-existing		Fitted		Not required	
Heat Pump Safety Interlock (3)	pre-existing		Fitted		Not required	
Automatic bypass to system	pre-existing		Fitted		Not required	

Buffer Vessel Fitted	Yes		No	If yes volume:	Litres
Plate Heat Exchanger fitted to give hydronic separation of the heat pump circuit to the heating circuit		Yes		No	
Expansion vessel for heating is sized, fitted & charged in accordance with manufacturer's instructions				Yes	
Legionella protection for stored hot water provided by timed temperature control?				Yes	

Water Treatment – SYSTEM AND HEAT PUMP (Tick the appropriate boxes/Measure and Record)						
System has been cleaned and treated in accordance with BS 7593:2019 and heat pump manufacturers' instructions?					Yes	
What system cleaner was used?	Brand:		Product:			
What heating system inhibitor was used?	Brand:		Product:			
What heat pump system anti-freeze/inhibitor was used? (monoblock only)	Brand:		Product:		% concentration	
System filter fitted in accordance with BS7593 : 2019?					Yes	

Heat Pump outdoor unit (Tick the appropriate boxes/Measure and Record)		
Is the heating system adequately frost protected and pipes insulated to prevent heat loss?	Yes	
Split only: The refrigerant circuit has been evacuated and 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 necessary heat pump defrost provision been put in place	Yes	
The heat pump fan free from obstacles and operational	Yes	
Condensate drain installed to manufacturer's instructions	Yes	

CENTRAL HEATING MODE (Tick the appropriate boxes/Measure and Record)					
The heating system has been filled and pressure tested				Yes	
Heating Flow Temperature		⁰C	Heating Return Temperature		⁰C
System correctly balance/rebalanced				Yes	

DOMESTIC HOT WATER MODE (Tick the appropriate boxes)								
Is the heat pump connected to a hot water cylinder?		Unvented		Vented		Thermal Store		Not connected
Hot water cylinder size		Litres	Stored hot water temperature					⁰C
Hot water has been checked at all outlets		Yes	Have Thermostatic Blending Valves been fitted?		Yes		Not required	

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ADDITIONAL SYSTEM INFORMATON (Tick the appropriate boxes/Measure and Record)													
Water flow rate setting of the heat pump at commissioning (l/min):													
Additional heat sources connected:		Gas Boiler		Oil Boiler		Electric Heater		Solar Thermal		Other:			
ALL INSTALLATIONS													
All electrical work complies with the appropriate Regulations											Yes		
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 and understood by 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 manufacturers' literature)													

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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 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.

*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have under-taken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

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Service provider

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*A System inhibitor efficacy test is required on every annual service in accordance with the manufacturers' instructions and BS 7593. It is only acceptable to not have undertaken this if the service engineers attendance visit was in between annual services to attend a non-water facing component.

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

SERVICE 01	Date:	
Engineer name:		
Company name:		
Telephone No:		
Operative ID No:		
System inhibitor concentration has been checked and appropriate action taken, in accordance with BS 7593 and heat pump manufacturers' instructions. *	Yes	N/a
Comments:		
Signature:		

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N Check conditions for determining the performance data in accordance with EN 14511

Application for the ground and ground water heat sources

N.1 Building circuit (heat distribution side in heating mode)

Setting the building circuit pump:

Menu → Installer level → Configuration → Conf. heat. build. pump

Adjust the value from Auto to 100%.

O Technical data

O.1 General

Dimensions

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Product dimensions, height, without adjustable feet	1,183 mm	1,183 mm	1,183 mm
Product dimensions, width	595 mm	595 mm	595 mm
Product dimensions, depth	600 mm	600 mm	600 mm
Weight, with packaging	161 kg	176 kg	188 kg
Weight, without packaging	151 kg	166 kg	178 kg
Weight, ready for operation	157 kg	173 kg	185 kg

Electrics

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Compressor/heating circuit/control circuit rated voltage	– 1~/N/PE 230 V 50 Hz – 2~/PE 230 V 50 Hz	– 1~/N/PE 230 V 50 Hz – 2~/PE 230 V 50 Hz	– 1~/N/PE 230 V 50 Hz – 2~/PE 230 V 50 Hz
Back-up heater rated voltage	– 1~/N/PE 230 V 50 Hz – 3~/PE 230 V 50 Hz	– 1~/N/PE 230 V 50 Hz – 3~/PE 230 V 50 Hz	– 1~/N/PE 230 V 50 Hz – 3~/PE 230 V 50 Hz
Power factor	cos φ = 0.75 – 0.9	cos φ = 0.75 – 0.9	cos φ = 0.75 – 0.9
Power factor for the auxiliary heater	cos φ = 1	cos φ = 1	cos φ = 1
Required network impedance Z_{max} with in-rush current limiter	≤ 0.472 Ω	≤ 0.472 Ω	≤ 0.472 Ω
Required network impedance Z_{max} for auxiliary heater	≤ 0.472 Ω	≤ 0.472 Ω	≤ 0.472 Ω
Fuse type, characteristic C, slow-blow, three-pole switching (disconnection of the three power supply cables in one switching operation)	Designing in accordance with the selected connection diagrams	Designing in accordance with the selected connection diagrams	Designing in accordance with the selected connection diagrams
Optional on-site residual-current circuit breaker	RCCB type A (type A pulse-current-sensitive residual-current circuit breakers) or RCCB type B (type B universal-current-sensitive residual-current circuit breakers)	RCCB type A (type A pulse-current-sensitive residual-current circuit breakers) or RCCB type B (type B universal-current-sensitive residual-current circuit breakers)	RCCB type A (type A pulse-current-sensitive residual-current circuit breakers) or RCCB type B (type B universal-current-sensitive residual-current circuit breakers)
In-rush current with in-rush current limiter	≤ 25 A	≤ 50 A	≤ 50 A
Measuring current L1 for compressor and electronics (connection diagram 1)	11.9 A	19.1 A	24.9 A
Measuring current L1 for the compressor and electronics plus maximum 1.3 A at X12 VR 40, maximum 0.9 A at X14 circulation pump and maximum 2.5 A at TB X141, X143, X144 and X145 (connection diagram 1)	16.6 A	23.8 A	29.6 A
Measuring current L1 & L2 for compressor and electronics (L1 = L2) (connection diagram 2)	11.9 A	19.1 A	24.9 A

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Measuring current L1 & L2 for the compressor and electronics plus maximum 1.3 A at X12 VR 40, maximum 0.9 A at X14 circulation pump and maximum 2.5 A at TB X141, X143, X144 and X145 (L1 = L2) (connection diagram 2)	16.6 A	23.8 A	29.6 A
Min. electrical power consumption of compressor	1.40 kW	2.10 kW	2.60 kW
Max. electrical power consumption of compressor	2.10 kW	3.10 kW	4.10 kW
Output levels for the auxiliary electric heater (connection diagram 1; connection diagram 2)	– 2.0 / 3.5 / 5.5 kW – 2.0 / 3.5 / 5.5 / 7.0 / 9.0 kW	– 2.0 / 3.5 / 5.5 kW – 2.0 / 3.5 / 5.5 / 7.0 / 9.0 kW	– 2.0 / 3.5 / 5.5 kW – 2.0 / 3.5 / 5.5 / 7.0 / 9.0 kW
IP rating EN 60529	IP 10B	IP 10B	IP 10B

Hydraulics

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heating flow/return connection	G 1 1/2 ″	G 1 1/2 ″	G 1 1/2 ″
Heat source flow/return connection	G 1 1/2 ″	G 1 1/2 ″	G 1 1/2 ″
Heating expansion vessel connection	G 3/4 ″	G 3/4 ″	G 3/4 ″

Heat source circuit/brine circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Brine content of the brine circuit in the heat pump	2.5 l	3.1 l	3.6 l
Brine circuit materials	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe
Min. brine fluid operating pressure	≥ 0.07 MPa (≥ 0.70 bar)	≥ 0.07 MPa (≥ 0.70 bar)	≥ 0.07 MPa (≥ 0.70 bar)
Max. brine fluid operating pressure	≤ 0.3 MPa (≤ 3.0 bar)	≤ 0.3 MPa (≤ 3.0 bar)	≤ 0.3 MPa (≤ 3.0 bar)
Max. electrical power consumption, brine circuit pump	76 W	76 W	130 W
Brine pump type	High-efficiency pump	High-efficiency pump	High-efficiency pump

Building circuit/heating circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heating circuit water contents in the heat pump	3.2 l	3.9 l	4.4 l
Heating circuit materials	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe	Cu, CuZn-Alloy, Stainless Steel, EPDM, Brass, Fe
Permissible heating water condition	Do not add frost or corrosion protection agents to heating water. Soften the heating water at water hardnesses from **3.0 mmol/l (16.8° dH)** in accordance with Directive VDI 2035 Sheet 1.	Do not add frost or corrosion protection agents to heating water. Soften the heating water at water hardnesses from **3.0 mmol/l (16.8° dH)** in accordance with Directive VDI 2035 Sheet 1.	Do not add frost or corrosion protection agents to heating water. Soften the heating water at water hardnesses from **3.0 mmol/l (16.8° dH)** in accordance with Directive VDI 2035 Sheet 1.
Min. heating circuit operating pressure	≥ 0.07 MPa (≥ 0.70 bar)	≥ 0.07 MPa (≥ 0.70 bar)	≥ 0.07 MPa (≥ 0.70 bar)
Max. heating circuit operating pressure	≤ 0.3 MPa (≤ 3.0 bar)	≤ 0.3 MPa (≤ 3.0 bar)	≤ 0.3 MPa (≤ 3.0 bar)
Min. heating mode flow temperature	25 °C	25 °C	25 °C
Max. heating mode target flow temperature with compressor	65 °C	65 °C	65 °C
Max. heating mode target flow temperature with auxiliary electric heater	75 °C	75 °C	75 °C
Min. cooling mode flow temperature	5 °C	5 °C	5 °C

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Max. electrical power consumption, heating circuit pump	63 W	63 W	63 W
Heating pump type	High-efficiency pump	High-efficiency pump	High-efficiency pump

Refrigeration circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Refrigerant type	R410A	R410A	R410A
Refrigerant content of the refrigeration circuit in the heat pump	1.50 kg	2.40 kg	2.50 kg
Global warming potential (GWP) in accordance with regulation (EU) no. 517/2014	2088	2088	2088
CO_2 equivalent	3.132 t	5.011 t	5.220 t
Global warming potential 100 (GWP_{100}) in accordance with regulation (EC) no. 842/2006	1975	1975	1975
Expansion valve design	Electronic	Electronic	Electronic
Permissible operating pressure (relative)	≤ 4.6 MPa (≤ 46.0 bar)	≤ 4.6 MPa (≤ 46.0 bar)	≤ 4.6 MPa (≤ 46.0 bar)
Compressor type	Scroll	Scroll	Scroll
Oil type	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)
Oil filling quantity	0.74 l	1.25 l	1.25 l

Installation site

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Installation site	Interior/dry	Interior/dry	Interior/dry
Installation room volume complying with EN 378	3.41 m³	5.45 m³	5.68 m³
Permissible environmental temperature at the installation site	7 to 25 °C	7 to 25 °C	7 to 25 °C
Permissible relative air humidity	40 to 75 %	40 to 75 %	40 to 75 %

O.2 Brine heat source

Heat source circuit/brine circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Min. source inlet temperature (hot brine) in heating mode	−10 °C	−10 °C	−10 °C
Max. source inlet temperature (hot brine) in heating mode	25 °C	25 °C	25 °C
Min. source inlet temperature (hot brine) in cooling mode	0 °C	0 °C	0 °C
Max. source inlet temperature (hot brine) in cooling mode	30 °C	30 °C	30 °C
Nominal flow ΔT 3 K for B0/W35	1,300 l/h	2,110 l/h	2,870 l/h
Min. volume flow during continuous operation at the application limits	1,190 l/h	1,990 l/h	2,570 l/h
Max. volume flow during continuous operation at the application limits	1,300 l/h	2,110 l/h	2,870 l/h
Max. remaining feed head with ΔT 3 K for B0/W35	0.063 MPa (0.630 bar)	0.041 MPa (0.410 bar)	0.055 MPa (0.550 bar)
Brine circuit pump electrical power consumption for B0/W35 ΔT 3 K with an external pressure loss of 250 mbar in the brine circuit	49 W	78 W	80 W
Brine fluid type	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.

Building circuit/heating circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Nominal flow at ΔT 5 K	930 l/h	1,450 l/h	1,930 l/h
Max. remaining feed head with ΔT 5 K	0.065 MPa (0.650 bar)	0.044 MPa (0.440 bar)	0.03 MPa (0.30 bar)
Nominal flow with ΔT 8 K	600 l/h	930 l/h	1,290 l/h
Max. remaining feed head with ΔT 8 K	0.068 MPa (0.680 bar)	0.065 MPa (0.650 bar)	0.054 MPa (0.540 bar)
Max. volume flow during continuous operation at the application limits	930 l/h	1,450 l/h	1,930 l/h
Heating pump electrical power consumption for B0/W35 ΔT 3 K with an external pressure loss of 250 mbar in the heating circuit	24 W	37 W	49 W

Performance data

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

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heat output B0/W35 ΔT 5 K	5.35 kW	8.19 kW	11.45 kW
Effective power consumption for B0/W35 ΔT 5 K	1.27 kW	2.01 kW	2.60 kW
Coefficient of performance B0/W35 ΔT 5 K/EN 14511	4.23	4.07	4.40
Heat output B0/W45 ΔT 5 K	5.31 kW	8.20 kW	11.32 kW
Effective power consumption B0/W45 ΔT 5 K	1.58 kW	2.51 kW	3.28 kW
Coefficient of performance B0/W45 ΔT 5 K/EN 14511	3.35	3.27	3.45
Heat output B0/W55 ΔT 8 K	5.37 kW	8.64 kW	11.67 kW
Effective power consumption for B0/W55 ΔT 8 K	1.90 kW	2.95 kW	3.87 kW
Coefficient of performance B0/W55 ΔT 8 K/EN 14511	2.83	2.93	3.01
Heat output B10/W35 ΔT 5 K	6.13 kW	9.89 kW	13.98 kW
Effective power consumption for B10/W35 ΔT 5 K	1.25 kW	2.04 kW	2.50 kW
Coefficient of performance B10/W35 ΔT 5 K / coefficient of performance EN 14511	4.90	4.85	5.62
Heat output B10/W45 ΔT 5 K	6.30 kW	10.16 kW	14.12 kW
Effective power consumption B10/W45 ΔT 5 K	1.60 kW	2.51 kW	3.22 kW
Coefficient of performance B10/W45 ΔT 5 K / coefficient of performance EN 14511	3.94	4.04	4.40
Heat output B10/W55 ΔT 8 K	6.39 kW	10.61 kW	14.40 kW
Effective power consumption for B10/W55 ΔT 8 K	1.93 kW	2.95 kW	3.86 kW
Coefficient of performance B10/W55 ΔT8 K / coefficient of performance EN 14511	3.31	3.59	3.73
Sound power level B0/W35 EN 12102/EN 14511 L_{WI} in heating mode	43.8 dB(A)	45.6 dB(A)	48.5 dB(A)
Sound power level B0/W45 EN 12102/EN 14511 L_{WI} in heating mode	43.1 dB(A)	48.6 dB(A)	52.7 dB(A)
Sound power level B0/W55 EN 12102/EN 14511 L_{WI} in heating mode	44.9 dB(A)	53.5 dB(A)	51.3 dB(A)

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). 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 (Brine heat source):
  – B15/W65
  – B25/W59
  – B25/W25
  – B−10/W25
  – B−10/W60
  – B−5/W65

O.3 Ground water heat source

Heat source circuit/brine circuit and ground water circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI
Min. source inlet temperature (hot water) in heating mode	10 °C	10 °C	10 °C
Max. source inlet temperature (hot water) in heating mode	25 °C	25 °C	25 °C
Nominal flow of groundwater at ΔT 3 K with W10W35	1,300 l/h	2,160 l/h	3,100 l/h
Brine fluid type	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.

Building circuit/heating circuit

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI
Nominal flow at ΔT 5 K	1,025 l/h	1,730 l/h	2,270 l/h
Max. remaining feed head with ΔT 5 K	0.08 MPa (0.80 bar)	0.2193 MPa (2.1930 bar)	0.4224 MPa (4.2240 bar)
Nominal flow with ΔT 8 K	710 l/h	1,120 l/h	1,510 l/h
Max. remaining feed head with ΔT 8 K	0.062 MPa (0.620 bar)	0.2103 MPa (2.1030 bar)	0.4045 MPa (4.0450 bar)
Min. volume flow during continuous operation at the application limits	710 l/h	1,120 l/h	1,510 l/h
Max. volume flow during continuous operation at the application limits	1,025 l/h	1,730 l/h	2,270 l/h
Heating pump electrical power consumption for W10/W35 ΔT 5 K with an external pressure loss of 250 mbar in the heating circuit	24 W	37 W	49 W

Performance data

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

Check conditions for determining the performance data in accordance with EN 14511

Installation: Connection pipes on the heat source side between VWF xx/4 and VWW xx/4 SI = 2 x 2 m (pipe internal diameter = 32 mm), environment circuit pump setting: Heating mode: Factory setting (auto), Cooling mode: Factory setting (auto)

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI
Heat output W10/W35 ΔT 5 K	5.72 kW	9.81 kW	13.04 kW
Effective power consumption for W10/W35 ΔT 5 K	1.26 kW	2.03 kW	2.73 kW
Coefficient of performance W10/W35 ΔT 5 K/EN 14511	4.54	4.83	4.78
Heat output W10/W45 ΔT 5 K	6.43 kW	9.81 kW	13.36 kW
Effective power consumption for W10/W45 ΔT 5 K	1.62 kW	2.57 kW	3.41 kW
Coefficient of performance W10/W45 ΔT 5 K/EN 14511	3.97	3.82	3.92
Heat output W10/W55 ΔT 8 K	6.48 kW	10.24 kW	13.77 kW

	VWF 57/4 230 V	VWF 87/4 230 V	VWF 117/4 230 V
Effective power consumption for W10/W55 ΔT 8 K	1.97 kW	3.07 kW	4.07 kW
Coefficient of performance W10/W55 ΔT 8 K/EN 14511	3.29	3.33	3.38
Sound power level W10/W35 EN 12102/EN 14511 L_{WI} in heating mode	43.3 dB(A)	46.9 dB(A)	50.0 dB(A)
Sound power level W10/W45 EN 12102/EN 14511 L_{WI} in heating mode	45.4 dB(A)	49.4 dB(A)	50.7 dB(A)
Sound power level W10/W55 EN 12102/EN 14511 L_{WI} in heating mode	45.7 dB(A)	52.6 dB(A)	52.6 dB(A)

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

- 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 (Ground water heat source):
  - W15/W65
  - W25/W59
  - W25/W25
  - W10/W25
  - W10/W65

P Rated currents = I_n [A]

I_n												
VWF xxx/4 230 V				1~/N/PE 230 V	1~/N/PE 230 V	3~/PE 230 V			2~/PE 230 V			
				X101					X101			
				5	1	5	6	7	1	3		
				L1	L1	L1	L2	L3	L1	L2		
				A	A	A	A	A	A	A		
VWF 5X/4 230 V			0,0 kW	0,0	11,9	0,0	0,0	0,0	11,9	11,9		
			2,0 kW	8,7	11,9	8,7	8,7	0,0	11,9	11,9		
			3,5 kW	15,2	11,9	15,2	0,0	15,2	11,9	11,9		
			5,5 kW	**23,9**	11,9	20,9	8,7	15,2	11,9	11,9		
			7,0 kW	--	--	15,2	15,2	26,3	11,9	11,9		
			9,0 kW	--	--	20,9	20,9	26,3	11,9	11,9		
		X12 (max. 1,3), X14 (max. 0,9), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	0,0	16,6	0,0	0,0	0,0	16,6	16,6		
			2,0 kW	8,7	16,6	8,7	8,7	0,0	16,6	16,6		
			3,5 kW	15,2	16,6	15,2	0,0	15,2	16,6	16,6		
			5,5 kW	**23,9**	16,6	20,9	8,7	15,2	16,6	16,6		
			7,0 kW	--	--	15,2	15,2	26,3	16,6	16,6		
			9,0 kW	--	--	20,9	20,9	26,3	16,6	16,6		
VWF 8X/4 230 V			0,0 kW	0,0	19,1	0,0	0,0	0,0	19,1	19,1		
			2,0 kW	8,7	19,1	8,7	8,7	0,0	19,1	19,1		
			3,5 kW	15,2	19,1	15,2	0,0	15,2	19,1	19,1		
			5,5 kW	23,9	19,1	20,9	8,7	15,2	19,1	19,1		
			7,0 kW	--	--	15,2	15,2	26,3	19,1	19,1		
			9,0 kW	--	--	20,9	20,9	26,3	19,1	19,1		
		X12 (max. 1,3), X14 (max. 0,9), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	0,0	23,8	0,0	0,0	0,0	23,8	23,8		
			2,0 kW	8,7	23,8	8,7	8,7	0,0	23,8	23,8		
			3,5 kW	15,2	23,8	15,2	0,0	15,2	23,8	23,8		
			5,5 kW	23,9	23,8	20,9	8,7	15,2	23,8	23,8		
			7,0 kW	--	--	15,2	15,2	26,3	23,8	23,8		
			9,0 kW	--	--	20,9	20,9	26,3	23,8	23,8		
VWF 11X/4 230 V			0,0 kW	0,0	24,9	0,0	0,0	0,0	24,9	24,9		
			2,0 kW	8,7	24,9	8,7	8,7	0,0	24,9	24,9		
			3,5 kW	15,2	24,9	15,2	0,0	15,2	24,9	24,9		
			5,5 kW	23,9	24,9	20,9	8,7	15,2	24,9	24,9		
			7,0 kW	--	--	15,2	15,2	26,3	24,9	24,9		
			9,0 kW	--	--	20,9	20,9	26,3	24,9	24,9		
		X12 (max. 1,3), X14 (max. 0,9), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	0,0	29,6	0,0	0,0	0,0	29,6	29,6		
			2,0 kW	8,7	29,6	8,7	8,7	0,0	29,6	29,6		
			3,5 kW	15,2	29,6	15,2	0,0	15,2	29,6	29,6		
			5,5 kW	23,9	29,6	20,9	8,7	15,2	29,6	29,6		
			7,0 kW	--	--	15,2	15,2	26,3	29,6	29,6		
			9,0 kW	--	--	20,9	20,9	26,3	29,6	29,6		

	Com-pressor		Pumps and electronics control sys-tem		Back-up heater		Power source		Electric Wiring Diagram

Example

The rated current for the VWF 5X/4 heat pump with a nominal heat output of 5 kW is **23.9 A** if connected in accordance with wiring diagram 1 in compressor mode with the electric back-up heater activated and an output of 5.5 kW enabled on L1; with all possible accessories connected to connections X12 to X145, it is **23.9 A**.

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