

Installation and maintenance instructions



flexoTHERM exclusive

VWF 57/4

VWF 87/4

VWF 117/4

VWF 157/4

VWF 197/4

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1 Safety

1 Safety

1.1 Action-related warnings

Classification of action-related warnings

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

Warning symbols and signal words



Danger!

Imminent danger to life or risk of severe personal injury



Danger!

Risk of death from electric shock



Warning.

Risk of minor personal injury



Caution.

Risk of material or environmental damage

1.2 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. Operation of 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 servicing instructions for the product and any other system components
- installing and fitting the product in accordance with the product and system approval
- compliance with all inspection and maintenance conditions listed in the instructions.

Intended use also covers installation in accordance with the IP 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.

1.3 General safety information

1.3.1 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
- ▶ Observe all instructions that are included with the product.
- ▶ Proceed in accordance with current technology.
- ▶ Observe all applicable directives, standards, laws and other regulations.

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

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

1.3.3 Risk of death due to lack of safety devices

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

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

1.3.4 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 with a contact gap of at least 3 mm, e.g. fuse or circuit breaker).
- ▶ Secure against being switched back on again.
- ▶ Wait for at least 3 minutes until the capacitors have discharged.
- ▶ Check that there is no voltage.

1.3.5 Risk of injury due to chemical burns caused by brine fluid

The brine fluid ethylene glycol is harmful to health.

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

1.3.6 Risk of burns due to hot and cold components

There is a risk of burns from any uninsulated pipelines and from the auxiliary electric heating.

- ▶ Only carry out work on the components once they have reached ambient temperature.

1.3.7 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.

1.3.8 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.

1.3.9 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 steam or gases that escape from the refrigerant circuit as a result of leaks.
- ▶ Avoid skin or eye contact with the refrigerant.
- ▶ In the event of skin or eye contact with the refrigerant, seek medical advice.

1.3.10 Risk of material damage caused by using an unsuitable tool

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

1.3.11 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.

1.3.12 Risk of material damage caused by frost

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





1 Safety

1.3.13 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.

1.4 Regulations (directives, laws, standards)

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



2 Notes on the documentation

2.1 Observing other applicable documents

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

2.2 Storing documents

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

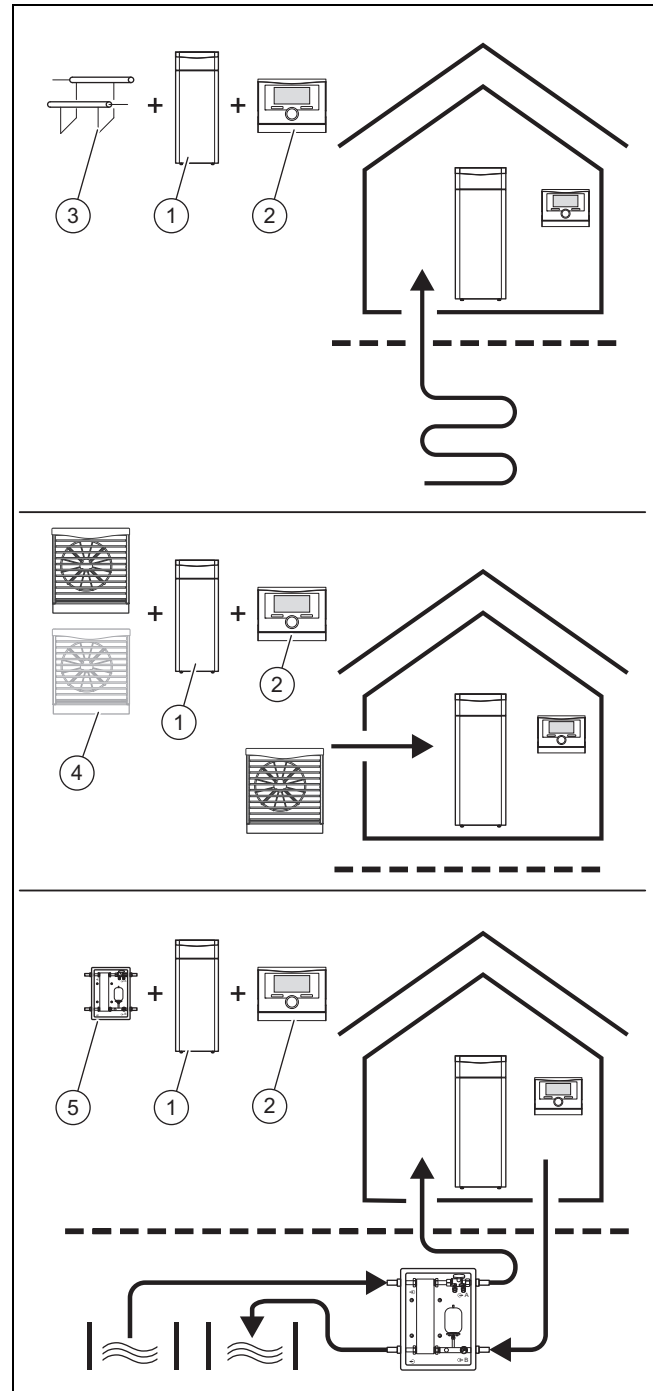
2.3 Validity of the instructions

These instructions apply only to:

Product
VWF 57/4
VWF 87/4
VWF 117/4
VWF 157/4
VWF 197/4

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 air heat source: Air/brine collector(s) **(4)**
- With well water heat source: Ground water module **(5)**

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. At the same time, there is an opportunity for active cooling to

3 System overview

take place via circulation reversal. The heat pump can be connected to three different types of heat source. This includes the outdoor air, geothermal energy and ground water, whereby the heat source is connected to the heat pump via a transfer station.

3.1.1 Heat pump

- Fulfills the heating demand of the system controller down to a minimum outside temperature and up to a maximum target flow temperature.
- Fulfills the cooling requirements of the system controller up to a maximum source temperature.
- 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 Air/brine collector

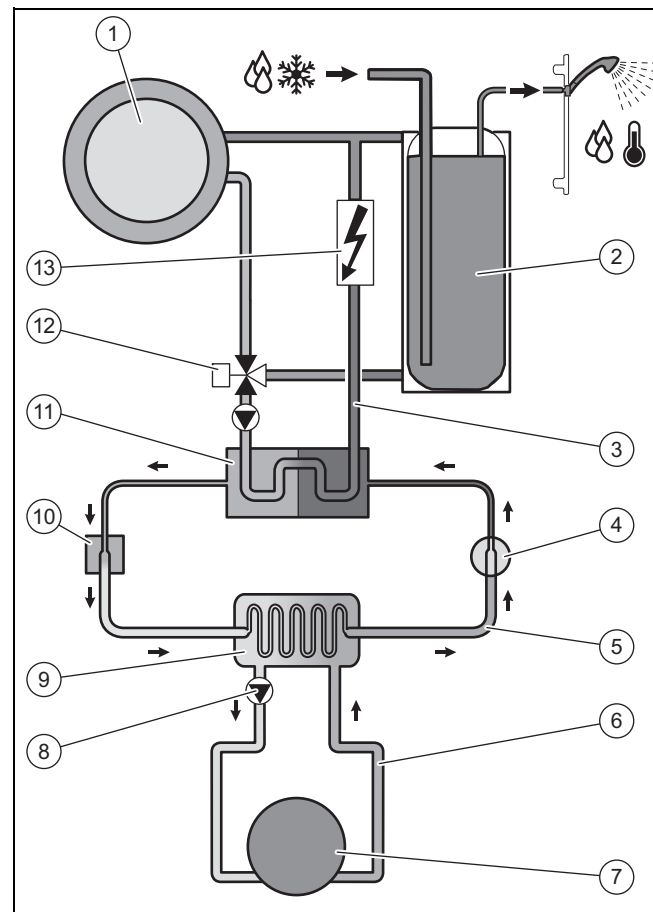
Heat transfer from the air to the brine heat transfer medium in the heat pump.

3.1.4 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	8	Brine pump
2	Domestic hot water cylinder (optional)	9	Evaporator
3	Heating circuit	10	Electronic expansion valve
4	Compressor	11	Condenser
5	Refrigerant circuit	12	Heating/cylinder charging diverter valve
6	Brine circuit	13	Electric back-up heater
7	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 thermal energy from the ground, the outdoor air or the ground water, and transfers this to the refrigerant circuit
- The refrigerant circuit, which is used to bring the thermal 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 thermal 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 thermal energy again. In so doing, the refrigerant becomes liquid again; it condenses.

As thermal 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 thermal 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 thermal 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 thermal 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 product is equipped with an active cooling function that you can use to maintain the temperature of your living rooms when the outdoor temperature is high during summer. Air is a particularly good heat source for this use, generally along with ground and ground water. For this purpose, a 4-port diverter valve is integrated into the heat pump's refrigerant circuit. In active cooling, the refrigerant circuit is used to extract thermal energy from the heat source installation (e.g. the underfloor heating) in order to release it into the outdoor air. For this, the 4-port diverter valve is used to hydraulically swap the heat exchange processes in the evaporator and condenser in the refrigerant circuit.

The heating water, which, when supplied, is colder in the flow than the room temperature, absorbs thermal energy from the rooms and is pumped by the heating pump to the condenser (which works as an evaporator when in cooling mode). This thermal energy is absorbed by the refrigerant and heated to a higher temperature level using the compressor. The thermal 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 thermal energy to be absorbed from the condenser again. The brine pump feeds the warm brine to the air/brine collector. The thermal energy is dissipated to the outdoor air.

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 thermal 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 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 mounted in the open air, 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 energy consumption and energy yield

In the display and in the app that can also be used, the system control displays values for the energy consumption and/or the energy yield. The system control displays an estimation of the values for the installation. Among other things, the values are influenced by the following:

- The installation/design of the heating installation
- User behaviour
- Seasonal environmental conditions
- Tolerances and components

External components, such as external heating pumps or valves, and other consumers and appliances in the household are still not taken into consideration.

The deviations between the energy consumption or energy yield that is displayed and the actual energy consumption or energy yield may be significant.

The specifications for the energy consumption or energy yield are not suitable to be used to create or compare energy billing.

3.3 Safety devices

3.3.1 Frost protection function

The frost protection function for the system is controlled via the system controller. If the system controller 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 pos-

4 Product description

sible 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

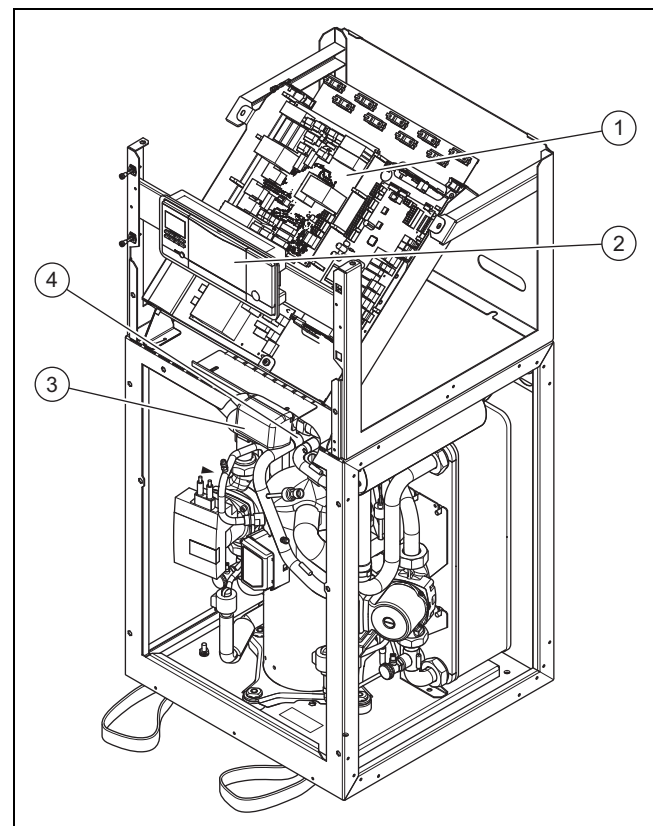
If the temperature in the heating circuit of the internal electric back-up heater exceeds the maximum temperature, the safety cut-out shuts down the electric back-up heater as a securing measure. Following a waiting period, another attempt is made to start the electric back-up heater. A fault message 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

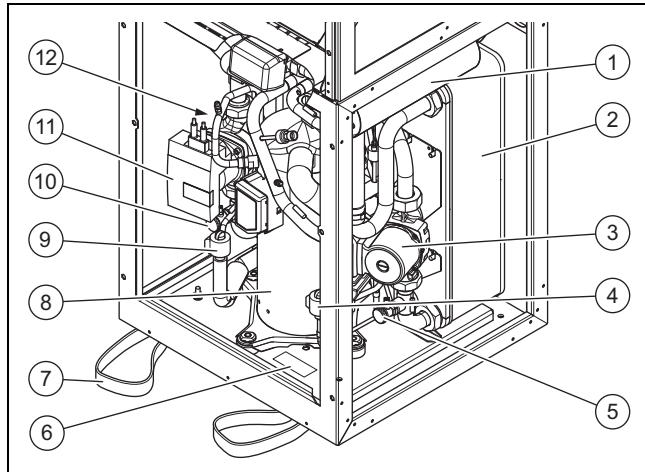
4 Product description

4.1 Product design

4.1.1 Front view, open

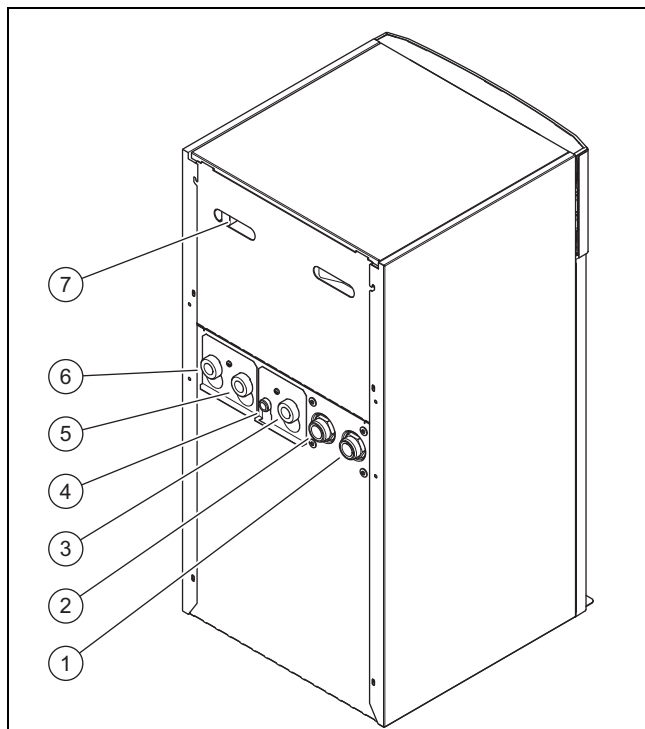


- | | | | |
|---|-----------------|---|--|
| 1 | Electronics box | 3 | Heating/cylinder charging diverter valve |
| 2 | Control panel | 4 | 4-port valve |



- | | | | |
|---|---|----|-------------------------------------|
| 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

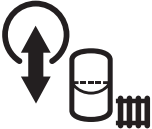
The main data plate is attached behind the front casing on the front cover of the refrigerant circuit.

Information on the data plate	Meaning
	Rated voltage of the compressor
	Rated voltage of the pumps and control
	Back-up heater rated voltage
P max	Maximum rated power
P max	Max. rated power of the compressor, pumps and control
P max	Max. rated power of the back-up heater
I max +	Maximum in-rush current
	Refrigerant type, fill quantity, permissible rated overpressure
COP B0/W35 /W45 /W55	Coefficient of Performance at a brine temperature of X °C and a heating flow temperature of X °C
B0/W35 /W45 /W55	Heating output at a brine temperature of X °C and a heating flow temperature of XX °C
COP A2/W35, A7/W35, A7/W45, A7/W55	Coefficient of Performance at an air temperature of X °C and a heating flow temperature of XX °C
EER A35/W1835	Energy Efficiency Ratio at an air temperature of XX °C and a heating flow temperature of XX °C
A2/W35, A7/W35, A7/W45, A7/W55	Heat output at an air temperature of X °C and a heating flow temperature of XX °C
A35/W18	Cooling output at an air temperature of X °C and a heating flow temperature of XX °C
COP W10/W35 /W45 /W55	Coefficient of Performance at a ground-water temperature of X °C and a heating flow temperature of XX °C
W10/W35 /W45 /W55	Heat output at a ground-water temperature of X °C and a heating flow temperature of XX °C
V	Mains voltage
Hz	Mains frequency
W	Power consumption
IP	Protection class
	Barcode with serial number, 7th to 16th digits = product article number

5 Set-up

Information on the data plate	Meaning
	Read the instructions
	Tested for safety by the Verband deutscher Elektrotechniker (German Association for Electrical, Electronic & Information Technologies)
	Electromagnetic Compatibility in accordance with the Verband deutscher Elektrotechniker

4.3 Explanation of product stickers

Symbol on the sticker	Meaning
	Heating flow connection
	Heating return connection
	Heating diaphragm expansion tank connection
	Connection from the heat source to the heat pump (hot brine)
	Connection from the heat pump to the heat source (cold brine)
	Brine heat source
	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 identification plate. The 7th to 16th digits of the serial number form the article number.

4.5 CE label



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

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

5 Set-up

5.1 Checking the scope of delivery

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

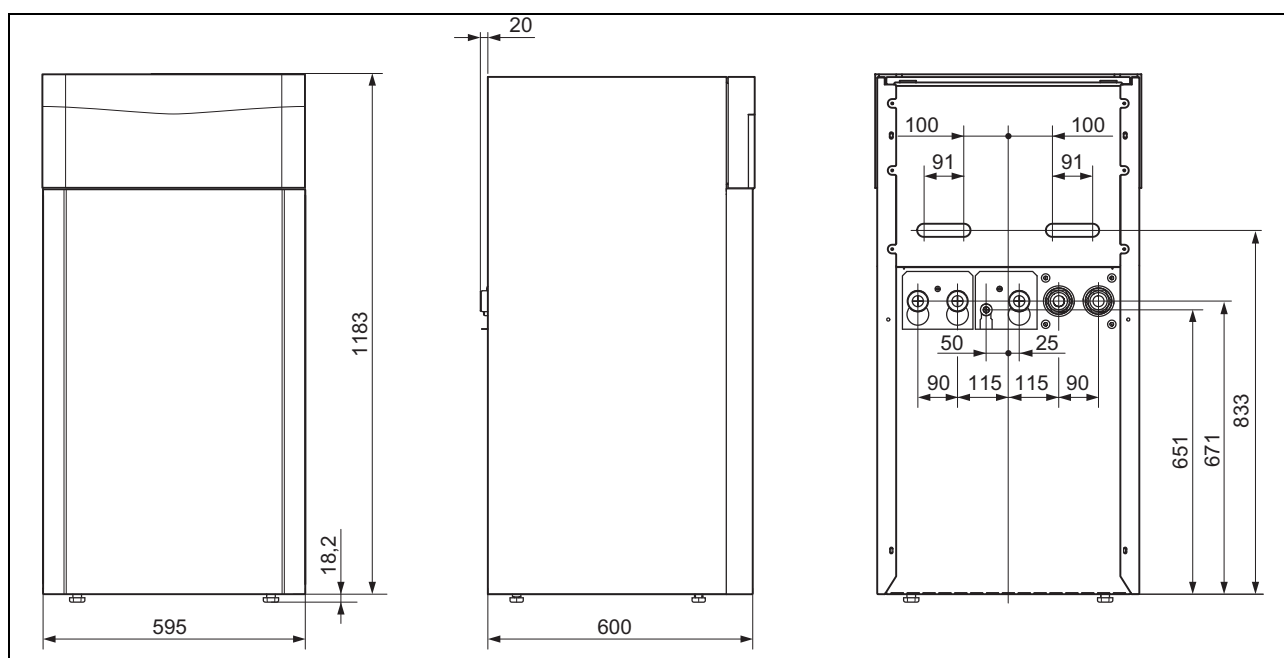
5.2 Selecting the installation site

- Select a dry room that is frost-proof throughout and in which the maximum installation height is not exceeded and the environmental temperature is neither above nor below the permitted range.
 - Permissible ambient temperature: 7 ... 25 °C
 - Permissible relative air humidity: 40 ... 75 %
- Ensure that the installation room has the required minimum volume.

Heat pump	R 410 A refrigerant filling volume	Minimum installation room volume
VWF 57/4	1.50 kg	3.41 m³
VWF 87/4	2.40 kg	5.45 m³
VWF 117/4	2.50 kg	5.68 m³
VWF 157/4	3.05 kg	6.93 m³
VWF 197/4	3.95 kg	8.98 m³

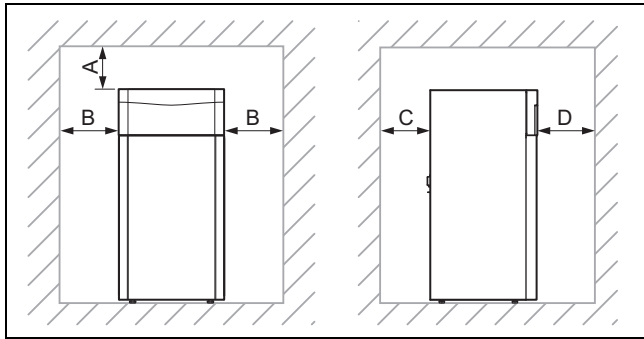
- Ensure that the required minimum clearances can be maintained.
- When selecting the installation site, you must take into consideration that when the heat pump is in operation, it will transfer vibrations to the floor and any nearby walls.
- Ensure that the floor is level and has sufficient load-bearing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

5.3 Dimensions



5 Set-up

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 malfunctions in the coolant circuit during subsequent operation. In the worst case scenario, this may lead to a fault in the whole system.

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

- 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. (→ Page 15)



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.



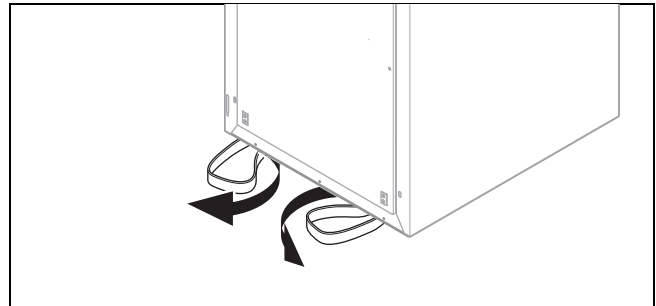
Danger!

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

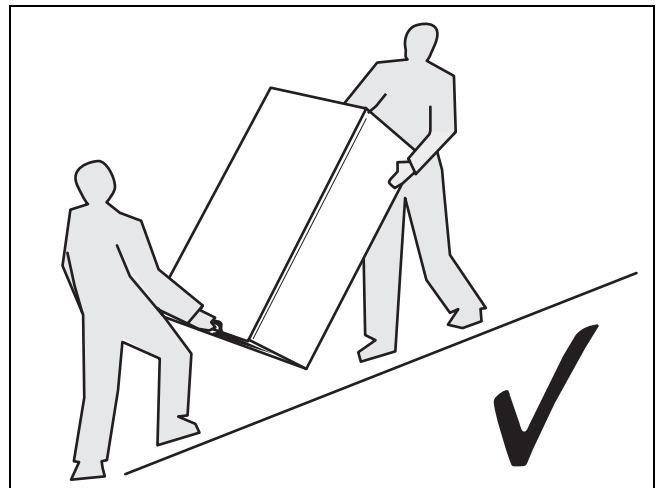
The carrying straps may break away during transport if the front casing is fitted.

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

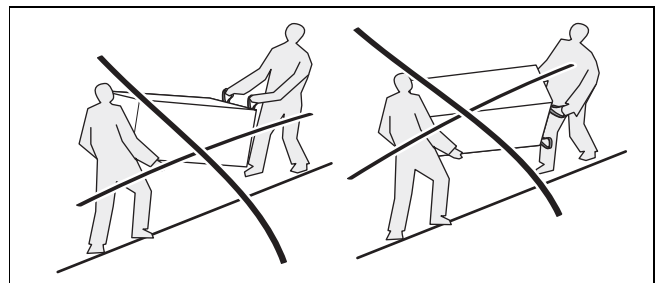
2. To transport the unit safely, use the two carrying straps on the two front feet of the product.



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.

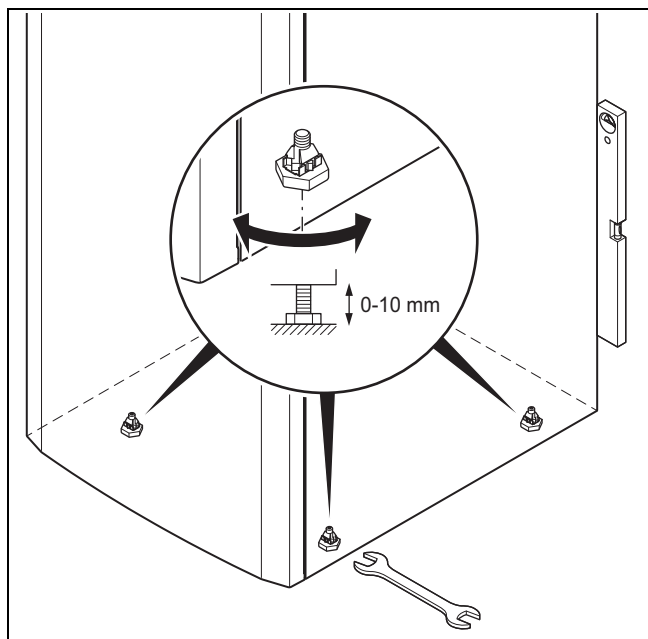


5. Always transport the product as illustrated above.



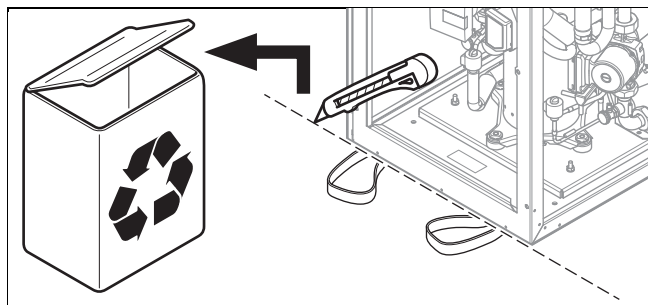
6. Never transport the product as illustrated above.

5.6 Installing the product



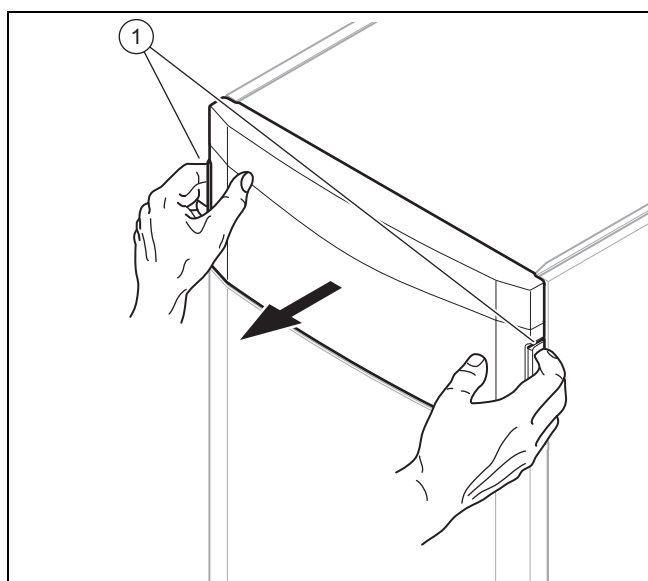
- Orientate the product horizontally by adjusting the adjustable feet.

5.7 Removing the carrying straps

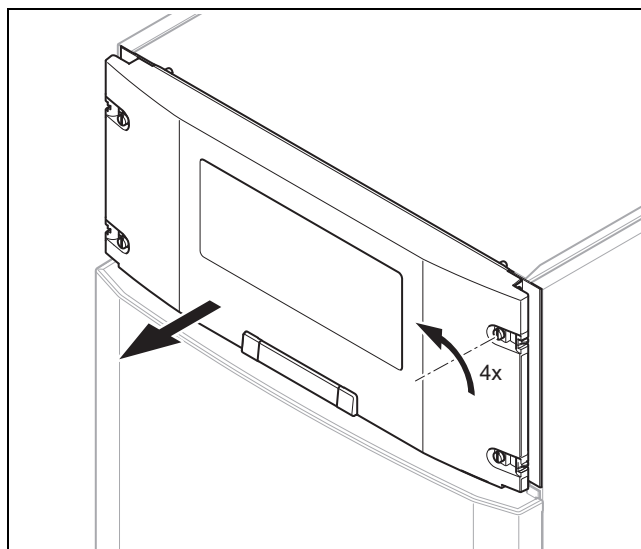


- Cut off the carrying straps and throw them away.

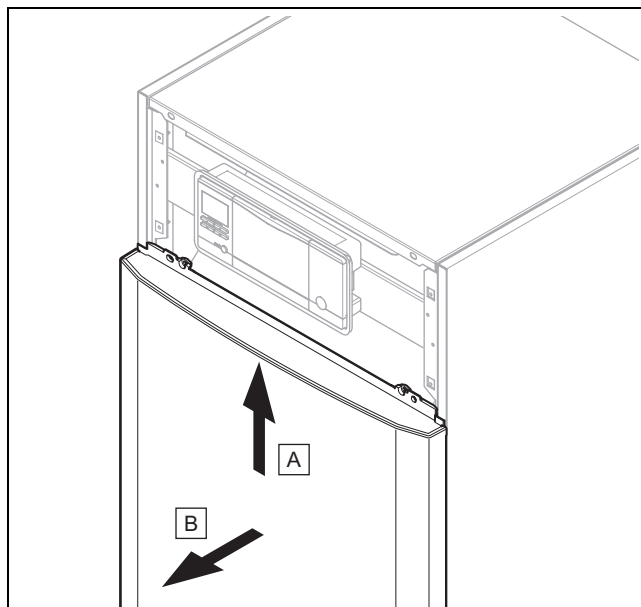
5.8 Removing the front casing



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

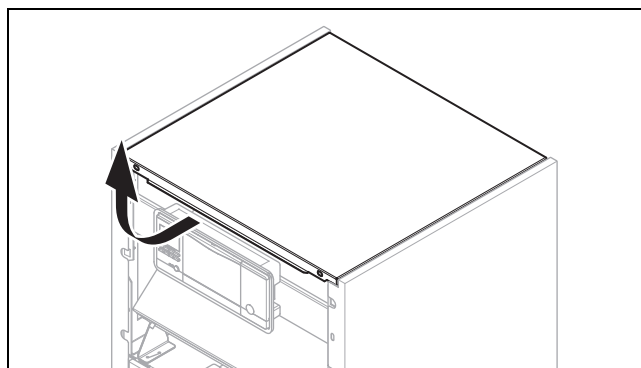


2. Turn the four screws by a quarter turn and lift off the cover on the operator control panel towards you.



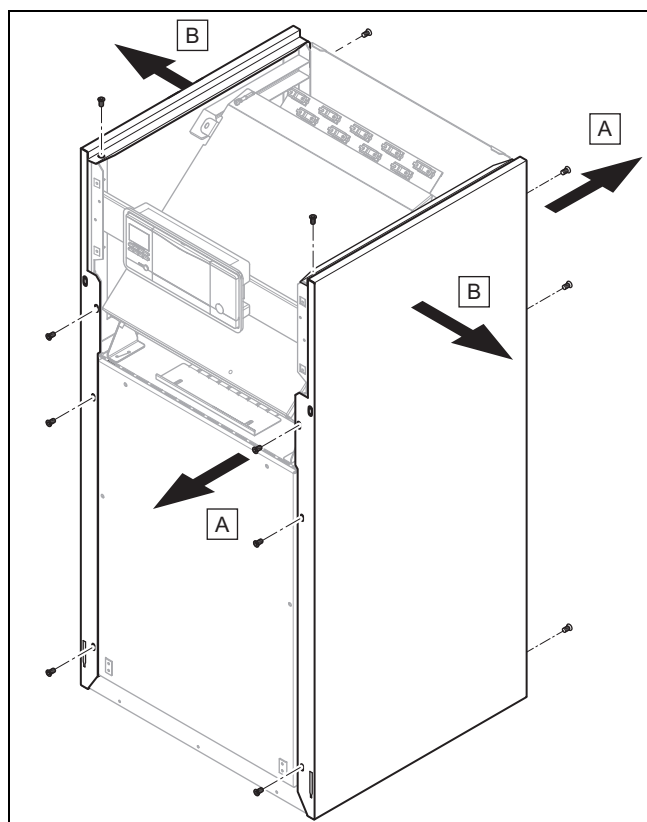
3. Pull each part of the front casing forwards slightly and remove it by lifting it upwards.

5.9 Removing the casing top and side casings



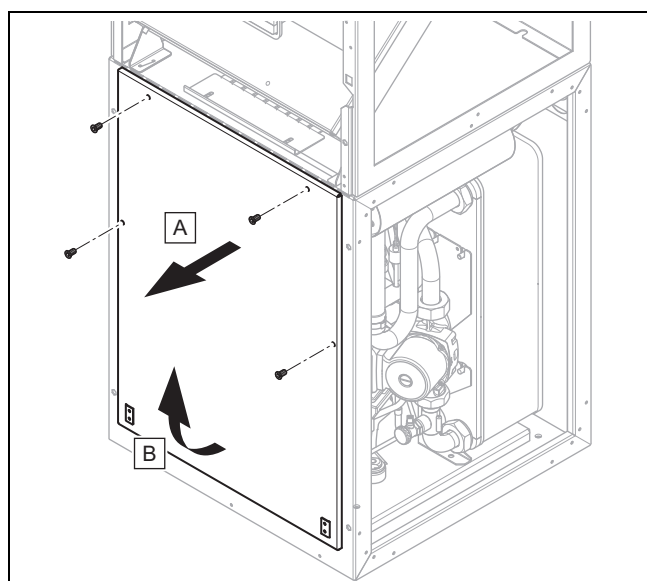
1. Pull the casing top forwards slightly and remove it by lifting it upwards.

6 Carrying out the hydraulics installation



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 system diagram book.

1. If you want to carry out active cooling using ground as the heat source, make sure that the borehole/ground collector is suitable for this purpose and observe the national directives and laws. The use of near-surface ground collectors for active cooling is prohibited.
2. Flush the heating installation thoroughly before connecting the heat pump in order to remove any residue which could be deposited in the heat pump and lead to damage.
3. Install the connection cables free from mechanical stress in accordance with the dimension and connection drawings.
 - Position the pipe brackets for securing the heating circuit and solar circuit piping so that they are not too close to the heat pump in order to prevent noise transmission.
 - If required, instead of pipe brackets, 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 corrugated pipes.
 - 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.

4. 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.

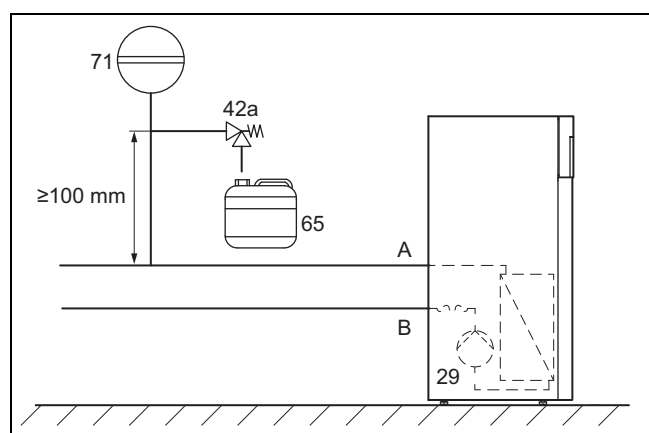
Risk of damage from magnetite deposition.

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 container		
71	Brine diaphragm expansion tank		

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. the flow and return lines of the brine circuit 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 circuit distributors directly to the heat pump.
3. Connect a limit thermostat to ensure that the heat pump's underfloor protection works correctly. (→ Page 23)
4. Ensure that a minimum circulation water volume is guaranteed.
 - Minimum volume of circulating water: 35% of the nominal flow

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

1. Install the heating circuits for direct operation. (→ Page 17)
2. Secure the temperature sensor (VR10), 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 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-protection measures, or fit a magnetic filter.
- Check the pH value of the removed water at 25 °C.
- If the value is below 8.2 or above 10.0, clean the installation and treat the heating water.
- Ensure that oxygen cannot get into the heating water.

Checking the filling and supplementary water

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

Treating the filling and supplementary water

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

Applicability: Germany

- In particular, observe VDI directive 2035, sheets 1 and 2.

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

You must treat the heating water in the following cases:

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

Applicability: Austria

OR Germany

OR Switzerland

Total heating output	Water hardness at specific system volume ¹⁾					
	≤ 20 l/kW		> 20 l/kW ≤ 50 l/kW		> 50 l/kW	
kW	°dH	mol/m³	°dH	mol/m³	°dH	mol/m³
< 50	< 16.8	< 3	11.2	2	0.11	0.02
> 50 to ≤ 200	11.2	2	8.4	1.5	0.11	0.02
> 200 to ≤ 600	8.4	1.5	0.11	0.02	0.11	0.02
> 600	0.11	0.02	0.11	0.02	0.11	0.02

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

Applicability: Austria

OR Germany

OR Switzerland



Caution.

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

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

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

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

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

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

Additives for cleaning measures (subsequent flushing required)

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

Additives intended to remain permanently in the installation

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

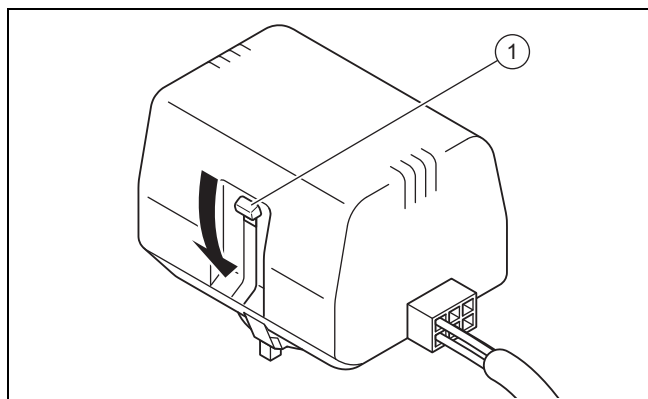
Additives for frost protection intended to remain permanently in the installation

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

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

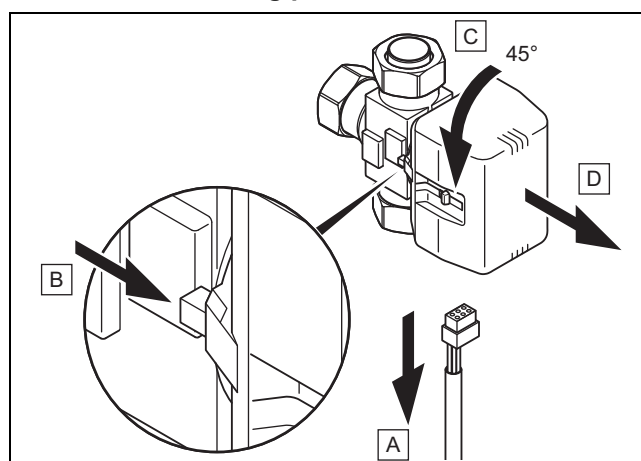
7.1.2 Filling and purging the heating installation

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. Remove the screw cap from the filling and drain valve for the heating circuit and fasten the free end of the filling hose to the valve.
6. Open the filling and drain 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 and drain 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. Then check the heating installation pressure again (if required, repeat the filling procedure).
13. Remove the filling hose from the filling and drain 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 /groundwater module	Air/brine collector
Brine content	30% vol.	44% vol.
* Cloud point	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.	
** Cold protection		

7 Filling and purging the installation

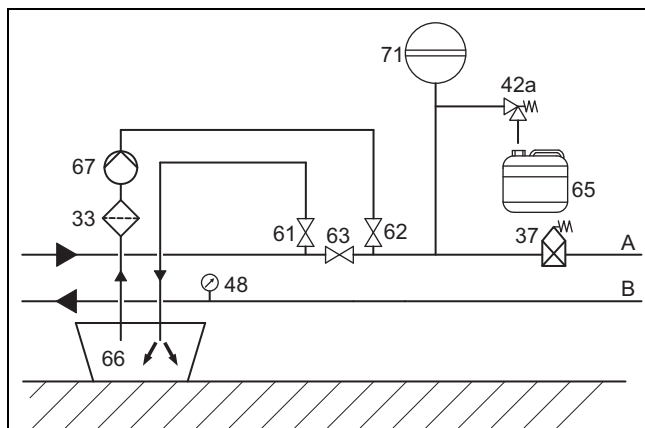
	Approved environment source	
	Ground /groundwater module	Air/brine collector
Water content	70% vol.	56% vol.
Cloud point* of the aqueous ethylene glycol mixture	-16 °C	-30 °C
Cold protection** of the aqueous ethylene glycol mixture	-18 °C	-33.5 °C
* Cloud point	Above this temperature, the first ice crystals start to form in the brine fluid.	
** Cold protection	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 medium is also authorised by Vaillant for the ground heat source:

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

7.2.2 Filling the brine circuit



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

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 Purge 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 ... 0.20 MPa (0.70 ... 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



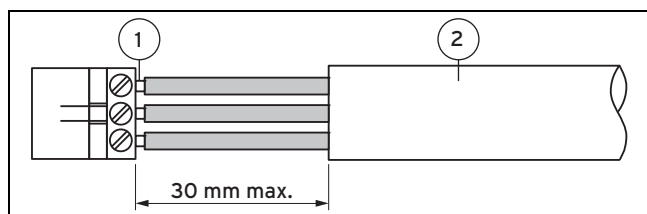
Danger!

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 residual-current circuit breakers are required to ensure that people are protected and fire is prevented in line with the applicable standards, use type A pulse-current-sensitive residual-current circuit breakers or type B universal-current-sensitive residual-current circuit breakers.

- Observe the technical connection conditions for connecting to the power supply network operator's low-voltage network.
- Use the values for the maximum rated power that are specified in the technical data to determine the required line 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.
- For the power supply, in accordance with the data plate, connect the product, in phase, to a three-phase 400 V AC network with a neutral line and an earth line.
- Fuse this connection using the exact values that are specified in the technical data.
- If the local power supply network operator requires that the heat pump is controlled using a blocking signal, fit a corresponding contact switch as prescribed by the power supply network operator.
- Ensure that the sensor lines, 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 low-voltage wire and power supply cable at a line length of > 10 m: 25 cm. If this is not possible, use shielded lines. 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

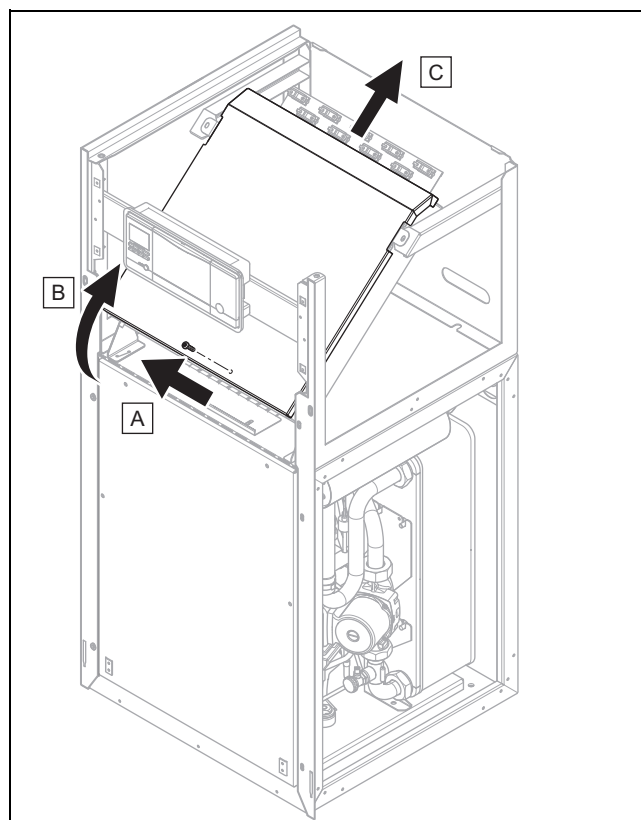
- Only strip a maximum of 3 cm from the outer sheathing of the flexible lines.
- Secure the conductors in the connection terminals.

- 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: $\geq 0.75 \text{ mm}^2$

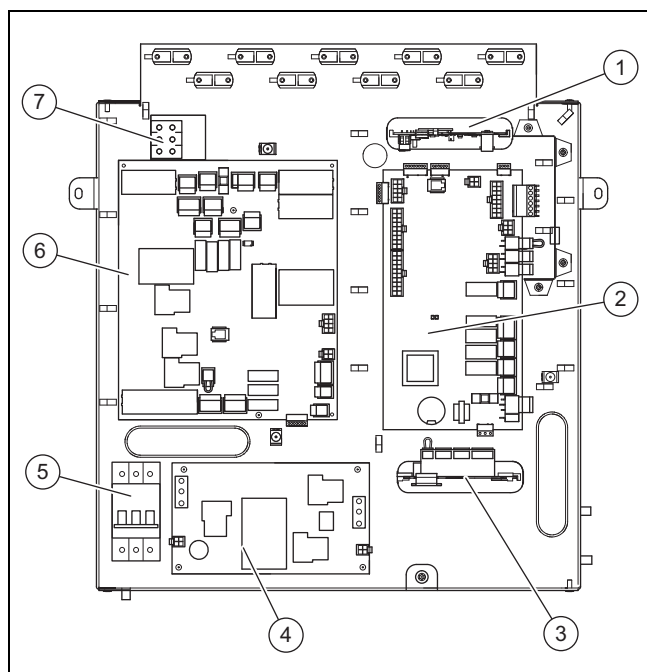
8.2 Opening the electronics box



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

8 Electrical installation

8.3 Electronics box



- | | |
|---|--|
| <p>1 VR 32 modulating bus coupler (optional)*
* If the system diagram selected on the system controller makes provision for this accessory, it can be connected here.</p> <p>2 Controller PCB</p> | <p>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 on the system controller.</p> <p>4 In-rush current limiter PCB</p> <p>5 Line protection switch</p> <p>6 Mains connection PCB</p> <p>7 Mains connection terminal for the auxiliary electric heater</p> |
|---|--|

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 3~/N/PE 400 V

- Connect the continuous power supply to the mains connection (X101). (→ Page 36)

8.4.2 Connecting the dual-circuit power supply special tariff – 3~/N/PE 400 V

1. Remove the bypass line from X103 to X102 which was installed at the factory. (→ Page 37)
2. Pull the plug out of contact X110A and plug it into contact X110B.
 - ◁ The control PCB (X110) is supplied with power via the bypass line from X110B.
3. Connect the blockable power supply to the X101 power supply.
4. Connect the continuous power supply to the X102 power supply.

8.4.3 Connecting the dual-circuit power supply special tariff – 3~/N/PE 400 V

1. Remove the bypass line from X110A to X110 which was installed at the factory. (→ Page 38)
2. Connect the continuous power supply to the X110 mains.
3. Connect the blockable power supply to the X101 mains.
 - ◁ Via the bypass line from X103 to X102 which was installed at the factory, the internal electric back-up heater is also supplied with a blockable power supply.

8.4.4 Connecting the dual-circuit power supply heat pump tariff – 3~/N/PE 400 V

1. Remove the bypass line from X103 to X102 which was installed at the factory. (→ Page 39)
2. Connect the continuous power supply to the X101 power supply.
 - ◁ The control PCB is supplied with power (unblocked) via the bypass line from X110A to X110 which was installed at the factory.
3. Connect the blockable power supply to the X102 power supply.

8.4.5 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.

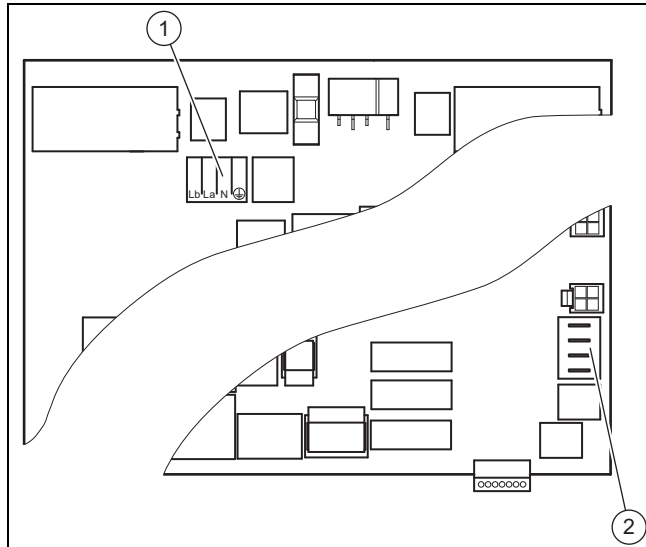
- Rated voltage of external brine pressure switch:
230 V 50 Hz
- Power range for external brine pressure switch (rms):
1 ... 5 mA

8.4.6 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.

8.4.7 Connecting an external well pump



A changeover contact connection X143 (1) with the assignment Lb, La, N, PE is provided for connecting an 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 temperature sensors available as accessories is labelled RR for return connections and VV for flow connections.

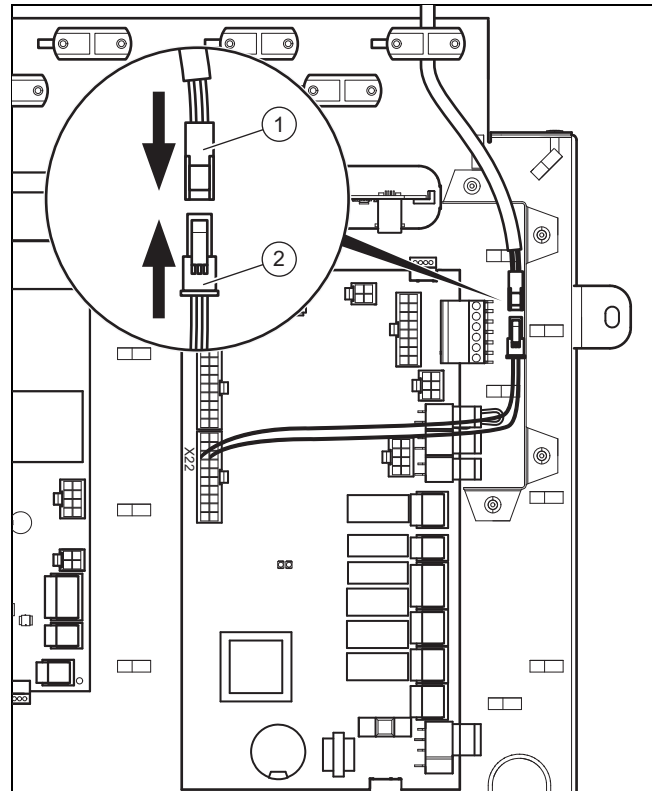
- Connect an external well pump to the X143 connection.
 - Max. switching capacity at plug output: 1 A
- Connect the temperature sensors to the VV (suction well) and RR (injection well) terminals.



Note

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

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



- Connect the cable on the VR 10 temperature sensor supplied as an accessory to bush (1) on plug (2). Use a strain relief which does not have a mains voltage line running through it.

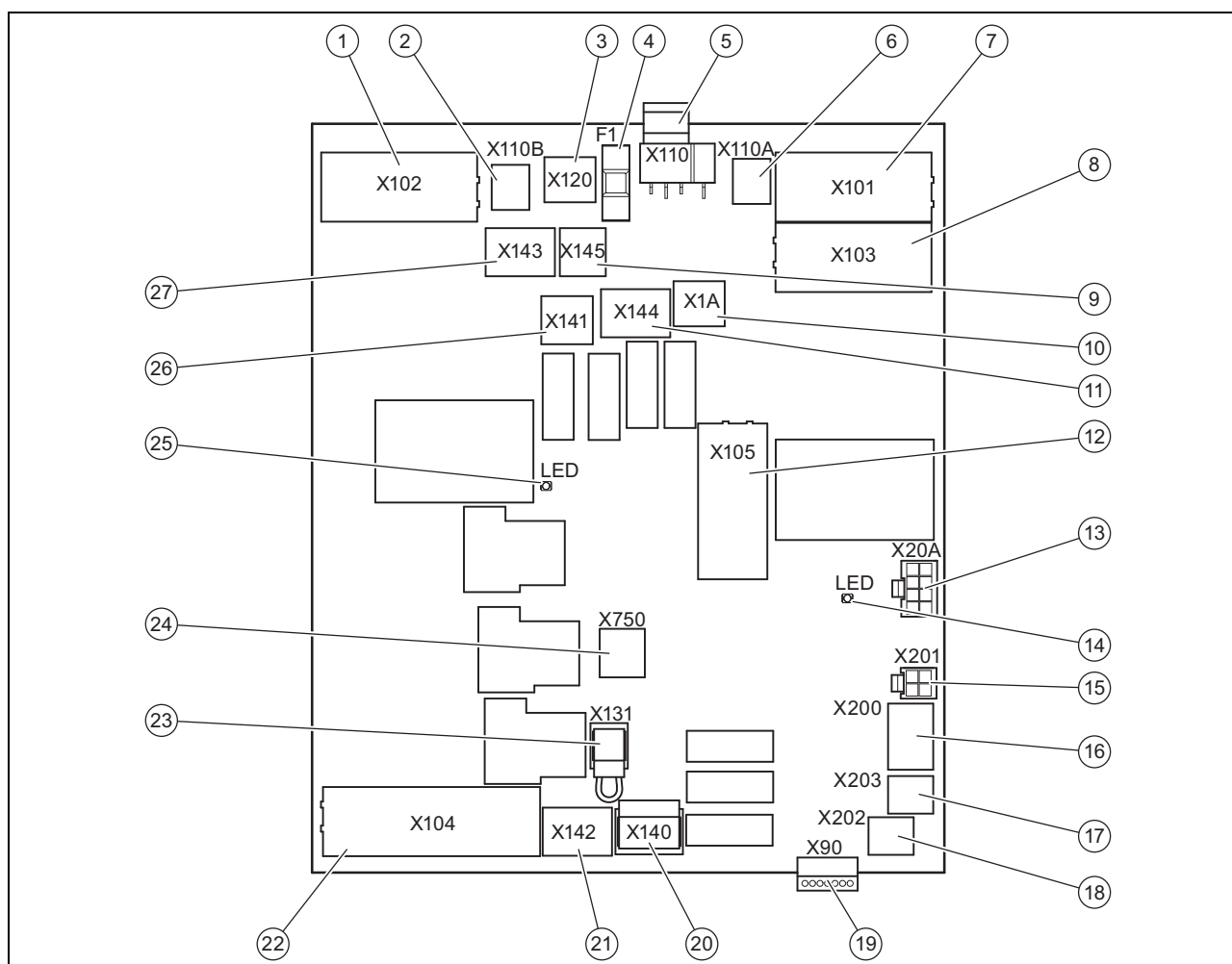
8 Electrical installation

8.5 Power supply PCB



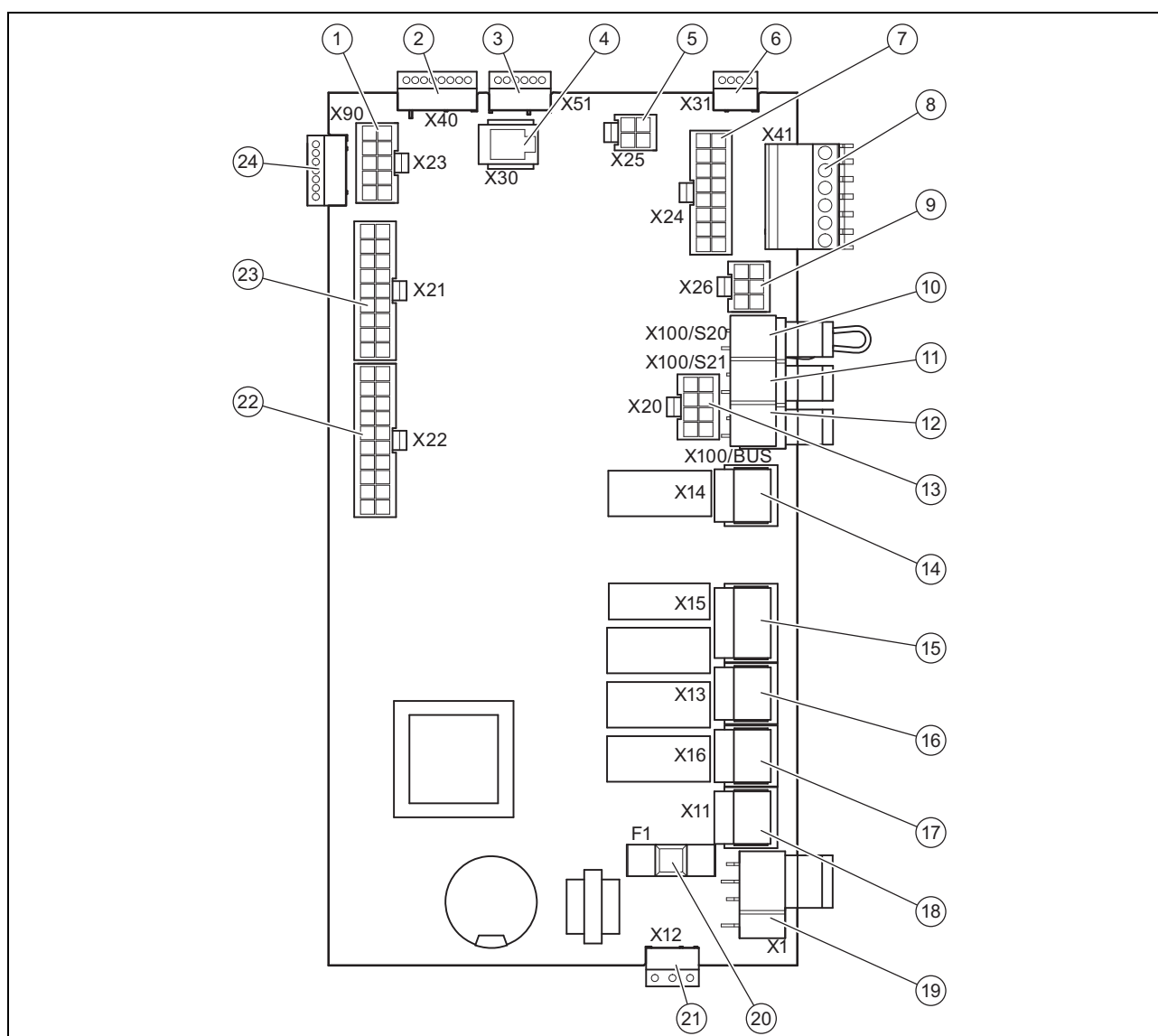
Note

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



- | | | | |
|----|--|----|---|
| 1 | [X102] 400 V power supply for internal electric back-up heater | 14 | LED safety switch for compressor |
| 2 | [X110B] Optional bridge to X110 (230 V supply for electronics system) | 15 | [X201] (not used) |
| 3 | [X120] Optional 230 V supply for protection anode (active tank anode) | 16 | [X200] Optional temperature sensors for ground water module |
| 4 | [F1] F1 T 4A/250 V fuse (protects 230 V loads on power supply PCB) | 17 | [X203] Optional flow temperature sensor for heating circuit with passive cooling module |
| 5 | [X110] Power supply for 230 V electronics system – power supply PCB (TB) and control PCB (HMU) | 18 | [X202] (not used) |
| 6 | [X110A] Bridge to X110 (230 V supply for electronics system) | 19 | [X90] (not used) |
| 7 | [X101] 400 V mains connection for compressor | 20 | [X140] Connection for 3-port diverter valve for passive cooling module |
| 8 | [X103] Bridge for supplying internal back-up heaters (if compressor and back-up heater have the same tariff) | 21 | [X142] 3-port mixing valve for passive cooling module |
| 9 | [X145] External back-up heater, 230 V, L N PE | 22 | [X104] Internal electric back-up heater connection |
| 10 | [X1A] 230 V supply for control PCB | 23 | [X131] Optional external brine pressure switch connection |
| 11 | [X144] External 3-port valve, 230 V, L S N PE | 24 | [X750] Safety cut-out for internal electric back-up heater |
| 12 | [X105] Connection for compressor with in-rush current limiter | 25 | LED safety switch for electric back-up heater |
| 13 | [X20A] Connection for control PCB communication line | 26 | [X141] Signal output with cooling mode active, 230 V, L N PE |
| | | 27 | [X143] Well pump |

8.6 Control PCB



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

8 Electrical installation

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 controller and accessories to the electronics system

1. Install the system controller in accordance with the installation instructions supplied.
2. Open the electronics box. (→ Page 21)
3. Carry out the wiring. (→ Page 26)
4. Connect controllers and accessories in accordance with the relevant system diagrams and installation instructions.
5. Install the VRC DCF receiver.
6. Close the electronics box.

8.9 Carrying out the wiring



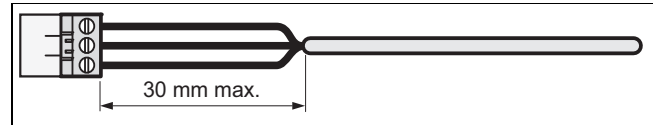
Caution.

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 mains connection 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. (→ Page 21)
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. (→ Page 26)
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 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. (→ Page 21)

8.14 Completing installation

8.14.1 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.

8.14.2 Checking the system pressure and leak-tightness

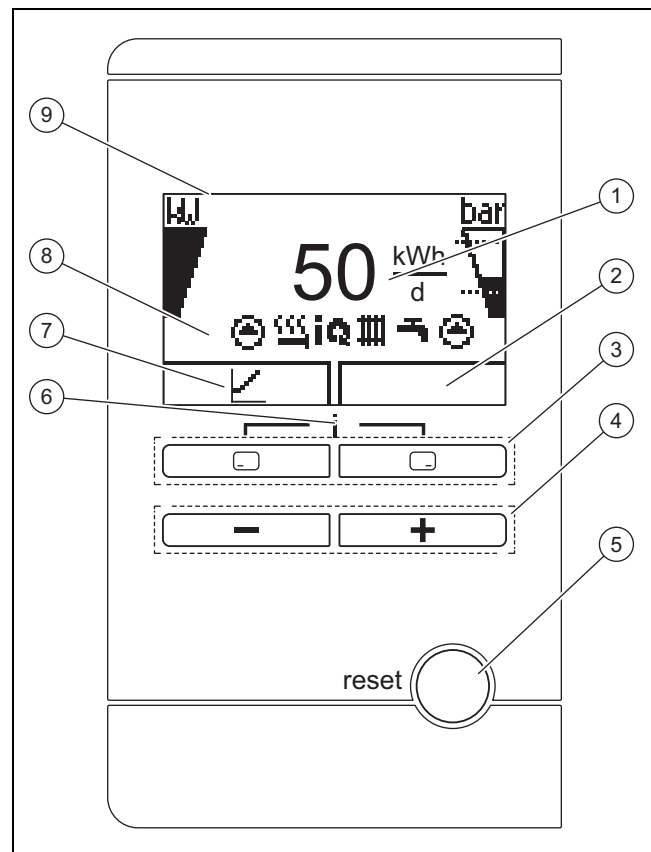
1. After completing the installation, carry out a check of the system.
2. Start up the product in accordance with the relevant operating instructions.
3. Check the filling pressure of the heating installation and check for leaks.

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 | Left and right configuration buttons | 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 Start-up

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.

When using ground/brine as the heat source, active cooling is limited to a brine output temperature of 40 °C in order to protect the source/probe borehole. If this temperature is exceeded (> 40 °C), active cooling mode is switched off. This limit can only be changed by Vaillant Customer service.

9.3.4 Enabling the electric back-up heater

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

- ▶ Activate the internal electric back-up heater with one of the following output levels.
- ▶ Ensure that the maximum output for the electric back-up heater does not exceed the output of the fuse protection for the household electricity system (rated currents, see Technical Data).



Note

Otherwise, the home's internal circuit breaker may trigger if, when there is insufficient heat source output, the electric back-up heater that is not derated is switched on.

Output levels for the 400 V electric back-up heater

- External
- 2.0 kW
- 3.5 kW

- 5.5 kW
- 7 kW
- 9 kW

9.3.5 Purging the building circuit

- ▶ Start the check programme **P.05** in order to purge the building circuit. (→ Page 33)

9.3.6 Purging the environment circuit

- ▶ Start the check programme **P.06** in order to purge the environment circuit. (→ Page 33)

Conditions: 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 .
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 Calling up statistics

Menu → Installer level → Test menu → Statistics

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

9.8 Checking that the product works correctly

1. Start up the product in accordance with the relevant operating instructions.
2. Navigate to **Menu → Installer level → Test menu → Check programs**.
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

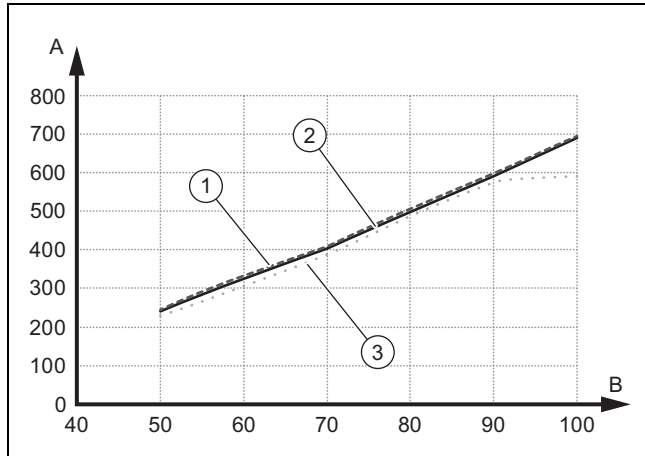
Menu → Installer level → Configuration → Max. remaining feed head

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 Adapting the unit to the heating installation

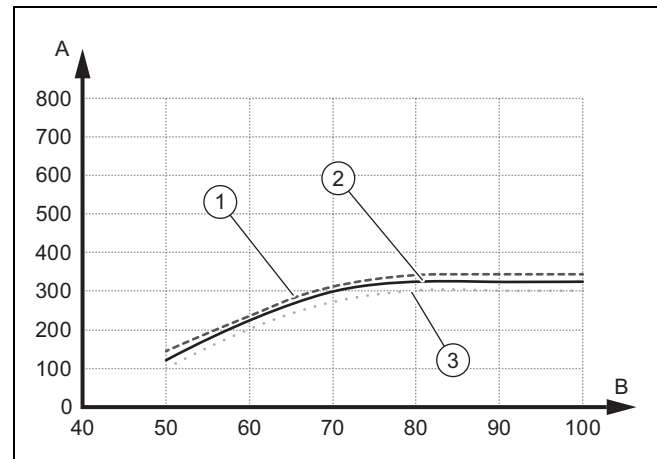
10.2.2 Remaining feed head of building circuit pump

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



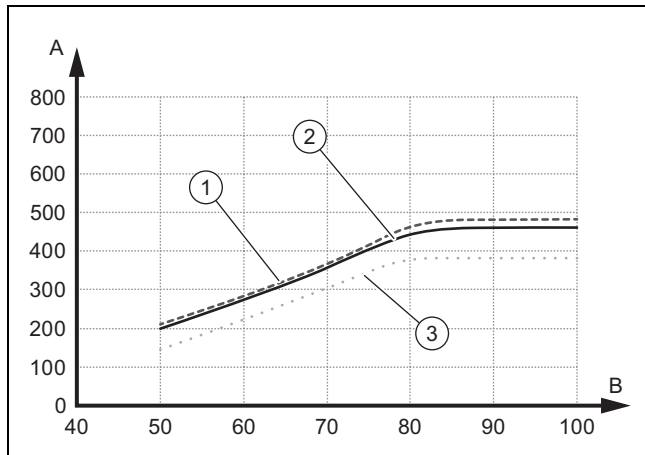
- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

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



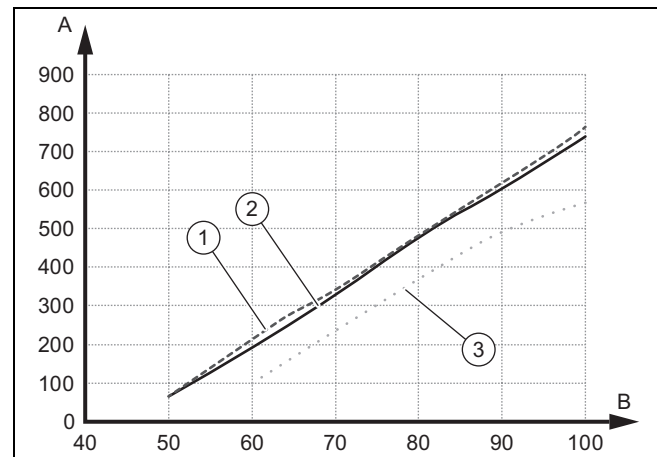
- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

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



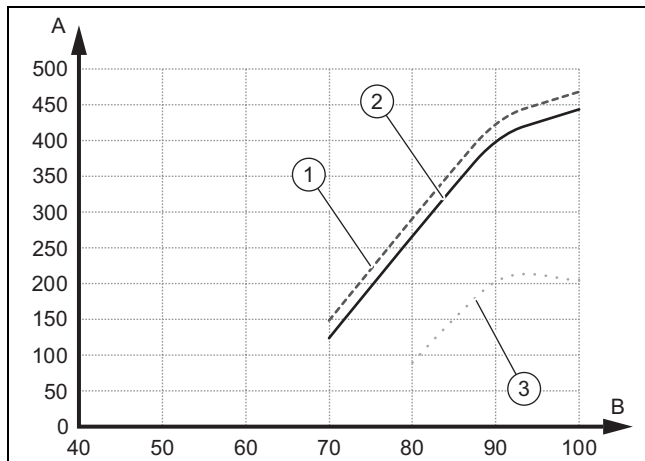
- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

10.2.2.4 Remaining feed head for VWF 15x/4 building circuit pump at nominal flow



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

10.2.2.5 Remaining feed head for VWF 19x/4 building circuit pump at nominal flow



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

10.2.3 Setting the environment circuit pump

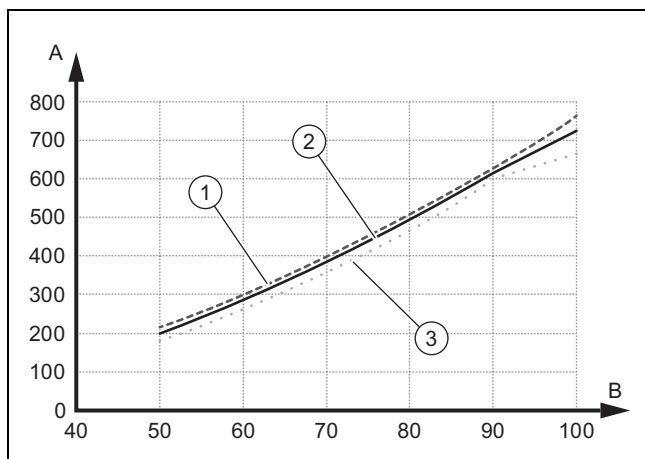
If the heat source temperature spread lies below 2 K due to low pressure losses (large pipe cross-sections, small drilling depth, with air as the heat source: Short distance to the air/brine collector) in continuous operation, you can adjust the pump output. The following diagram shows how setting the 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 → Env. pump target val.** menu point.
- ▶ If necessary, change the factory setting and confirm by pressing .

10.2.4 Remaining feed head of environment circuit pump

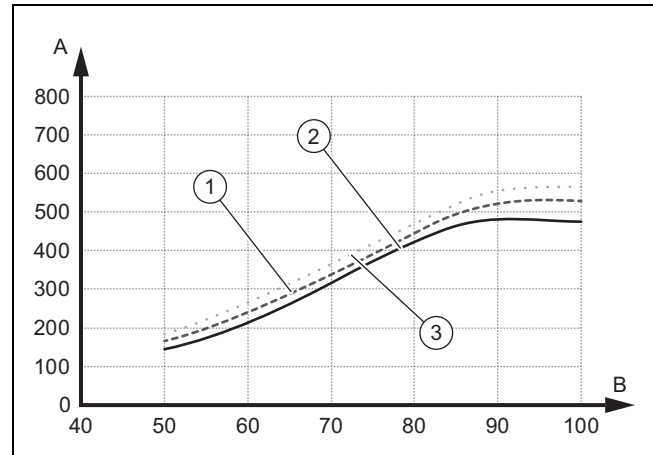
10.2.4.1 Remaining feed head for VWF 5x/4 environment circuit pump at nominal flow



- | | | | |
|---|-----------------|---|--------------------|
| 1 | Air heat source | 2 | Ground heat source |
|---|-----------------|---|--------------------|

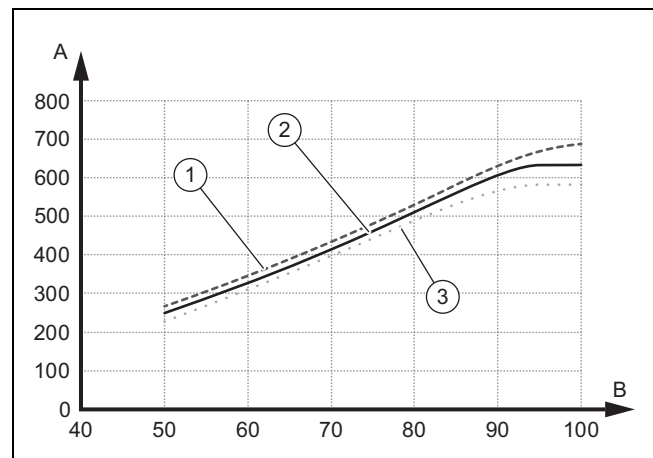
- | | | | |
|---|-----------------------------------|---|------------------|
| 3 | Groundwater heat source | B | Pump output in % |
| A | Remaining feed head in hPa (mbar) | | |

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



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

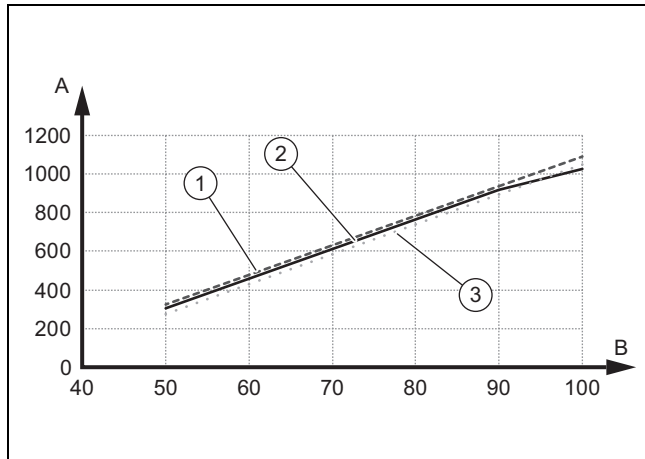
10.2.4.3 Remaining feed head for VWF 11x/4 environment circuit pump at nominal flow



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

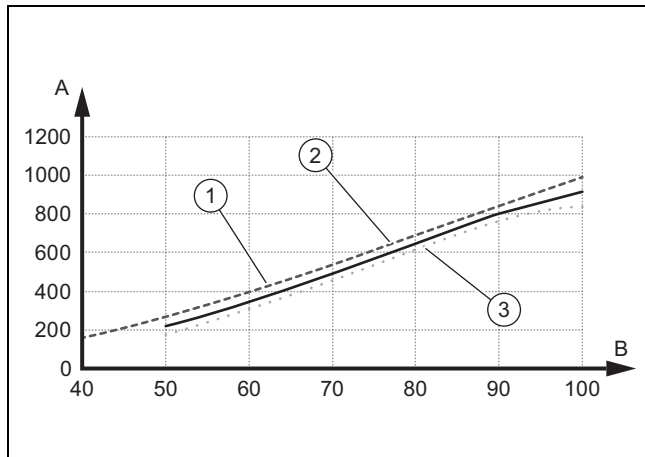
11 Troubleshooting

10.2.4.4 Remaining feed head for VWF 15x/4 environment circuit pump at nominal flow



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

10.2.4.5 Remaining feed head for VWF 19x/4 environment circuit pump at nominal flow



- | | | | |
|---|-------------------------|---|-----------------------------------|
| 1 | Air heat source | A | Remaining feed head in hPa (mbar) |
| 2 | Ground heat source | B | Pump output in % |
| 3 | Groundwater heat source | | |

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 (→ Page 45)

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 (→ Page 47)

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

- Rectify the fault.
- To restart the product, press  (→ 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

- The number of faults that have 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 characteristics in the appendix.

Characteristic values for the VR 10 external temperature sensor (→ Page 53)

Characteristic values for internal temperature sensors (→ Page 54)

Characteristic values for the VRC DCF outdoor temperature sensor (→ Page 55)

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 void the conformity of the product and it will therefore no longer comply with the applicable standards.

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

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

12 Inspection and maintenance

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**. (→ Page 32)
- Carry out the maintenance work that is listed in the table. Maintenance messages (→ Page 47)

Conditions: Lhm. 37 is displayed

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

If the temperature sensor for the building circuit outlet, environment circuit inlet or environment circuit outlet fails, the product continues to run with replacement values. Active cooling mode is no longer possible.

- To determine which component is defective, read the fault memory. (→ Page 33)



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)	Main- tenance (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

No.	Work	Inspection (every year, within 24 months at the latest)	Main- tenance (every two years)
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 in order to start up the heat pump again, Filling and purging the heating installation (→ Page 19).
- If you notice frequent losses in pressure, 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 shut down and a maintenance message is shown on the display.

- Minimum brine fluid pressure: ≥ 0.05 MPa (≥ 0.50 bar)
- Top up the pre-mixed brine fluid in order to restart the heat pump, Filling the brine circuit (→ Page 20). Never top up with pure water.
 - Min. brine fluid operating pressure: ≥ 0.07 MPa (≥ 0.70 bar)
- If you notice frequent losses in pressure, 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 auxiliary electric heating.

- ▶ 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. (→ Page 12)

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.

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

Applicability: Austria

Vaillant Group Austria GmbH
Clemens-Holzmeister-Straße 6
1100 Wien
Österreich

E-Mail Kundendienst: termin@vaillant.at

Internet Kundendienst: <http://www.vaillant.at/werkskunden-dienst/>

Telefon: 05 7050-2100 (zum Regionaltarif österreichweit, bei Anrufen aus dem Mobilfunknetz ggf. abweichende Tarife - nähere Information erhalten Sie bei Ihrem Mobilnetzbetreiber)

Der flächendeckende Kundendienst für ganz Österreich ist täglich von 0 bis 24 Uhr erreichbar. Vaillant Kundendienst-techniker sind 365 Tage für Sie unterwegs, sonn- und feiertags, österreichweit.

Applicability: Switzerland

Vaillant GmbH (Schweiz, Suisse, Svizzera)
Riedstrasse 12
CH-8953 Dietikon
Schweiz, Svizzera, Suisse

Kundendienst: 044 74429-29

Techn. Vertriebssupport: 044 74429-19

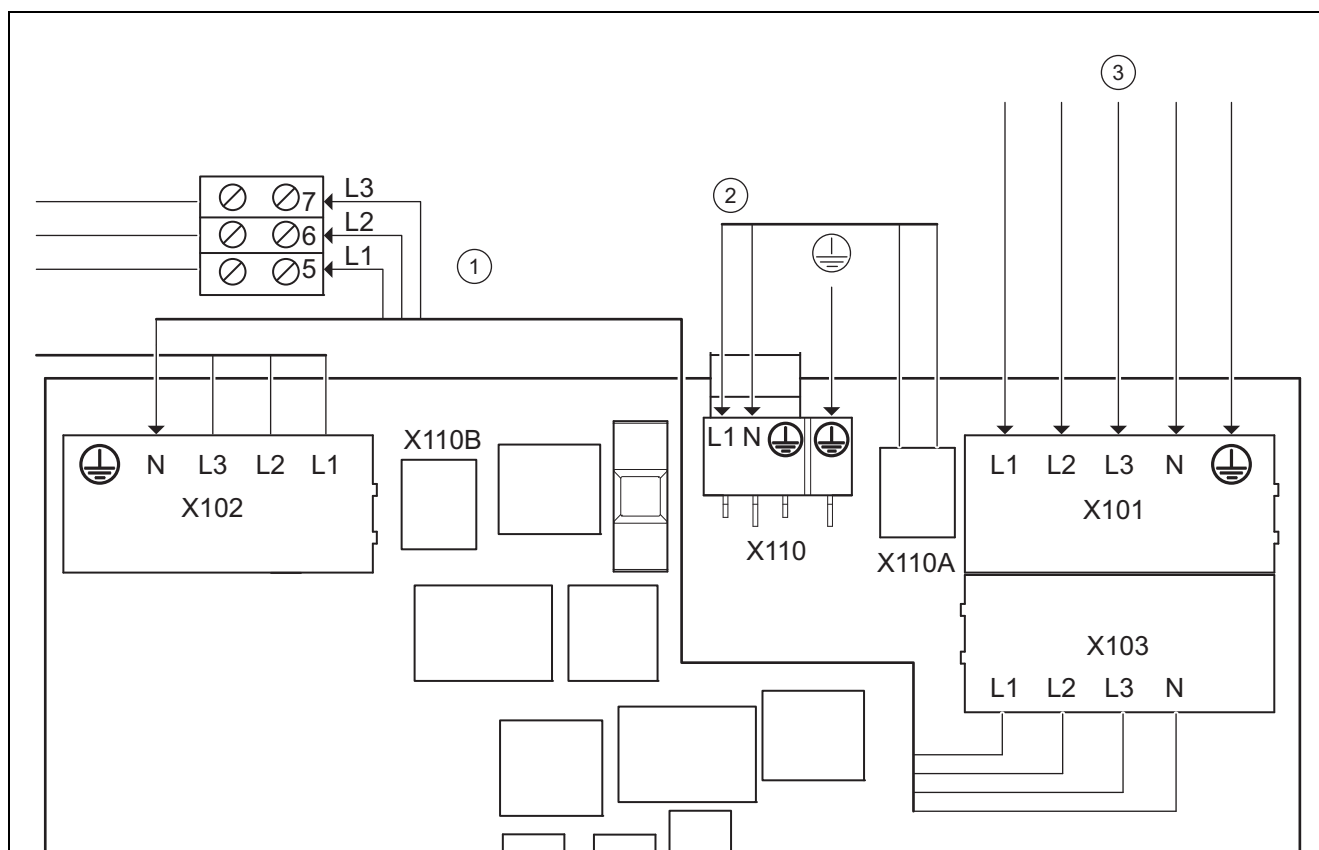
Applicability: Germany

Auftragsannahme Vaillant Kundendienst: 021 91 5767901

Appendix

Appendix

A Unblocked power supply 3~/N/PE 400 V (wiring diagram 1 =)



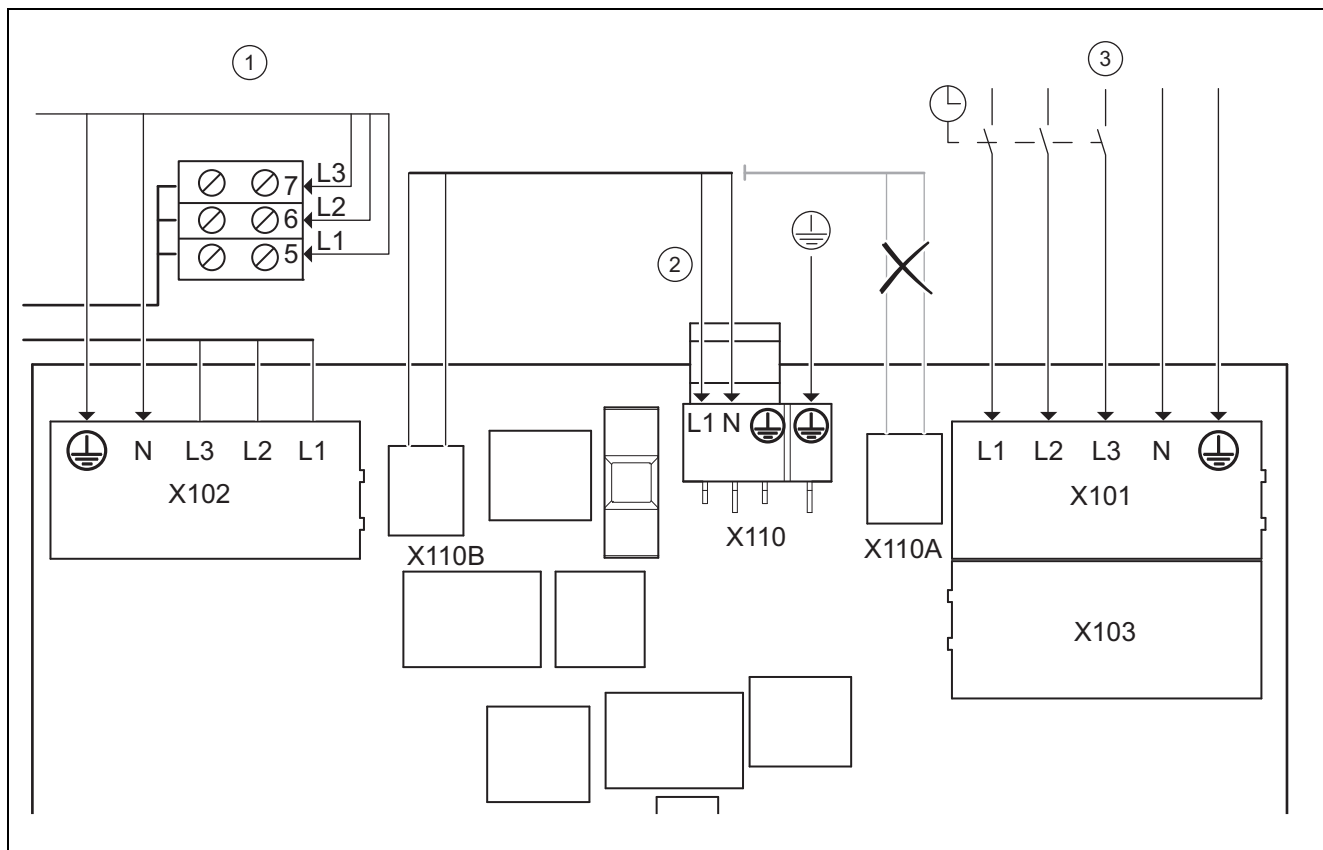
1	Power supply for internal auxiliary electric heating	X101	Mains connection for compressor
2	Power supply for control system	X103	Optional power output for internal auxiliary electric heating (X102)
3	Continuous power supply	X102	Mains connection for internal auxiliary electric heating
X110A	Optional power output for controller PCB (X110)	X110	Mains connection for heat pump controller PCB
X110B	Optional power output for controller PCB (X110)		

This is how it is wired when supplied. The product is connected to the supply network using a single electricity tariff (a consumption meter).

The internal electric back-up heater is supplied with power (unblocked) via the bypass line from X103 to X102 which was installed at the factory.

The control PCB is supplied with power (unblocked) via the bypass line from X110A to X110 which was installed at the factory.

B Dual-circuit power supply special tariff A – 3~/N/PE 400 V (wiring diagram 2 =)



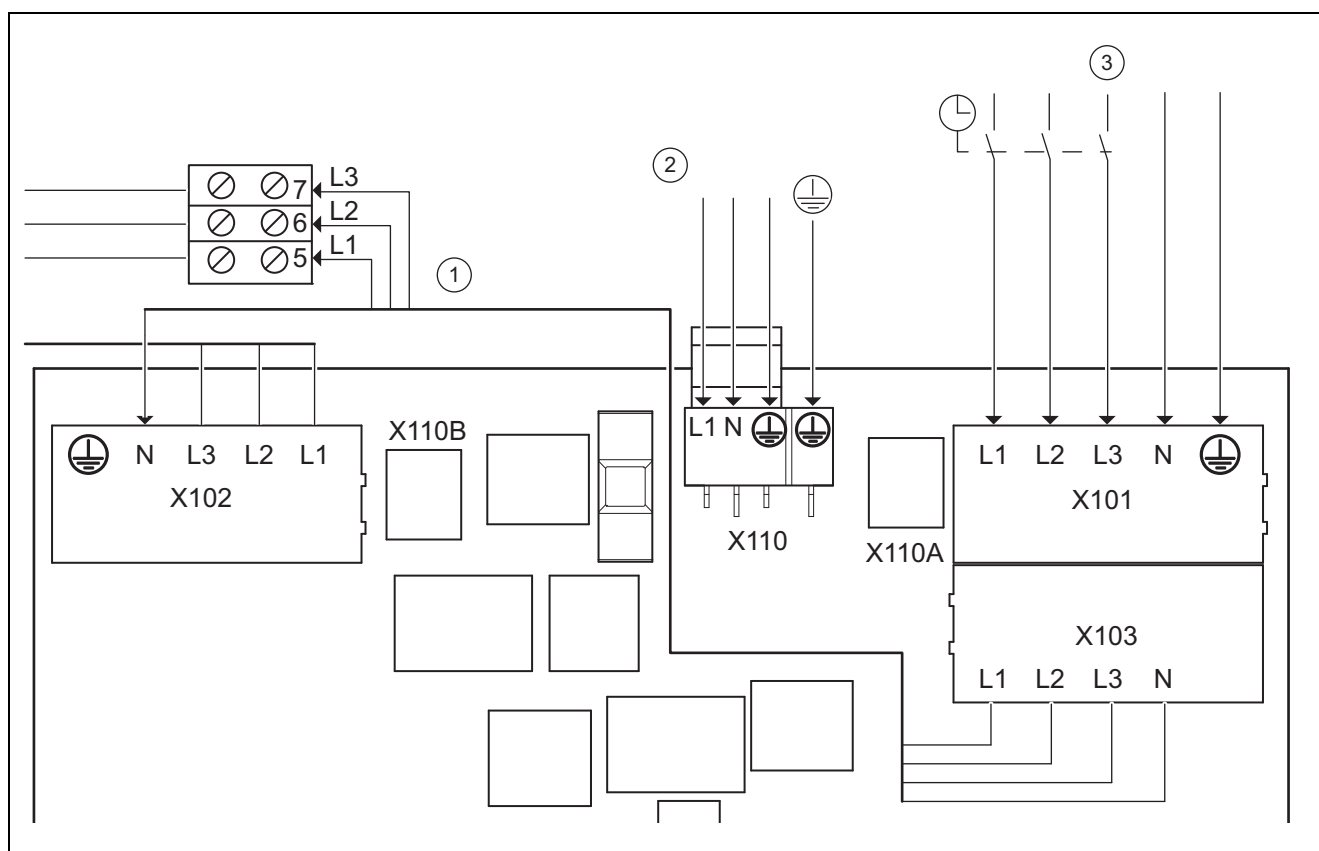
1	Continuous power supply for internal auxiliary electric heating	X101	Mains connection for compressor
2	Power supply for control system	X103	Optional power output for internal auxiliary electric heating (X102)
3	Blocked power supply	X102	Mains connection for internal auxiliary electric heating
X110A	Optional power output for controller PCB (X110)	X110	Mains connection for heat pump controller PCB
X110B	Optional power output for controller PCB (X110)		

In this case, the heat pump is operated using two electricity tariffs (two consumption meters).

A continuous power supply ensures the operation of the internal electric back-up heater and the control PCB of the heat pump via its own electricity meter.

The power from the additional, blockable power supply for the compressor is supplied via a second electricity meter and can be suspended by the power supply network operator at peak times. The duration and frequency of the outage is determined by the power supply network operator or must be clarified with them.

C Dual-circuit power supply special tariff B – 3~/N/PE 400 V (wiring diagram 3 =)



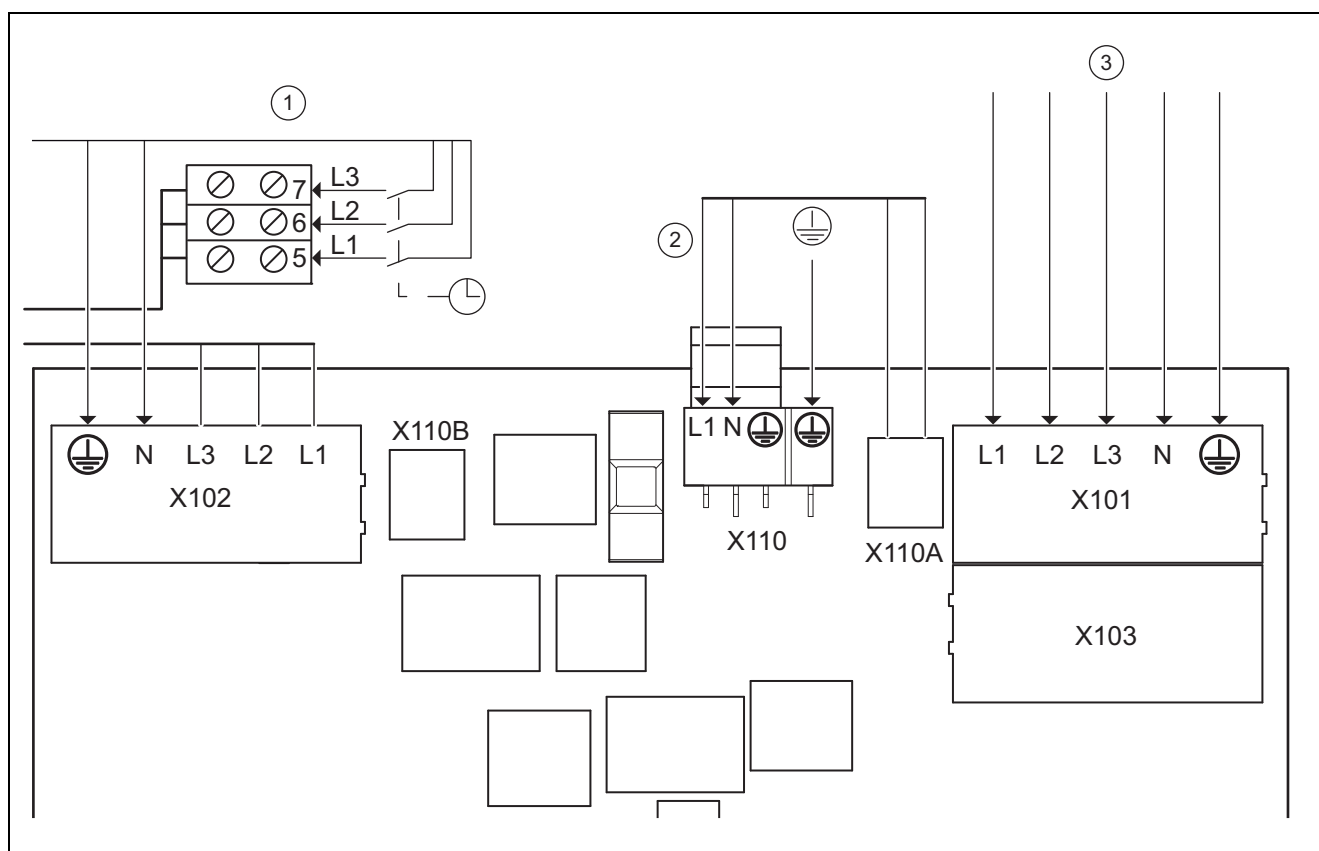
1	Blocked power supply for internal auxiliary electric heating	X101	Mains connection for compressor
2	Continuous power supply for control system	X103	Optional power output for internal auxiliary electric heating (X102)
3	Blocked power supply	X102	Mains connection for internal auxiliary electric heating
X110A	Optional power output for controller PCB (X110)	X110	Mains connection for heat pump controller PCB
X110B	Optional power output for controller PCB (X110)		

In this case, the heat pump is operated using two electricity tariffs (two consumption meters).

A continuous power supply ensures the operation of the auxiliary consumers (circulation pumps, controls, etc.) via a separate electricity meter.

The power from the additional, blockable power supply for the compressor and the internal electric back-up heater is supplied via a second electricity meter and can be suspended by the power supply network operator at peak times. The duration and frequency of the outage is determined by the power supply network operator or must be clarified with them.

D Dual-circuit power supply heat pump tariff – 3~/N/PE 400 V (wiring diagram 4 =)



1	Blocked power supply for internal auxiliary electric heating	X101	Mains connection for compressor
2	Power supply for control system	X103	Optional power output for auxiliary heating (X102)
3	Continuous power supply	X102	Mains connection for internal auxiliary electric heating
X110A	Optional power output for controller PCB (X110)	X110	Mains connection for heat pump controller PCB
X110B	Optional power output for controller PCB (X110)		

In this case, the heat pump is operated using two electricity tariffs (two consumption meters).

A continuous power supply ensures the operation of the compressor and the control PCB of the heat pump via its own electricity meter.

The power from the additional, blockable power supply for the internal electric back-up heater is supplied via a second electricity meter and can be suspended by the power supply network operator at peak times. The duration and frequency of the outage is determined by the power supply network operator or must be clarified with them.

E Installer level overview

Setting level	Values		Unit	Increment, select, explanation	Default 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					
¹⁾ See overview of fault codes						

Appendix

Setting level	Values		Unit	Increment, select, explanation	Default setting	Setting
	Min.	Max.				
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					
Fan 1: Hours	Current value		h			
Fan 1: Starts	Current value					
De-icer 1: Hours	Current value		h			
De-icer 1: Switch.	Current value					
Fan 2: Hours	Current value		h			
Fan 2: Switchings	Current value					
De-icer 2: Hours	Current value		h			
De-icer 2: 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						
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	
1) See overview of fault codes						

Setting level	Values		Unit	Increment, select, explanation	Default setting	Setting
	Min.	Max.				
T.17 Well pump	Off	On		Off, On	Off	
T.18 Fan 1: Power (for the air/brine environment circuit type only)	0	100	%	5	0	
T.19 De-icer 1: (for the air/brine environment circuit type only)	Off	On		Off, On	Off	
T.20 Fan 2: Power (for the air/brine environment circuit type only)	0	100	%	5	0	
T.21 De-icer 2: (for the air/brine environment circuit type only)	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/brine environment circuit type only)	Closed	Open		Closed, Open	Closed	
¹⁾ See overview of fault codes						

Appendix

Setting level	Values		Unit	Increment, select, explanation	Default setting	Setting
	Min.	Max.				
T.105 Air inlet temp. Fan unit 1: (for the air/brine environment circuit type only)	-40	90	°C	0.1		
T.106 Brine outlet temp. Fan unit 1: (for the air/brine environment circuit type only)	-40	90	°C	0.1		
T.107 Safety cut-out Fan unit 1: (for the air/brine environment circuit type only)	Closed	Open		Closed, Open	Closed	
T.108 Air inlet temp. Fan unit 2: (for the air/brine environment circuit type only)	-40	90	°C	0.1		
T.109 Brine outlet temp. Fan unit 2: (for the air/brine environment circuit type only)	-40	90	°C	0.1		
T.110 Safety cut-out Fan unit 2: (for the air/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		
T.127 High pressure	0	47	bar (abs)	0.1		
T.128 Condensation temperature	-40	70	°C	0.1		
T.129 Low pressure	0	47	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	02 English	
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	
¹⁾ See overview of fault codes						

Setting level	Values		Unit	Increment, select, explanation	Default setting	Setting
	Min.	Max.				
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	400 V 3 phases – External – 2 kW – 3.5 kW – 5.5 kW – 7 kW – 9 kW	9	
Env. pump target val.	1	100	%	1	Air/brine – VWF 57/4: 55 – VWF 87/4: 78 – VWF 117/4: 86 – VWF 157/4: 47 – VWF 197/4: 68 Ground/brine – VWF 57/4: 100 – VWF 87/4: 100 – VWF 117/4: 100 – VWF 157/4: 100 – VWF 197/4: 100 Well – VWF 57/4: 47 – VWF 87/4: 100 – VWF 117/4: 100 – VWF 157/4: 47 – VWF 197/4: 74	
Conf. fan	Auto, 1	100	%	1	Auto	
Noise reduction fan	0	40	%	1	20	
Env. circuit type	Ground/brine: -14 Air/brine: -28 Well: +2	5	°C	1	Ground/brine: -7 Air/brine: -28 Well: +2	
Env. circuit type	Current value			Ground/brine Air/brine Well		
Enable emerg. mode	Off	On		Off, On	Off	
¹⁾ See overview of fault codes						

Appendix

Setting level	Values		Unit	Increment, select, explanation	Default setting	Setting
	Min.	Max.				
Cooling technology	No cooling	On-site pass. cooling		No cooling Active cooling On-site pass. cooling On-site pass. cooling	0	
Device Specific No.	40	44		Current value	VWF 5x/4 = 40 VWF 8x/4 = 41 VWF 11x/4 = 42 VWF 157/4 = 43 VWF 197/4 = 44	
Software version	Current value for the controller 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	02 English	
Env. circuit type	Select			Air/brine Ground/brine Well		
Freeze protection	Ground/brine: -14 Air/brine: -28 Well: +2	5	°C	1	Ground/brine: -7 Air/brine: -28 Well: +2	
Im. heater outp. range	External	9	kW	1 400 V 3 phases – External – 2 kW – 3.5 kW – 5.5 kW – 7 kW – 9 kW	9	
Cooling technology	No cooling	On-site pass. cooling		No cooling Active cooling On-site pass. cooling 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	
Check program: Purge 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	Default setting	Setting
	Min.	Max.				
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

Status code	Explanation/indicator in the heat pump display
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
S.202	Check program: Purging of building circuit active
S.203	Actuator test active
Displays relating to communication	
S.211	Connection error: Display not recognised

Appendix

Status code	Explanation/indicator in the heat pump display
S.212	Connection error: Controller not recognised
S.213	Connection error: Fan 1 not recognised
S.214	Connection error: Fan 2 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	Environment circuit: Fault cont.: Pump open
S.248	Fan unit: De-icing with fan only
S.249	Fan unit: De-icing with de-icer
S.252	Fan unit 1: Fan blocked
S.253	Fan unit 1: Safety cut-out open
S.254	Fan unit 1: De-icing takes too long
S.255	Fan unit 1: Air inlet temp. too high
S.256	Fan unit 1: Air inlet temp. too low
S.260	Fan unit 2: Fan blocked
S.261	Fan unit 2: Safety cut-out open
S.262	Fan unit 2: De-icing takes too long
S.263	Fan unit 2: Air inlet temp. too high
S.264	Fan unit 2: Air inlet temp. too low
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

Status code	Explanation/indicator in the heat pump display
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 leaks 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-water heat exchanger contaminated	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-water heat exchanger)
M.34	Environment circuit: Pressure low	- Pressure loss in the environment circuit due to leaks or air pockets - Environment circuit pressure sensor defective	- Check the environment circuit for leaks, top up with medium (brine/water), and purge - Check the plug contact on the PCB and on the cable harness; check that the pressure sensor is working correctly and, if required, replace the pressure sensor
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

In the rare 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.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

Appendix

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	– Check the stopcocks and thermostatic valves – Ensure that the flow rate is at least 35% of the nominal flow rate – Check that the building circuit pump functions correctly
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	– Four-way valve is mechanically blocked – The 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.708	Connection error: Fan unit 1:	– No electrical connection – No eBUS connection	– Check the electrical connection to fan unit 1 (check the line connection; contact fault? Has the circuit breaker tripped in the connection box?) – Check the eBUS connection to fan unit 1 – Check the address switch position on the PCB of fan unit 1. Required switch position: 1
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	– 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) – Purging the environment circuit

Code	Meaning	Cause	Remedy
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/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, overvoltage, undervoltage) and switched the pump off as a securing measure.	– Switch the heat pump off for at least 30 seconds (no current) – Check the quality of the plug contact on the PCB – Check that the pump functions correctly – Purging the environment circuit
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 65 °C – Operating the de-icer outside of the permitted area of application – De-icer operation when the brine circuit is not filled – During de-icer operation at brine temperatures above 115 °C, the safety fuse of the safety cut-out is tripped and the fuse must be replaced.	– Checking 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 30 °C again. If the safety cut-out is still open at a de-icer temperature below 65 °C (or 30 °C), temperatures above 115 °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
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.	– 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.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 – Insufficient volume flow as a result of closing individual 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, four-way valve mechanically blocked, filter blocked). Inform Customer Service. – VWL SA (cooling mode): Check the fan unit for dirt

Appendix

Code	Meaning	Cause	Remedy
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.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
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 four-way 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 four-way valve functions correctly – Check the environment circuit – Check the sensors – Reduce or stop the external heat that is entering

Code	Meaning	Cause	Remedy
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 four-way valve functions correctly - Check the sensors
F.782	Connection error: Fan unit 2:	- No electrical connection - No eBUS connection	- Check the electrical connection to fan unit 2 (check the line connection; contact fault? Has the circuit breaker tripped in the connection box?) - Check the eBUS connection to fan unit 2 - Check the address switch position on the PCB of fan unit 2. Required switch position: 2
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
F.785	Fan unit 2: 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.786	Fan unit 2: Safety cut-out open	- The safety cut-out on the de-icer is open due to insufficient volume flow and/or brine temperatures above 65 °C - Operating the de-icer outside of the permitted area of application - De-icer operation when the brine circuit is not filled - During de-icer operation at brine temperatures above 115 °C, the safety fuse of the safety cut-out is tripped and the fuse must be replaced.	- Checking 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 30 °C again. If the safety cut-out is still open at a de-icer temperature below 65 °C (or 30 °C), temperatures above 115 °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.787	Environment circuit: Pressure mon. open	- Pressure loss in the environment circuit due to leakages or air pockets - Environment circuit pressure monitor 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/water), purge - Check the screwed contact on the PCB - Check that the pressure monitor works correctly - Replace the pressure monitor - 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

Appendix

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 switched the pump off as a securing measure.	– 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.789	Sensor fault: Fan unit 2 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.790	Sensor fault: Fan unit 2 brine flow 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.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 – Heating rod operation when the building circuit is not filled – Heating rod operation at flow temperatures above 110 °C trips the safety fuse of the safety cut-out and requires that the fuse be replaced – Feeding 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 on the grid feed-in – Check the in-rush current limiter

Code	Meaning	Cause	Remedy
F.1119	Compressor: ICL fault	– In-rush current limiter defective or incorrectly connected – Mains voltage too low	– Check all plug contacts – Check the ICL compressor connection – Check the ICL controller 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 three 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 for the VR 10 external temperature sensor

Temperature (°C)	Resistance (ohms)
-40	87879
-35	63774
-30	46747
-25	34599
-20	25848
-15	19484
-10	14814
-5	11358
0	8778
5	6836
10	5363
15	4238
20	3372
25	2700
30	2176
35	1764
40	1439
45	1180
50	973
55	807
60	672
65	562
70	473
75	400
80	339
85	289
90	247
95	212
100	183
105	158
110	137
115	120
120	104

Appendix

Temperature (°C)	Resistance (ohms)
125	92
130	81
135	71
140	63
145	56
150	50
155	44

J Characteristic values for internal temperature sensors

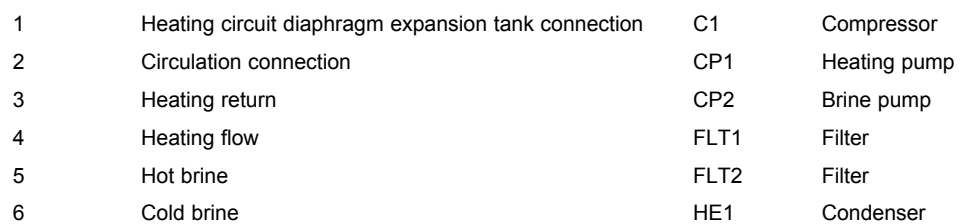
Temperature (°C)	Resistance (ohms)
-40	327344
-35	237193
-30	173657
-25	128410
-20	95862
-15	72222
-10	54892
-5	42073
0	32510
5	25316
10	19862
15	15694
20	12486
25	10000
30	8060
35	6535
40	5330
45	4372
50	3605
55	2989
60	2490
65	2084
70	1753
75	1481
80	1256
85	1070
90	916
95	786
100	678
105	586
110	509
115	443
120	387
125	339
130	298
135	263
140	232
145	206

Temperature (°C)	Resistance (ohms)
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

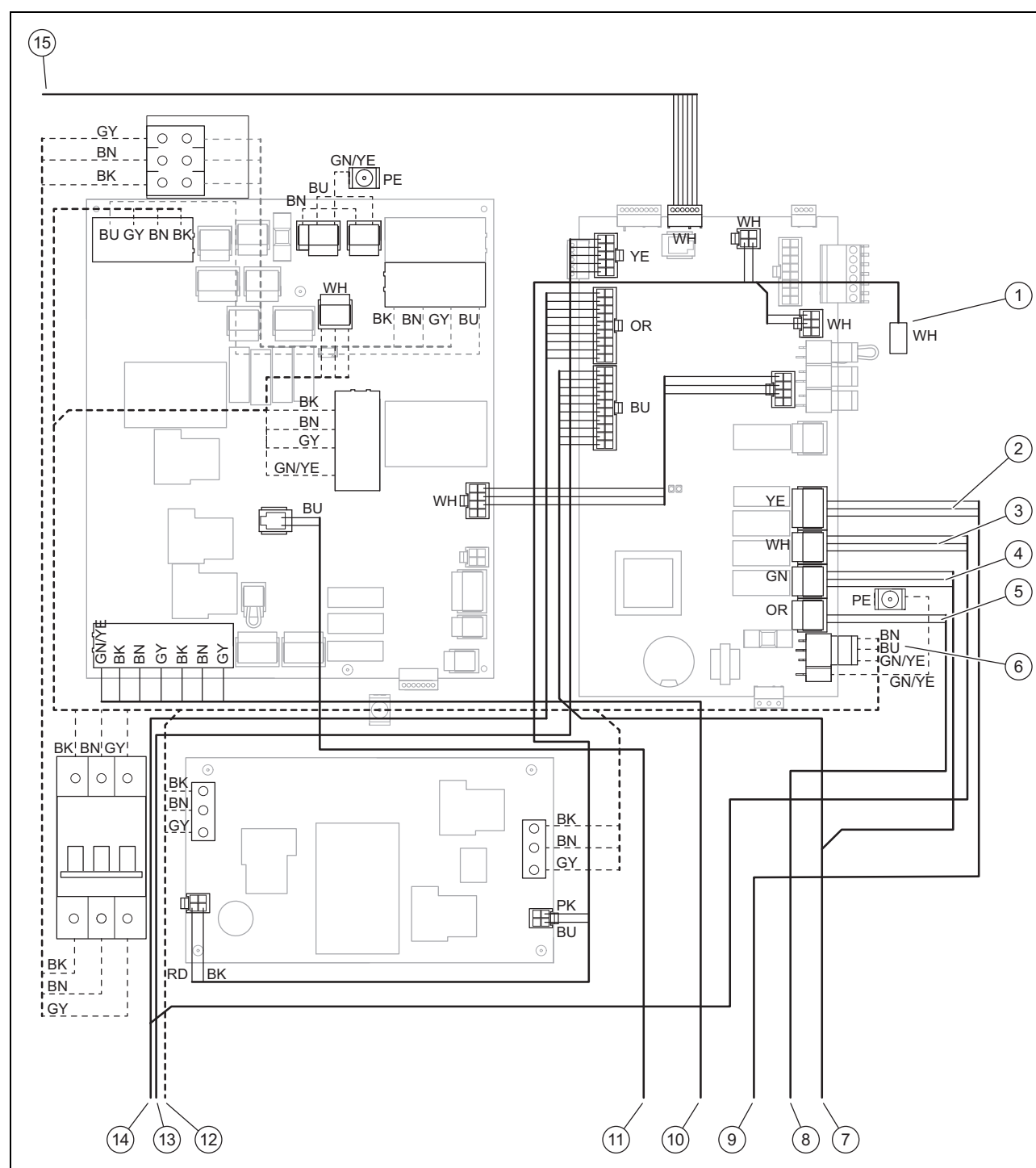
L Heat pump schematic



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

Appendix

M Circuit diagram



- | | | | |
|---|--|----|---|
| 1 | Connection for VR 10 cylinder temperature sensor | 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 | | |

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	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Product dimensions, height, without adjustable feet	1,183 mm	1,183 mm	1,183 mm	1,183 mm	1,183 mm
Product dimensions, width	595 mm	595 mm	595 mm	595 mm	595 mm
Product dimensions, depth	600 mm	600 mm	600 mm	600 mm	600 mm
Weight, with packaging	155 kg	170 kg	178 kg	185 kg	197 kg
Weight, without packaging	145 kg	160 kg	168 kg	176 kg	187 kg
Weight, ready for operation	151 kg	167 kg	175 kg	187 kg	200 kg

Electrics

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Compressor/heating circuit rated voltage	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz
Control circuit rated voltage	1~/N/PE 230 V 50 Hz	1~/N/PE 230 V 50 Hz	1~/N/PE 230 V 50 Hz	1~/N/PE 230 V 50 Hz	1~/N/PE 230 V 50 Hz
Auxiliary heater rated voltage	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz	3~/N/PE 400 V 50 Hz
Power factor	$\cos \varphi = 0.75 - 0.9$	$\cos \varphi = 0.75 - 0.9$	$\cos \varphi = 0.75 - 0.9$	$\cos \varphi = 0.75 - 0.9$	$\cos \varphi = 0.75 - 0.9$
Required network impedance $Z_{\max}$ with in-rush current limiter	$\leq 0.472 \Omega$	$\leq 0.472 \Omega$	$\leq 0.472 \Omega$	$\leq 0.472 \Omega$	$\leq 0.472 \Omega$
Fuse type, characteristic C, slow-blow, three-pole switching (disconnection of the three mains connection lines in one switching operation)	Design in accordance with the selected connection diagrams	Design in accordance with the selected connection diagrams	Design in accordance with the selected connection diagrams	Design in accordance with the selected connection diagrams	Design 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)	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	$\leq 15 \text{ A}$	$\leq 19 \text{ A}$	$\leq 22 \text{ A}$	$\leq 26 \text{ A}$	$\leq 30 \text{ A}$
Measuring current, max.	19.8 A	21.2 A	23.4 A	25.2 A	30.4 A
Min. electrical power consumption	1.40 kW	2.00 kW	2.50 kW	3.30 kW	4.70 kW
Max. electrical power consumption	11.5 kW	12.8 kW	14.1 kW	15.6 kW	17.8 kW

Appendix

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Max. electrical power consumption of auxiliary heater	9 kW	9 kW	9 kW	9 kW	9 kW
EN 60529 level of protection	IP 10B	IP 10B	IP 10B	IP 10B	IP 10B

Hydraulics

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heating flow/return connection	G 1 1/2 "	G 1 1/2 "	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 "	G 1 1/2 "	G 1 1/2 "
Heating expansion vessel connection	G 3/4 "	G 3/4 "	G 3/4 "	G 3/4 "	G 3/4 "

Heat source circuit/brine circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Brine content of the brine circuit in the heat pump	2.5 l	3.1 l	3.6 l	4.5 l	5.3 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	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)	≥ 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)	≤ 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	310 W	310 W
Brine pump type	High-efficiency pump	High-efficiency pump	High-efficiency pump	High-efficiency pump	High-efficiency pump

Building circuit/heating circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heating circuit water contents in the heat pump	3.2 l	3.9 l	4.4 l	5.8 l	6.5 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	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) according to 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) according to 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) according to 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) according to 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) according to 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)	≥ 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)	≤ 0.3 MPa (≤ 3.0 bar)	≤ 0.3 MPa (≤ 3.0 bar)
Min. heating mode flow temperature	25 °C	25 °C	25 °C	25 °C	25 °C
Max. heating mode target flow temperature with external auxiliary heater	75 °C	75 °C	75 °C	75 °C	75 °C
Max. heating mode target flow temperature without auxiliary heater	65 °C	65 °C	65 °C	65 °C	65 °C
Min. cooling mode flow temperature	5 °C	5 °C	5 °C	5 °C	5 °C

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Max. electrical power consumption, heating pump	63 W	63 W	63 W	140 W	140 W
Heating pump type	High-efficiency pump	High-efficiency pump	High-efficiency pump	High-efficiency pump	High-efficiency pump

Refrigerant circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Coolant type	R410A	R410A	R410A	R410A	R410A
Refrigerant content of the refrigerant circuit in the heat pump	1.50 kg	2.40 kg	2.50 kg	3.05 kg	3.95 kg
Global warming potential (GWP) in accordance with regulation (EU) no. 517/2014	2088	2088	2088	2088	2088
CO ₂ equivalent	3.132 t	5.011 t	5.220 t	6.368 t	8.248 t
Global warming potential 100 (GWP ₁₀₀) in accordance with regulation (EC) no. 842/2006	1975	1975	1975	1975	1975
Expansion valve design	Electronic	Electronic	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)	≤ 4.6 MPa (≤ 46.0 bar)	≤ 4.6 MPa (≤ 46.0 bar)
Compressor type	Scroll	Scroll	Scroll	Scroll	Scroll
Oil type	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)	Ester (EMKARATE RL32-3MAF)
Oil filling quantity	0.75 l	1.25 l	1.25 l	1.24 l	1.89 l

Installation site

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Installation site	Interior/dry	Interior/dry	Interior/dry	Interior/dry	Interior/dry
Installation room volume complying with EN 378	3.41 m ³	5.45 m ³	5.68 m ³	6.93 m ³	8.98 m ³
Permissible ambient temperature at the installation site	7 ... 25 °C	7 ... 25 °C	7 ... 25 °C	7 ... 25 °C	7 ... 25 °C
Permissible relative air humidity	40 ... 75 %	40 ... 75 %	40 ... 75 %	40 ... 75 %	40 ... 75 %

O.2 Brine heat source

Heat source circuit/brine circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Min. source inlet temperature (hot brine) in heating mode	-10 °C	-10 °C	-10 °C	-10 °C	-10 °C
Max. source inlet temperature (hot brine) in heating mode	25 °C	25 °C	25 °C	25 °C	25 °C
Min. source inlet temperature (hot brine) in cooling mode	0 °C	0 °C	0 °C	0 °C	0 °C
Max. source inlet temperature (hot brine) in cooling mode	30 °C	30 °C	30 °C	30 °C	30 °C
Nominal flow ΔT 3 K for B0/W35	1,290 l/h	2,320 l/h	3,000 l/h	3,590 l/h	4,780 l/h
Min. volume flow during continuous operation at the application limits	1,110 l/h	2,140 l/h	2,460 l/h	3,380 l/h	3,840 l/h
Max. volume flow during continuous operation at the application limits	1,290 l/h	2,320 l/h	3,000 l/h	3,590 l/h	4,780 l/h
Max. remaining feed head with ΔT 3 K for B0/W35	0.062 MPa (0.620 bar)	0.039 MPa (0.390 bar)	0.051 MPa (0.510 bar)	0.098 MPa (0.980 bar)	0.082 MPa (0.820 bar)

Appendix

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Brine circuit pump electrical power consumption for B0/W35 ΔT 3 K with an external pressure loss of 250 mbar in the brine circuit	44 W	62 W	64 W	83 W	121 W
Brine fluid type	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.

Building circuit/heating circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Nominal flow at ΔT 5 K	920 l/h	1,530 l/h	1,920 l/h	2,450 l/h	3,320 l/h
Max. remaining feed head with ΔT 5 K	0.065 MPa (0.650 bar)	0.045 MPa (0.450 bar)	0.035 MPa (0.350 bar)	0.073 MPa (0.730 bar)	0.045 MPa (0.450 bar)
Nominal flow with ΔT 8 K	570 l/h	980 l/h	1,240 l/h	1,600 l/h	2,180 l/h
Max. remaining feed head with ΔT 8 K	0.068 MPa (0.680 bar)	0.065 MPa (0.650 bar)	0.057 MPa (0.570 bar)	0.086 MPa (0.860 bar)	0.080 MPa (0.800 bar)
Min. volume flow during continuous operation at the application limits	570 l/h	980 l/h	1,240 l/h	1,600 l/h	2,180 l/h
Max. volume flow during continuous operation at the application limits	920 l/h	1,530 l/h	1,920 l/h	2,450 l/h	3,320 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	25 W	30 W	45 W	60 W	74 W

Performance data

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

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heating output B0/W35 ΔT 5 K	5.30 kW	8.90 kW	11.20 kW	14.50 kW	19.70 kW
Effective power consumption for B0/W35 ΔT 5 K	1.13 kW	1.75 kW	2.24 kW	2.96 kW	4.19 kW
Output figure B0/W35 ΔT 5 K/coefficient of performance EN 14511	4.70	5.10	5.00	4.90	4.70
Heating output B0/W45 ΔT 5 K	5.30 kW	8.80 kW	11.20 kW	14.10 kW	19.60 kW
Effective power consumption B0/W45 ΔT 5 K	1.51 kW	2.32 kW	2.95 kW	3.71 kW	5.30 kW
Output figure B0/W45 ΔT 5 K/coefficient of performance EN 14511	3.50	3.80	3.80	3.80	3.70
Heating output B0/W55 ΔT 8 K	5.40 kW	9.00 kW	11.40 kW	14.70 kW	20.00 kW
Effective power consumption for B0/W55 ΔT 8 K	1.80 kW	2.73 kW	3.56 kW	4.59 kW	6.25 kW
Output figure B0/W55 ΔT 8 K/coefficient of performance EN 14511	3.00	3.30	3.20	3.20	3.20
Heat output B10/W35 ΔT 5 K	6.60 kW	10.50 kW	13.70 kW	17.70 kW	24.20 kW
Effective power consumption for B10/W35 ΔT 5 K	1.14 kW	1.78 kW	2.21 kW	2.81 kW	4.17 kW
Coefficient of performance B10/W35 ΔT 5 K / coefficient of performance EN 14511	5.80	5.90	6.20	6.30	5.80
Heat output B10/W45 ΔT 5 K	6.50 kW	10.70 kW	13.90 kW	17.60 kW	24.30 kW
Effective power consumption B10/W45 ΔT 5 K	1.51 kW	2.33 kW	2.90 kW	3.67 kW	5.17 kW
Coefficient of performance B10/W45 ΔT 5 K / coefficient of performance EN 14511	4.30	4.60	4.80	4.80	4.70
Sound power level B0/W35 EN 12102/EN 14511 L_{w1} in heating mode	39.8 dB(A)	42.4 dB(A)	45.2 dB(A)	49.9 dB(A)	48.4 dB(A)
Sound power level B0/W45 EN 12102/EN 14511 L_{w1} in heating mode	40.7 dB(A)	45.1 dB(A)	46.7 dB(A)	49.3 dB(A)	46.1 dB(A)
Sound power level B0/W55 EN 12102/EN 14511 L_{w1} in heating mode	40.6 dB(A)	49.9 dB(A)	47.2 dB(A)	48.0 dB(A)	48.4 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) 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 (Brine heat source):
 - B15/W65
 - B25/W59
 - B25/W25
 - B-10/W25
 - B-10/W60
 - B-5/W65

O.3 Air heat source**Heat source circuit/brine circuit**

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	1 x VWL 11/4 SA	1 x VWL 11/4 SA	1 x VWL 11/4 SA	2 x VWL 11/4 SA	2 x VWL 11/4 SA
Brine fluid type	Ethylene glycol 44% vol.	Ethylene glycol 44% vol.	Ethylene glycol 44% vol.	Ethylene glycol 44% vol.	Ethylene glycol 44% vol.

Building circuit/heating circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	1 x VWL 11/4 SA	1 x VWL 11/4 SA	1 x VWL 11/4 SA	2 x VWL 11/4 SA	2 x VWL 11/4 SA
Nominal flow at ΔT 5 K	1,070 l/h	1,510 l/h	1,990 l/h	2,650 l/h	3,440 l/h
Max. remaining feed head with ΔT 5 K	0.061 MPa (0.610 bar)	0.042 MPa (0.420 bar)	0.031 MPa (0.310 bar)	0.064 MPa (0.640 bar)	0.038 MPa (0.380 bar)
Nominal flow with ΔT 8 K	660 l/h	1,020 l/h	1,350 l/h	1,720 l/h	2,300 l/h
Max. remaining feed head with ΔT 8 K	0.069 MPa (0.690 bar)	0.056 MPa (0.560 bar)	0.053 MPa (0.530 bar)	0.084 MPa (0.840 bar)	0.075 MPa (0.750 bar)
Min. volume flow during continuous operation at the application limits	660 l/h	1,020 l/h	1,350 l/h	1,720 l/h	2,300 l/h
Max. volume flow during continuous operation at the application limits	1,070 l/h	1,510 l/h	1,990 l/h	2,650 l/h	3,440 l/h
Heating pump electrical power consumption for A7/W35 ΔT 5 K with an external pressure loss of 250 mbar in the heating circuit	28 W	36 W	50 W	70 W	78 W

Performance data

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

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	1 x VWL 11/4 SA	1 x VWL 11/4 SA	1 x VWL 11/4 SA	2 x VWL 11/4 SA	2 x VWL 11/4 SA
A2/W35 heating output	5.70 kW	7.80 kW	10.30 kW	13.90 kW	17.40 kW
Effective power consumption A2/W35	1.36 kW	1.95 kW	2.64 kW	3.39 kW	4.70 kW
A2/W35 output figure/EN 14511 coefficient of performance	4.20	4.00	3.90	4.10	3.70
Heating output A7/W35 ΔT 5 K	6.20 kW	8.80 kW	11.50 kW	15.30 kW	19.80 kW
Effective power consumption A7/W35 ΔT 5 K	1.29 kW	1.91 kW	2.50 kW	3.19 kW	4.50 kW
Output figure A7/W35 ΔT 5 K/coefficient of performance EN 14511	4.80	4.60	4.60	4.80	4.40
Heating output A7/W45 ΔT 5 K	6.10 kW	9.00 kW	12.00 kW	15.60 kW	20.60 kW
Effective power consumption A7/W45 ΔT 5 K	1.65 kW	2.43 kW	3.16 kW	4.00 kW	5.57 kW
Output figure A7/W45 ΔT 5 K/coefficient of performance EN 14511	3.70	3.70	3.80	3.90	3.70
Heating output A7/W55 ΔT 8 K	6.10 kW	9.50 kW	12.20 kW	16.00 kW	20.90 kW

Appendix

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Effective power consumption A7/W55 ΔT 8 K	1.97 kW	2.97 kW	3.81 kW	4.85 kW	6.53 kW
Output figure A7/W55 ΔT 8 K/coefficient of performance EN 14511	3.10	3.20	3.20	3.30	3.20
Cooling output A35/W18 ΔT 5 K, active	6.60 kW	8.60 kW	12.10 kW	15.80 kW	22.30 kW
Effective power consumption A35/W18 ΔT 5 K, active	1.53 kW	2.69 kW	3.56 kW	4.05 kW	6.56 kW
Energy efficiency ratio A35/W18 EN 14511	4,30	3,20	3,40	3,90	3,40
Sound power level A7/W35 EN 12102/EN 14511 L_{w1} in heating mode	40.3 dB(A)	45.8 dB(A)	44.4 dB(A)	48.7 dB(A)	48.1 dB(A)
Sound power level A7/W45 EN 12102/EN 14511 L_{w1} in heating mode	41.0 dB(A)	50.1 dB(A)	46.4 dB(A)	49.4 dB(A)	46.1 dB(A)
Sound power level A7/W55 EN 12102/EN 14511 L_{w1} in heating mode	40.9 dB(A)	52.7 dB(A)	46.1 dB(A)	48.0 dB(A)	46.4 dB(A)
Sound power level A35/W18 EN 12102/EN 14511 L_{w1} in cooling mode	48.3 dB(A)	54.7 dB(A)	49.7 dB(A)	46.8 dB(A)	47.2 dB(A)

Application limits for the heat pump: Heating and cooling (heat source = air)

At the same volume flow rates in the heating circuit (ΔT 5K or ΔT 8 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.

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Application limits for the heat pump: Heating (Air heat source)	A40/W65, A40/W25, A-22/W25, A-22/W25, A-2/W65, A15/W65	A40/W65, A40/W25, A-22/W25, A-22/W25, A-2/W65, A15/W65	A40/W65, A40/W25, A-22/W25, A-22/W25, A-2/W65, A15/W65	A40/W65, A40/W25, A-22/W25, A-22/W25, A-2/W65, A15/W65	A40/W65, A40/W25, A-22/W25, A-22/W25, A-2/W65, A15/W65
Application limits for the heat pump: Cooling (Air heat source)	A20/W20, A40/W20, A40/W5, A20/W5	A20/W20, A40/W20, A40/W5, A20/W5	A20/W20, A40/W20, A40/W5, A20/W5	A20/W20, A40/W20, A40/W5, A20/W5	A20/W20, A40/W20, A40/W5, A20/W5

O.4 Groundwater heat source

Heat source circuit/brine circuit and groundwater circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI	VWW 19/4 SI	VWW 19/4 SI
Nominal flow of groundwater at ΔT 3 K with W10W35	1,450 l/h	2,240 l/h	3,520 l/h	4,540 l/h	5,480 l/h
Brine fluid type	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.	Ethylene glycol 30% vol.

Building circuit/heating circuit

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI	VWW 19/4 SI	VWW 19/4 SI
Nominal flow at ΔT 5 K	1,100 l/h	1,720 l/h	2,170 l/h	2,920 l/h	3,990 l/h
Max. remaining feed head with ΔT 5 K	0.065 MPa (0.650 bar)	0.042 MPa (0.420 bar)	0.023 MPa (0.230 bar)	0.056 MPa (0.560 bar)	0.021 MPa (0.210 bar)
Nominal flow with ΔT 8 K	680 l/h	1,130 l/h	1,420 l/h	1,870 l/h	2,610 l/h
Max. remaining feed head with ΔT 8 K	0.068 MPa (0.680 bar)	0.056 MPa (0.560 bar)	0.047 MPa (0.470 bar)	0.082 MPa (0.820 bar)	0.069 MPa (0.690 bar)
Min. volume flow during continuous operation at the application limits	680 l/h	1,130 l/h	1,420 l/h	1,870 l/h	2,610 l/h

	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Max. volume flow during continuous operation at the application limits	1,100 l/h	1,720 l/h	2,170 l/h	2,920 l/h	3,990 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	35 W	45 W	55 W	100 W	110 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)

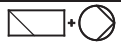
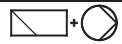
	VWF 57/4	VWF 87/4	VWF 117/4	VWF 157/4	VWF 197/4
Heat source module	VWW 11/4 SI	VWW 11/4 SI	VWW 11/4 SI	VWW 19/4 SI	VWW 19/4 SI
Heating output W10/W35 ΔT 5 K	6.40 kW	10.00 kW	12.90 kW	16.80 kW	23.00 kW
Effective power consumption for W10/W35 ΔT 5 K	1.33 kW	1.92 kW	2.53 kW	3.11 kW	4.42 kW
Output figure W10/W35 ΔT 5 K/coefficient of performance EN 14511	4.80	5.20	5.10	5.40	5.20
Heating output W10/W45 ΔT 5 K	6.30 kW	10.10 kW	12.90 kW	16.60 kW	23.60 kW
Effective power consumption for W10/W45 ΔT 5 K	1.70 kW	2.46 kW	3.23 kW	3.95 kW	5.76 kW
Output figure W10/W45 ΔT 5 K/coefficient of performance EN 14511	3.70	4.10	4.00	4.20	4.10
Heating output W10/W55 ΔT 8 K	6.30 kW	10.30 kW	13.30 kW	17.10 kW	23.80 kW
Effective power consumption for W10/W55 ΔT 8 K	2.10 kW	2.94 kW	4.03 kW	4.75 kW	6.80 kW
Output figure W10/W55 ΔT 8 K/coefficient of performance EN 14511	3.00	3.50	3.30	3.60	3.50
Sound power level W10/W35 EN 12102/EN 14511 L_{wI} in heating mode	41.2 dB(A)	47.9 dB(A)	45.0 dB(A)	49.9 dB(A)	50.6 dB(A)
Sound power level W10/W45 EN 12102/EN 14511 L_{wI} in heating mode	40.9 dB(A)	50.3 dB(A)	47.8 dB(A)	48.0 dB(A)	47.8 dB(A)
Sound power level W10/W55 EN 12102/EN 14511 L_{wI} in heating mode	41.8 dB(A)	53.8 dB(A)	47.6 dB(A)	49.1 dB(A)	46.4 dB(A)

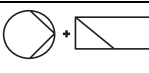
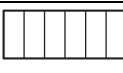
Application limits for the heat pump: Heating (heat source = groundwater)

- At the same volume flow rates in the heating circuit (ΔT 5 K or ΔT 8 K) and the groundwater 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 (Groundwater heat source):
 - W15/W65
 - W25/W59
 - W25/W25
 - W10/W25
 - W10/W65

Appendix

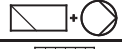
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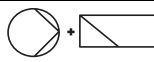
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				L1	L2	L3	L1	L2	L3	L1	L2	L3
				A	A	A	A	A	A	A	A	A
VWF 5X/4 400 V	 		0,0 kW	5,0	4,6	4,6	0,4	0,0	0,0	4,6	4,6	4,6
			2,0 kW	13,7	4,6	4,6	9,1	0,0	0,0	4,6	4,6	4,6
			3,5 kW	5,0	4,6	19,8	0,4	0,0	15,2	4,6	4,6	4,6
			5,5 kW	13,7	4,6	19,8	9,1	0,0	15,2	4,6	4,6	4,6
			7,0 kW	5,0	19,8	19,8	0,4	15,2	15,2	4,6	4,6	4,6
			9,0 kW	13,7	19,8	19,8	9,1	15,2	15,2	4,6	4,6	4,6
VWF 8X/4 400 V	 		0,0 kW	9,7	4,6	4,6	5,1	0,0	0,0	4,6	4,6	4,6
			2,0 kW	18,4	4,6	4,6	13,8	0,0	0,0	4,6	4,6	4,6
			3,5 kW	9,7	4,6	19,8	5,1	0,0	15,2	4,6	4,6	4,6
			5,5 kW	18,4	4,6	19,8	13,8	0,0	15,2	4,6	4,6	4,6
			7,0 kW	9,7	19,8	19,8	5,1	15,2	15,2	4,6	4,6	4,6
			9,0 kW	18,4	19,8	19,8	13,8	15,2	15,2	4,6	4,6	4,6
VWF 11X/4 400 V	 		0,0 kW	13,7	8,2	8,2	5,5	0,0	0,0	8,2	8,2	8,2
			2,0 kW	22,4	8,2	8,2	14,2	0,0	0,0	8,2	8,2	8,2
			3,5 kW	13,7	8,2	23,4	5,5	0,0	15,2	8,2	8,2	8,2
			5,5 kW	22,4	8,2	23,4	14,2	0,0	15,2	8,2	8,2	8,2
			7,0 kW	13,7	23,4	23,4	5,5	15,2	15,2	8,2	8,2	8,2
			9,0 kW	22,4	23,4	23,4	14,2	15,2	15,2	8,2	8,2	8,2

	Compressor		Pumps and electronics control system		Back-up heater		Power source		Electric Wiring Diagram
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Example

The rated current for the VWF 5X/4 heat pump with a output of 5 kW is **13.7 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 **18.4 A**.

I_n VWF xxx/4 400 V				 3~/N/PE 400 V    X101			 3~/N/PE 400 V    X102 X101						
				L1	L2	L3	L1	L2	L3	L1	L2	L3	
VWF 157/4 400 V	 			0,0 kW	10,9	10,0	10,0	0,9	0,0	0,0	10,0	10,0	10,0
			2,0 kW	19,6	10,0	10,0	9,6	0,0	0,0	10,0	10,0	10,0	
			3,5 kW	10,9	10,0	25,2	0,9	0,0	15,2	10,0	10,0	10,0	
			5,5 kW	19,6	10,0	25,2	9,6	0,0	15,2	10,0	10,0	10,0	
			7,0 kW	10,9	25,2	25,2	0,9	15,2	15,2	10,0	10,0	10,0	
			9,0 kW	19,6	25,2	25,2	9,6	15,2	15,2	10,0	10,0	10,0	
	 	X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)		0,0 kW	15,6	10,0	10,0	5,6	0,0	0,0	10,0	10,0	10,0
				2,0 kW	24,3	10,0	10,0	14,3	0,0	0,0	10,0	10,0	10,0
				3,5 kW	15,6	10,0	25,2	5,6	0,0	15,2	10,0	10,0	10,0
				5,5 kW	24,3	10,0	25,2	14,3	0,0	15,2	10,0	10,0	10,0
VWF 197/4 400 V	 			0,0 kW	16,1	15,2	15,2	0,9	0,0	0,0	15,2	15,2	15,2
			2,0 kW	24,8	15,2	15,2	9,6	0,0	0,0	15,2	15,2	15,2	
			3,5 kW	16,1	15,2	30,4	0,9	0,0	15,2	15,2	15,2	15,2	
			5,5 kW	24,8	15,2	30,4	9,6	0,0	15,2	15,2	15,2	15,2	
			7,0 kW	16,1	30,4	30,4	0,9	15,2	15,2	15,2	15,2	15,2	
			9,0 kW	24,8	30,4	30,4	9,6	15,2	15,2	15,2	15,2	15,2	
	 	X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)		0,0 kW	18,8	15,2	15,2	5,6	0,0	0,0	15,2	15,2	15,2
				2,0 kW	29,5	15,2	15,2	14,3	0,0	0,0	15,2	15,2	15,2
				3,5 kW	18,8	15,2	30,4	5,6	0,0	15,2	15,2	15,2	15,2
				5,5 kW	29,5	15,2	30,4	14,3	0,0	15,2	15,2	15,2	15,2
	 			7,0 kW	18,8	30,4	30,4	5,6	15,2	15,2	15,2	15,2	
				9,0 kW	29,5	30,4	30,4	14,3	15,2	15,2	15,2	15,2	15,2

	Compressor		Pumps and electronics control system		Back-up heater		Power source		Electric Wiring Diagram
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	Com-pressor		Pumps and electronics control system		Back-up heater		Power source		Electric Wiring Diagram
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Appendix

I_n VWF xxx/4 400 V				1~N/PE 230 V 3~N/PE 400 V X110 X101				3~N/PE 400 V X102 X101						
				L1 L1 L2 L3				L1 L2 L3 L1 L2 L3						
				A A A A				A A A A A A						
VWF 5X/4 400 V				0,0 kW	0,4	4,6	4,6	4,6	0,0	0,0	0,0	5,0	4,6	4,6
				2,0 kW	0,4	13,3	4,6	4,6	8,7	0,0	0,0	5,0	4,6	4,6
				3,5 kW	0,4	4,6	4,6	19,8	0,0	0,0	15,2	5,0	4,6	4,6
				5,5 kW	0,4	13,3	4,6	19,8	8,7	0,0	15,2	5,0	4,6	4,6
				7,0 kW	0,4	4,6	19,8	19,8	0,0	15,2	15,2	5,0	4,6	4,6
				9,0 kW	0,4	13,3	19,8	19,8	8,7	15,2	15,2	5,0	4,6	4,6
VWF 8X/4 400 V			X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	5,1	4,6	4,6	4,6	0,0	0,0	0,0	9,7	4,6	4,6
				2,0 kW	5,1	13,3	4,6	4,6	8,7	0,0	0,0	9,7	4,6	4,6
				3,5 kW	5,1	4,6	4,6	19,8	0,0	0,0	15,2	9,7	4,6	4,6
				5,5 kW	5,1	13,3	4,6	19,8	8,7	0,0	15,2	9,7	4,6	4,6
				7,0 kW	5,1	4,6	19,8	19,8	0,0	15,2	15,2	9,7	4,6	4,6
				9,0 kW	5,1	13,3	19,8	19,8	8,7	15,2	15,2	9,7	4,6	4,6
VWF 11X/4 400 V			X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	0,6	6,0	6,0	6,0	0,0	0,0	0,0	6,6	6,0	6,0
				2,0 kW	0,6	14,7	6,0	6,0	8,7	0,0	0,0	6,6	6,0	6,0
				3,5 kW	0,6	6,0	6,0	21,2	0,0	0,0	15,2	6,6	6,0	6,0
				5,5 kW	0,6	14,7	6,0	21,2	8,7	0,0	15,2	6,6	6,0	6,0
				7,0 kW	0,6	6,0	21,2	21,2	0,0	15,2	15,2	6,6	6,0	6,0
				9,0 kW	0,6	14,7	21,2	21,2	8,7	15,2	15,2	6,6	6,0	6,0
VWF 11X/4 400 V			X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	5,3	6,0	6,0	6,0	0,0	0,0	0,0	11,3	6,0	6,0
				2,0 kW	5,3	14,7	6,0	6,0	8,7	0,0	0,0	11,3	6,0	6,0
				3,5 kW	5,3	6,0	6,0	21,2	0,0	0,0	15,2	11,3	6,0	6,0
				5,5 kW	5,3	14,7	6,0	21,2	8,7	0,0	15,2	11,3	6,0	6,0
				7,0 kW	5,3	6,0	21,2	21,2	0,0	15,2	15,2	11,3	6,0	6,0
				9,0 kW	5,3	14,7	21,2	21,2	8,7	15,2	15,2	11,3	6,0	6,0
VWF 11X/4 400 V			X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	0,8	8,2	8,2	8,2	0,0	0,0	0,0	9,0	8,2	8,2
				2,0 kW	0,8	16,9	8,2	8,2	8,7	0,0	0,0	9,0	8,2	8,2
				3,5 kW	0,8	8,2	8,2	23,4	0,0	0,0	15,2	9,0	8,2	8,2
				5,5 kW	0,8	16,9	8,2	23,4	8,7	0,0	15,2	9,0	8,2	8,2
				7,0 kW	0,8	8,2	23,4	23,4	0,0	15,2	15,2	9,0	8,2	8,2
				9,0 kW	0,8	16,9	23,4	23,4	8,7	15,2	15,2	9,0	8,2	8,2
VWF 11X/4 400 V			X12 (max. 1,3 A), X14 (max. 0,9 A), X141, X143, X144, X145, (max. 2,5 A)	0,0 kW	5,5	8,2	8,2	8,2	0,0	0,0	0,0	13,7	8,2	8,2
				2,0 kW	5,5	16,9	8,2	8,2	8,7	0,0	0,0	13,7	8,2	8,2
				3,5 kW	5,5	8,2	8,2	23,4	0,0	0,0	15,2	13,7	8,2	8,2
				5,5 kW	5,5	16,9	8,2	23,4	8,7	0,0	15,2	13,7	8,2	8,2
				7,0 kW	5,5	8,2	23,4	23,4	0,0	15,2	15,2	13,7	8,2	8,2
				9,0 kW	5,5	16,9	23,4	23,4	8,7	15,2	15,2	13,7	8,2	8,2

	Compressor		Pumps and electronics control system		Back-up heater		Power source		Electric Wiring Diagram
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	Com-pressor		Pumps and electronics control system		Back-up heater		Power source		Electric Wiring Diagram
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