Installation and service instructions

for contractors

Vitocal 350-G Pro
Type BWR/BWS 352.B027 to BWR/BWS 353.B198, 27.2 to 197.0 kW

Heat pump with electric drive, 2 and 3-stage

VITOCAL 350-G PRO

5855865 GB 1/2022

Please keep safe.

Safety instructions

⚠ Please follow these safety instructions closely to prevent accidents and material losses.

Safety instructions explained

⚠ **Danger**
This symbol warns against the risk of injury.

! **Please note**
This symbol warns against the risk of material losses and environmental pollution.

Note
Details identified by the word "Note" contain additional information.

Target group

These instructions are exclusively intended for qualified contractors.

- Work on the refrigerant circuit may only be carried out by authorised refrigeration engineers.
- Work on electrical equipment may only be carried out by a qualified electrician.
- The system must be commissioned by the system installer or a qualified person authorised by the installer.

Regulations to be observed

- National installation regulations
- Statutory regulations for the prevention of accidents
- Statutory regulations for environmental protection
- Codes of practice of the relevant trade associations
- Relevant country-specific safety regulations

Safety instructions (cont.)

Safety instructions for working on the system

Working on the system

- Isolate the system from the power supply, e.g. by removing the separate fuse or by means of a mains isolator, and check that it is no longer live.
  Note
  In addition to the control circuit there may be several power circuits.

  ⚠ **Danger**
  Contact with live components can result in severe injuries. Some components on PCBs remain live even after the power supply has been switched off.
  Prior to removing covers from the appliances, wait at least 4 minutes until the voltage has completely dropped out.
- Safeguard the system against reconnection.
- Wear suitable personal protective equipment when carrying out any work.

⚠ **Danger**
Hot surfaces and fluids can result in burns or scalding.
- Before maintenance and service work, switch off the appliance and let it cool down.
- Do not touch hot surfaces on the appliance, fittings or pipework.

! **Please note**
Electronic assemblies can be damaged by electrostatic discharge.
Before beginning work, touch earthed objects, such as heating or water pipes, to discharge any static.

Work on the refrigerant circuit

Refrigerants are air displacing, colourless, odourless gases.
R134a is not flammable.

⚠ **Danger**
Excessively high pressure in the refrigerant circuit can cause the circuit to burst and release refrigerant. If the refrigerant comes into contact with flames, it may break down into toxic substances.
- Keep away from the appliance.
- It is extremely important to observe the firefighting instructions.
- The leak test must only be carried out with the heat pump switched off.
- The safety high pressure switch/ limiter must only be tripped with the casing closed.

⚠ **Danger**
Direct contact with liquid and gaseous refrigerant can cause serious damage to health.
- Prevent direct contact with liquid and gaseous refrigerant.
- Wear personal protective equipment when handling liquid and gaseous refrigerant.

⚠ **Danger**
Unregulated escape of refrigerant in enclosed spaces can lead to breathing difficulties and suffocation.
- Never breathe in refrigerant vapours.
- Ensure adequate ventilation in enclosed spaces.

Perform the following measures before beginning work on the refrigerant circuit:
- Check the refrigerant circuit for leaks.
- Ensure very good ventilation especially in the floor area and sustain this for the duration of the work.

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Safety instructions (cont.)

- Inform all persons in the vicinity of the system about the type of work to be carried out.
- Secure the area surrounding the work area.
- If brazing/soldering or welding work is being carried out, a CO_2 or powder extinguisher must be to hand.

Danger
Damage to the refrigerant circuit can cause refrigerant to enter the hydraulic system. This can cause serious damage to health.
After completion of the work, professionally vent the hydraulic system on the primary and secondary sides.

Repair work

Please note
Repairing components that fulfil a safety function can compromise the safe operation of the system.
Replace faulty components only with genuine Viessmann spare parts.

Auxiliary components, spare and wearing parts

Please note
Spare and wearing parts that have not been tested together with the system can compromise its function. Installing non-authorised components and making non-approved modifications or conversions can compromise safety and may invalidate our warranty.
For replacements, use only original spare parts supplied or approved by Viessmann.

Safety instructions for operating the system

If water escapes from the appliance

Danger
If water escapes from the appliance there is a risk of electric shock.
Switch off the heating system at the external isolator (e.g. fuse box, domestic distribution board).

Danger
If water escapes from the appliance, there is a risk of scalding.
Never touch hot heating water.

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Index (cont.)

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Occupational safety

Responsibilities during the lifecycle

Lifecycle	System user	External personnel	Manufacturer	Refrigeration engineer	Logistics	Electrician/ heating contractor	Service engineer	Disposal contractor
Manufacture, delivery		X	X					
Moving, handling, siting	X	X		X	X	X		
Installation		X		X		X		
Commissioning	X	X		X		X	X	
Operation	X	X						
Maintenance, repair, shutdown	X	X		X		X	X	
Dismantling, removal, collection		X		X	X	X		X
Disposal		X		X				X

Personal protective equipment

The wearing of personal protective equipment is required by law.

Technicians/contractors carrying out work on the appliance require the following protective equipment:

Personal protective equipment (PPE) based on EN 378-1 and EN 378-3 ①	Intended use		
	Operation		
	Transport	Service, repairs (maintenance, repair and recovery)	Welding and brazing/soldering work
Protective gloves, safety goggles, safety shoes and protective clothing	X	X	X
Hearing protection		X	X
Respirator ②		X	X

Personal protective equipment (PPE) based on EN 378-1 and EN 378-3 ①	Use in emergencies
Respiratory protective devices ③ to EN 132, EN 133, EN 134, EN 136, EN 137, EN 14387 and EN 14594	X
First aid kit ④	X
Respiratory protective device ⑤ with filter (full face mask) or self-contained respiratory protective device/breathing apparatus	X

Occupational safety (cont.)

① The following applies to personal protective equipment and equipment for use in emergencies:
- The type of equipment depends on the quantity and type of refrigerant and must be agreed with the local emergency services.
- It should be easily accessible.
- It should be stored carefully, away from exposure to adverse influences, and normally outside the room in which a refrigerant leak may occur, but close to the entrance to this room.
- It should be checked and maintained regularly in accordance with the manufacturer's recommendations. If faults or defects are found, the equipment must be replaced immediately.
- The equipment must be suitable for the application (temperature, climatic conditions of the surroundings...).

② Respirator
- To EN 132, EN 133, EN 134, EN 135, EN 136, EN 14593-1, EN 14593-2 and EN 14594
- It is imperative to observe the information in EN 378-3, A.1.6!
- In the case of heat pumps containing Group A1 refrigerant, always use a respiratory protective device with a filter when carrying out welding or brazing/soldering work in the presence of refrigerant. The filter element must offer protection from decomposition products!

③ Respiratory protective devices should be suitable for the refrigerant used.

④ Depending on the type of refrigerant used, a first aid kit, medicines and special chemical preparations, as well as protective covers, etc., should be provided and should be stored outside the plant/ engineering room but close to its entrance. It is particularly important to ensure that means of treating eye injuries quickly are readily available. Medicines and other chemical preparations in the first aid kit should only be provided after prior consultation with healthcare professionals. (In accordance with EN 378-3, A.3.3)

⑤ If self-contained respiratory protective devices/ breathing apparatus are provided at the installation site – in consultation with the local emergency services – these should be maintained regularly by suitably qualified persons and should only be used by appropriately trained personnel who are familiar with and know how to handle the make and type of equipment provided.

What to do in an emergency

1. Alert the rescue teams
2. Provide first aid
3. Evacuate the room, depending on the situation

If there are injuries, use the first aid kit (must be provided on site).

R134a refrigerant

Immediate actions in the event of an emergency

First aid measures for the following types of contact with the refrigerant

Inhalation	High concentrations may cause asphyxiation. Symptoms may include loss of mobility and consciousness. The casualty may not be aware of asphyxiation. Wearing self-contained breathing apparatus, move the casualty into the fresh air. Keep the casualty warm and calm. Call a doctor. If breathing stops, administer artificial respiration.
Contact with eyes	Immediately flush the eye with water. Where possible, remove any contact lenses. Continue flushing out the eye. Thoroughly flush the eye with water for at least 15 minutes. Seek medical attention immediately. If medical assistance is not immediately available, continue flushing the eye for a further 15 minutes.
Contact with skin	Contact with evaporating fluid can cause frostbite.
Ingestion	Ingestion is not considered a likely route of exposure.

Most important acute and delayed symptoms and effects

Respiratory arrest. Contact with liquefied gas may cause damage (frostbite) due to the rapid evaporative cooling effect.

Occupational safety (cont.)

Immediate medical assistance or special treatment required

Risks	Respiratory arrest. Contact with liquefied gas may cause damage (frostbite) due to the rapid evaporative cooling effect.
Treatment	Thaw out frozen areas of tissue with lukewarm water. Do not rub the affected area. Get medical advice/attention immediately.

Firefighting measures

General fire hazards

Containers may explode when exposed to heat.

Extinguishing media

Suitable extinguishing media	In the event of a fire in the surrounding area, use suitable fire extinguishing media.
Unsuitable extinguishing media	None

Special hazards arising from the substance or mixture

In the event of a fire or intense heat, hazardous decomposition products may develop.

Hazardous combustion products	Exposure to fire may result in the following toxic and/or corrosive substances being formed due to thermal decomposition: Carbon oxides, fluorocarbons, hydrogen fluoride, carbonyl difluoride

Information for firefighters

Information for firefighters	The substance does not burn. In the event of a fire in the surrounding area, use suitable fire extinguishing media.
Special safety equipment for firefighting	Fire-fighting personnel must wear standard safety equipment, including flame-retardant jackets, helmets with face shield, gloves and rubber boots, as well as self-contained respiratory protective devices in enclosed rooms. Guideline: EN 469:2005: Protective clothing for firefighters. Performance requirements for protective clothing for firefighting. EN 15090 Footwear for firefighters EN 659 Protective gloves for firefighters EN 443 Helmets for fire fighting in buildings and other structures EN 137 Respiratory protective devices. Self-contained open-circuit compressed air breathing apparatus with full face mask. Requirements, testing, marking.

Measures for accidental release of refrigerant

Personal precautions, protective equipment and emergency procedures	Clear the area. Ensure sufficient ventilation. Prevent discharge into sewers, basements and work pits and any locations where accumulation may be hazardous. When entering the area, wear self-contained breathing apparatus unless the environment has been verified as safe. EN 137 Respiratory protective devices. Self-contained open-circuit compressed air breathing apparatus with full face mask. Requirements, testing, marking.

Safety concept (protection of heat pump from excessive pressure except in the event of external fires)

The following table provides an overview with information on the overall safety concept.

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Occupational safety (cont.)

Side/component	No fire
Refrigerant side	
Safety high pressure switch/limiter	X
Primary and secondary side	
External pressure relief valve	X ①
High limit temperature cut-out device	X ②

① The persons responsible for the water-side installation are tasked with selecting the appropriate safety valves.

② On-site installation to protect from high temperatures on the primary and secondary side of the heat pump.
The heat pump control unit does not contain any safety functions for the external heat generator. To prevent excessive temperatures in the heat pump flow and return in case of a fault, high limit safety cut-outs must be provided to stop the external heat generator (switching threshold 70 °C).

As protection from overpressure, the refrigerant circuit is equipped with a pressure limiter for each compressor; a safety valve to EN 378-2, 6.2.6.2 is not required.

Danger
If the heat pump is exposed to fire, the refrigerant circuit may burst as a result of overpressure. This will result in a release of refrigerant. If the refrigerant comes into contact with flames, it may break down into toxic substances.
Keep away from the appliance!
The provision of firefighting instructions is essential and is the responsibility of the fire safety officer.
Suitable fire extinguishers for firefighting must be easily accessible.

When carrying out leak tests, never use air or a gas containing oxygen to drain the pipes or create a vacuum in the appliance (risk of explosion as oxygen reacts strongly with oil and grease). Use only dry nitrogen for leak tests, if required with a suitable tracer gas. Never exceed the maximum operating pressures! For information on the maximum permissible test pressures on the low and high pressure sides, see "Specification" or the type plate.

Compressor safety chain

Note
*The safety chain must be checked **at least** once per year.*
In standard operating conditions, its service life is usually the same as that of the appliance.

Note
The safety high pressure switch/limiter must only be tripped with the casing closed.

In compliance with EN 378-2, the heat pumps are designed with a safety chain which consists of the following components for each compressor.

Components included

Safety chain components	Protective function / trips at
▪ Safety high pressure switch (types B027 to B056) ▪ Safety high pressure limiter (types B076 to B198)	Overpressure in high pressure side of refrigerant circuit
Winding protection, compressor	Overcurrent
Overload fuse protection, compressor	Overcurrent/overload and short circuit
Soft starter, compressor	Overcurrent

Note
In accordance with EN 378, a fire is not a criterion for consideration in this safety chain.

For the positions of the electrical and refrigerant circuit components, see pages 42 and 79.
For a detailed function description of the soft starter, see "Electronic soft starter, type SMC", on page 56.

Function description and reset

The safety high pressure switch (dual safety high pressure switch) must be reset manually by pressing reset button 1 and/or 2. Stage 2 can only be unlocked by a service engineer.
The soft starter must be reset by pressing the reset button.
The winding protection is reset automatically.
The "self-locking" alarm message must then be acknowledged.

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Occupational safety (cont.)

Note
Observe the instructions in "Checks in the event of safety accessory failure"!

Checks in the event of safety accessory failure

If the compressor safety chain has tripped, the appliance must be shut down immediately.

Before restarting, all functions on the appliance and on the safety equipment must be checked. See chapter "Commissioning, inspection, maintenance".
If the checks reveal a fault which could be the cause of the overpressure in the refrigerant circuit, all pressure equipment must then be checked for mechanical integrity.

Electrical connections

⚠ **Danger**
Electromagnetic radiation near the wiring chamber of the heat pump control unit can interfere with electrical devices such as heart pacemakers and defibrillators.
- Wearers of heart pacemakers:
  Avoid immediate proximity to the wiring chamber of the heat pump control unit. If necessary, consult a doctor beforehand.
- Store and use defibrillators outside the area at risk.

⚠ **Danger**
Incorrect electrical installations can lead to serious injury from electrical current and result in appliance damage.

Connect the power supply and implement all safety measures (e.g. RCD circuit) in accordance with the following regulations:
- IEC 60364-4-41
- VDE regulations
- TAR medium voltage VDE-AR-N-4110

⚠ **Danger**
Contact with live components can lead to serious injury from electric current. Some components on PCBs remain live even after the power supply has been switched off.
- Switch off the power supply to the system (e.g. at a separate fuse or mains isolator). Check the system is isolated from the power supply and safeguard against reconnection.
  In addition to the control circuit there may be several power circuits.
- Prior to removing the heat pump covers, wait **at least 4 minutes** until the voltage has dropped out.
- Never touch terminal areas of the heat pump control unit or power connections (see page 41).

⚠ **Danger**
The absence of component earthing can result in serious injury from electrical current and in component damage in the event of an electrical fault.
- Restore all protective conductor connections of the heat pump.
- The heat pump and pipework must be grounded to the equipotential bonding of the building.

Note
Observe all information in the "safety instructions".
For further information regarding electrical connections, see page 40 onwards.

Working on the heat pump

Note
Before commissioning and after repair or maintenance work, check that the heat pump is in the intended condition.

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Occupational safety (cont.)

Danger
Heavy and unwieldy heat pump components can result in life threatening crushing or breakages if they fall or are dropped.
- Use suitable ropes/slings and lifting gear when installing/dismantling compressors and heat exchangers, for example.
- Wear appropriate protective clothing (e.g. safety boots) in compliance with applicable regulations on accident prevention and in line with trade association recommendations.

Working on the refrigerant circuit

Danger
Direct contact with refrigerant can be harmful to the skin.
- Always wear safety goggles and safety gloves when working on the refrigerant circuit
  Note
  *Work on the **refrigerant circuit** may only be carried out by a qualified **refrigeration engineer**.*
- Wear suitable protective clothing.
- The leak test must only be carried out with the heat pump switched off.
- The safety high pressure switch/limiter must only be tripped with the casing closed.

Danger
Refrigerant circuits of heat pumps develop extremely low (–25 °C) and very high (+130 °C) temperatures. Work on heat pumps can result in life threatening frostbite and burns.
- Switch off the heat pump **at least 30 min** before maintenance work.
- Do not touch the injection valve or compressor. Wear protective gloves if necessary.
- Wear suitable protective clothing.

Danger
Refrigerant R134a is a non-poisonous gas that displaces air. Unregulated escape of refrigerant R134a in enclosed spaces can result in breathing difficulties and suffocation.
- Never breathe in refrigerant vapours.
- Ensure adequate ventilation in enclosed spaces.
- Prevent open flames.
- Always observe regulations and guidelines on handling this type of refrigerant.

Disposal of packaging

Please dispose of packaging waste in line with statutory regulations.

Symbols

Symbol	Meaning
	Reference to other document containing further information
	Step in a diagram: The numbers correspond to the order in which the steps are carried out.
	Warning of material losses and environmental pollution
	Live electrical area
	Pay particular attention.
	▪ Component must audibly click into place. or ▪ Acoustic signal
	▪ Fit new component. or ▪ In conjunction with a tool: Clean the surface.
	Dispose of component correctly.
	Dispose of component at a suitable collection point. Do **not** dispose of component in domestic waste.

The steps in connection with commissioning, inspection and maintenance are found in the "Commissioning, inspection and maintenance" section and identified as follows:

Symbol	Meaning
	Steps required during commissioning
	Not required during commissioning
	Steps required during inspection
	Not required during inspection
	Steps required during maintenance
	Not required during maintenance

Intended use

The Vitocal 350-G Pro heat pump,
type BWR/BWS 352.B027 to BWR/BWS 353.B198,
can be used for the following purposes:

Type BWR/BWS
- Generation of cooling and/or heating
- Room heating and room cooling via a heating system
- DHW heating

Type BWR
- Remote monitoring/remote control of the heat pump and heating system via Ethernet interface
- As master heat pump in combination with a slave heat pump

Type BWS
- As slave heat pump in combination with a master heat pump of the same series and size

Intended use (cont.)

Intended use presupposes that a fixed installation in conjunction with permissible, system-specific components has been carried out.
Power supply: Up to 1000 A and 400 V

For operation in industry, commerce, property development with enclosed boiler room

Commercial or industrial usage for a purpose other than central heating/cooling or DHW heating shall be deemed inappropriate.

Incorrect use and/or operation of the appliance (e.g. the appliance being opened by the system user) is prohibited and will result in an exclusion of liability. Incorrect use also occurs if the components in the heating system are modified from their intended function.

Note
The room in which the heat pump is operated must only be accessible to authorised and trained personnel. In addition, the appliance must only be operated by authorised and trained personnel.

Product information

Vitocal 350-G Pro

Medium	Brine/water
2-stage heat pumps	Type BWR/BWS 352.B027, 352.B034, 352.B056, 352.B076, 352.B097, 352.B114, 352.B132, 352.B156
3-stage heat pumps	Type BWR/BWS 353.B172, 353.B198

Key points

- Brine/water heat pump
- Integral Vitotronic SPS heat pump control unit, type 2.0
- The refrigerant circuit has an electronic expansion valve (EEV).
- The heat pump control unit can activate and control a heating circuit provided on site for cooling or a separate cooling circuit.
- All sensors are fitted inside sensor wells.
- It is possible to expand the output with a master/slave system.
  This requires a master heat pump (type BWR) combined with a slave heat pump (type BWS) of the same series and size.

Application limits

System limit	See hydraulic scheme, connection and wiring diagram
Service life	
▪ Heat pump	15 to 25 years
▪ Wearing parts (filter dryer, refrigerant oil) ***Note*** *Refrigerant oil is available from your local retailer.*	Depending on the time in use and the operating point
▪ Control system power supply (UPS)	20 years, depending on ambient temperature conditions
▪ Safety components	In standard operating conditions, service life is usually the same as that of the appliance. Annual function check required

System examples

Available system examples: See **www.viessmann-schemes.com**.

Product information (cont.)

Spare parts lists

Information about spare parts can be found at **www.viessmann.com/etapp** or in the Viessmann spare part app.

General information on electrical connection

- **Electrical connection of system components**
  (pumps, mixers, valves, message facilities, contactors, function extensions, sensors, etc.):
  Connections are made inside the heat pump wiring chamber. See information from page 40.
- **Power supply**
  The number of power cables from the distribution board (meter box) to the heat pump control unit and the control panel depends on the system version and tariffs used.
  Connections are made inside the heat pump control panel. See information from page 55.

Transport and siting requirements: Heat pump

- The heat pump is delivered as a standard unit. Side panels are packed separately for fitting on site.
- The programming unit of the Vitotronic SPS is delivered loose inside the wiring chamber and must be fitted and connected on site.
- Accessories are delivered separately.
- The heat pump has been charged with oil and refrigerant at the factory.

Unloading and transport

Note
Before unloading, check the consignment for damage. Note down any damage on the delivery note and notify the haulage contractor.

- Lifting gear, such as slings and cross beams, must be provided on site.
- The lifting capacity of each sling and that of the cross beam must be at least equal to the shipping weight. See "Specification".
- Only use suitable equipment for unloading the lorry; see the following chapter.

Please note
Incorrect unloading and transporting can result in damage to the appliance.
- **Never** put weight on top of the appliance.
- Protect the paint finish:
  Wrap the lifting gear (such as ropes, cross beams) and place padding between the heat pump and lifting gear.
- Observe correct weight distribution when lifting. Due to the heat exchanger, the heat pump centre of gravity is on the left-hand side.
- To protect heat pump pipework:
  Avoid bumps and shocks.
- To protect the refrigerant circuit:
  Do not tilt the compressor too far. **Max.** heat pump tilting angle 30°.

Note
Viessmann Climate Solutions SE accepts no liability for any damage resulting from incorrect handling.

Transport and siting requirements: Heat pump (cont.)

Handling by crane

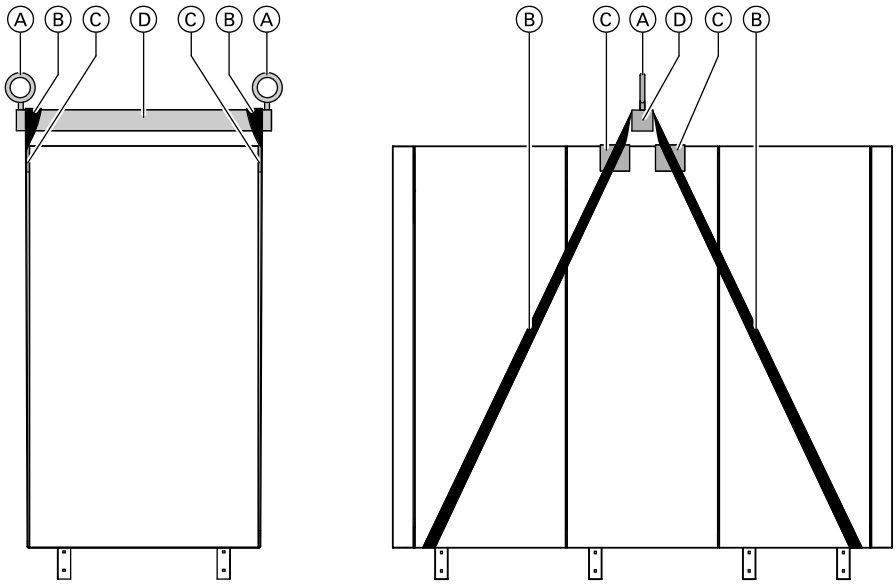

Fig. 1

Ⓐ Lifting shackle attachment points
Ⓑ Sling suitable for the weight (see page 18)
Ⓒ Edge protection (e.g. 2 or 3 layers of corrugated cardboard)
Ⓓ Cross beam to relieve the load on the frame

Note
*Lifting with slings is only permitted **without** the side, front or back panels fitted.*

Handling by forklift truck or pallet truck

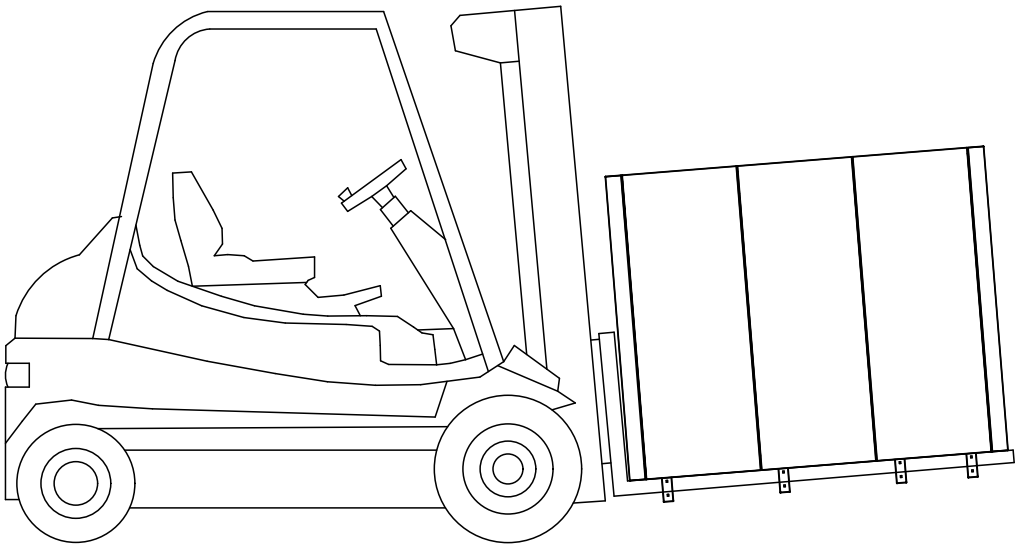

Fig. 2

Information regarding transport with forklift truck
- Select a fork length in line with the heat pump length; see "Specification" from page 82.
- The heat pump centre of gravity is on the left-hand side.
- Use edge protection (e.g. 2 or 3 layers of corrugated cardboard).

Note
*Transport by forklift truck is only permitted **without** the side, front and back panels fitted.*

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Transport and siting requirements: Heat pump (cont.)

Installation room requirements

Please note
Unfavourable ambient conditions can lead to malfunctions and appliance damage.
- The installation room must be dry and free from the risk of frost.
- Ensure ambient temperatures between 3 and 30 °C.

Danger
Dust, gases and vapours can be damaging to health and trigger explosions.
Avoid dust, gases and vapours in the installation room.

Please note
Overloading the floor can result in damage to the building structure.
Observe the permissible floor load. Take the weight of the appliance into account.

Weight

Type	Weight in kg
BWR/BWS 352.B027	555
BWR/BWS 352.B034	672
BWR/BWS 352.B056	723
BWR/BWS 352.B076	963
BWR/BWS 352.B097	1065
BWR/BWS 352.B114	1113
BWR/BWS 352.B132	1209
BWR/BWS 352.B156	1260
BWR/BWS 353.B172	1604
BWR/BWS 353.B198	1678

- To prevent the transmission of structure-borne noise, never site the appliance above ceilings with wooden joists (e.g. in the attic).
- Level the appliance horizontally.
  Where floors are uneven, distribute the load evenly across the feet.
- Observe minimum room volume (to EN 378).
  Observe additional country-specific regulations.
- Observe the floor area and minimum clearances (see following chapter).

Minimum room volume, based on the available air volume

Taking into account the type and charge weight of the refrigerant used, the following minimum room volumes result.

Note
Refrigerant charge, see "Specification" or type plate.

Type	Minimum room volume in m^3
BWR/BWS 352.B027	17
BWR/BWS 352.B034	21
BWR/BWS 352.B056	26
BWR/BWS 352.B076	30
BWR/BWS 352.B097	40
BWR/BWS 352.B114	48
BWR/BWS 352.B132	56
BWR/BWS 352.B156	68
BWR/BWS 353.B172	76
BWR/BWS 353.B198	88

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Transport and siting requirements: Heat pump (cont.)

Minimum clearances

Ensure adequate clearance around the system for maintenance, repair and dismantling.

One heat pump

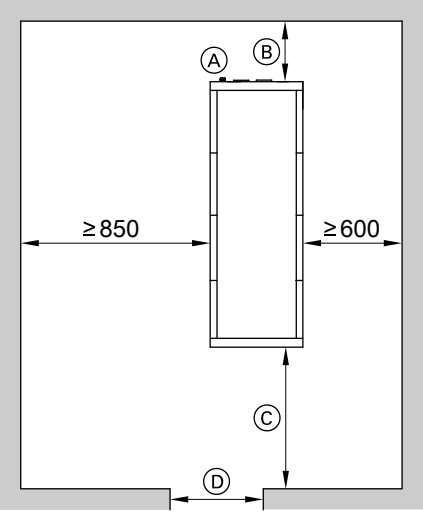

Fig. 3

Master/slave with two heat pumps

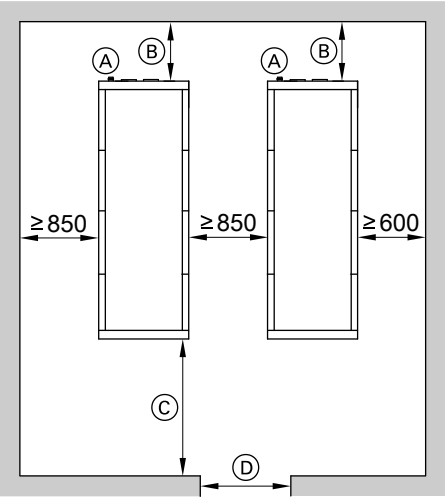

Fig. 4

Ⓐ Power cable entry
Ⓑ With connection set and anti-vibration expansion joints (accessories)
Ⓒ Clearances for installation and maintenance: ≥ 500 mm
Ⓓ Clearance (according to DIN 18101)

Type BWR/BWS	Minimum clearance in mm	
	Ⓑ	Ⓓ
352.B027	700	800
352.B034	800	800
352.B056	800	800
352.B076	700	944
352.B097	700	944
352.B114	700	944
352.B132	1000	944
352.B156	1000	944
353.B172	1000	944
353.B198	1000	944

Note
The electronic injection valve and the compressor wiring chamber are located on the right-hand side.

Anti-vibration base

The heat pump should be sited on a base prepared on site for the purpose of optimised noise attenuation and even weight distribution.

Note
In the case of corner installation, enlarge the base by the minimum clearances (see chapter "Minimum clearances" on page 19).

Transport and siting requirements: Heat pump (cont.)

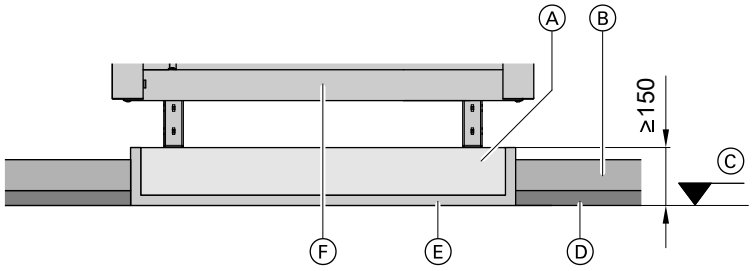

Fig. 5

Ⓐ Reinforced concrete B25
Ⓑ Floor construction, screed
Ⓒ Top edge unfinished floor
Ⓓ Impact sound insulation as per regulations
Ⓔ Pressure-tested sound insulation layer, approx. 10 to 20 mm thick
Ⓕ Heat pump

Pressure points of the heat pump feet

Types BWR/BWS 352.B027, BWR/BWS 352.B034, BWR/BWS 352.B056

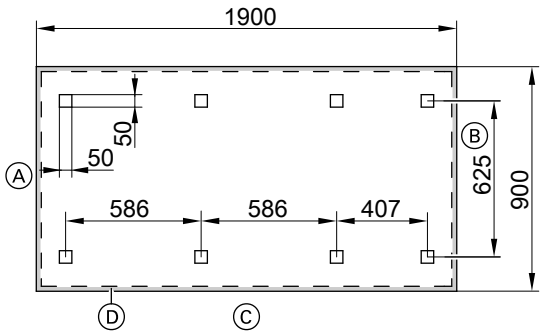

Fig. 6

☐ Pressure point, foot
Ⓐ Connection area
Ⓑ Operating side
Ⓒ Service area
Ⓓ Pressure-tested sound insulation layer, approx. 10 to 20 mm

Types BWR/BWS 352.B076, BWR/BWS 352.B097, BWR/BWS 352.B114, BWR/BWS 352.B132, BWR/BWS 352.B156

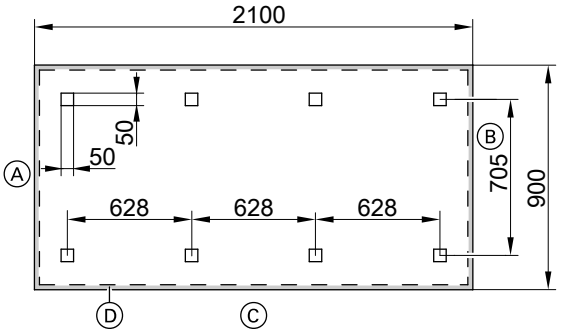

Fig. 7

☐ Pressure point, foot
Ⓐ Connection area
Ⓑ Operating side
Ⓒ Service area
Ⓓ Pressure-tested sound insulation layer, approx. 10 to 20 mm

Types BWR/BWS 353.B172, BWR/BWS 353.B198

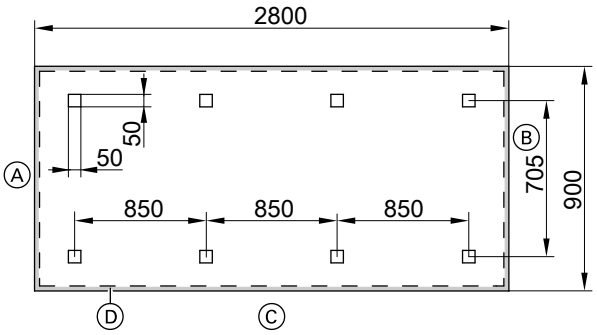

Fig. 8

☐ Pressure point, foot
Ⓐ Connection area

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Transport and siting requirements: Heat pump (cont.)

Ⓑ Operating side
Ⓒ Service area
Ⓓ Pressure-tested sound insulation layer, approx. 10 to 20 mm

Requirements for on-site connections

Dimensions, types BWR/BWS 352.B027, BWR/BWS 352.B034 and BWR/BWS 352.B056

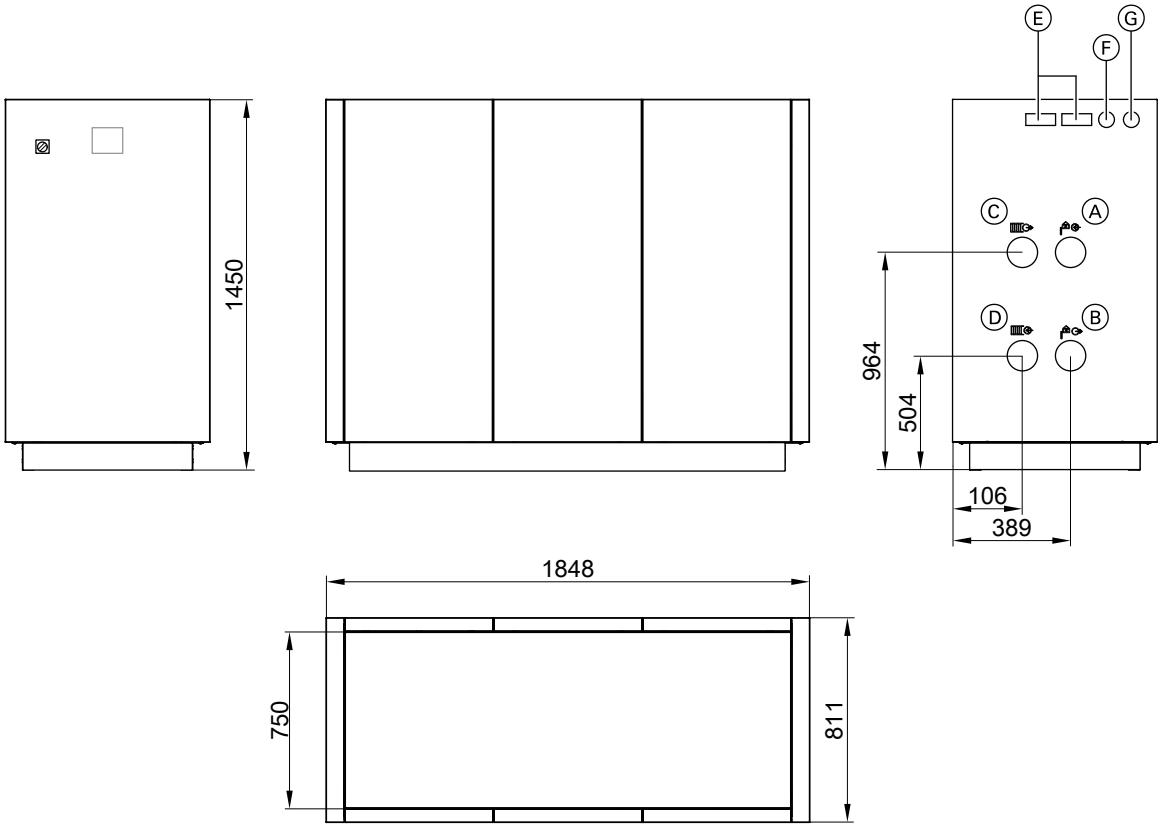

Fig. 9

Ⓐ Primary circuit flow (brine inlet)
Ⓑ Primary circuit return (brine outlet)
Ⓒ Secondary circuit flow (outlet)
Ⓓ Secondary circuit return (inlet)
Ⓔ Extra low voltage (ELV) < 50 V
Ⓕ Power supply 230 V/50 Hz
Ⓖ Power supply 400 V/50 Hz

Note
The dimensions excluding the side panels are the transport dimensions for handling.

Requirements for on-site connections (cont.)

Dimensions, types BWR/BWS 352.B076, BWR/BWS 352.B097 and BWR/BWS 352.B114

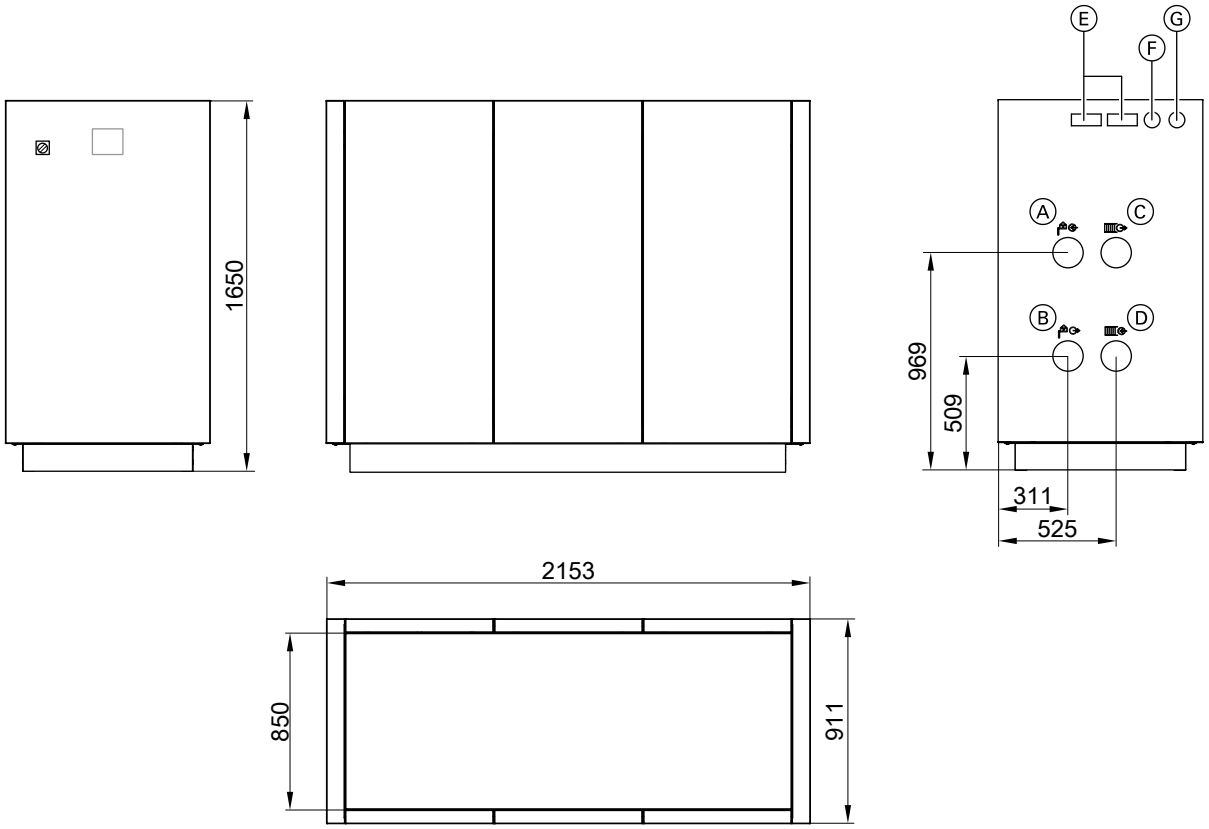

Fig. 10

Ⓐ Primary circuit flow (brine inlet)
Ⓑ Primary circuit return (brine outlet)
Ⓒ Secondary circuit flow (outlet)
Ⓓ Secondary circuit return (inlet)
Ⓔ Extra low voltage (ELV) < 50 V
Ⓕ Power supply 230 V/50 Hz
Ⓖ Power supply 400 V/50 Hz

Note
The dimensions excluding the side panels are the transport dimensions for handling.

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Requirements for on-site connections (cont.)

Dimensions, types BWR/BWS 352.B132 and BWR/BWS 352.B156

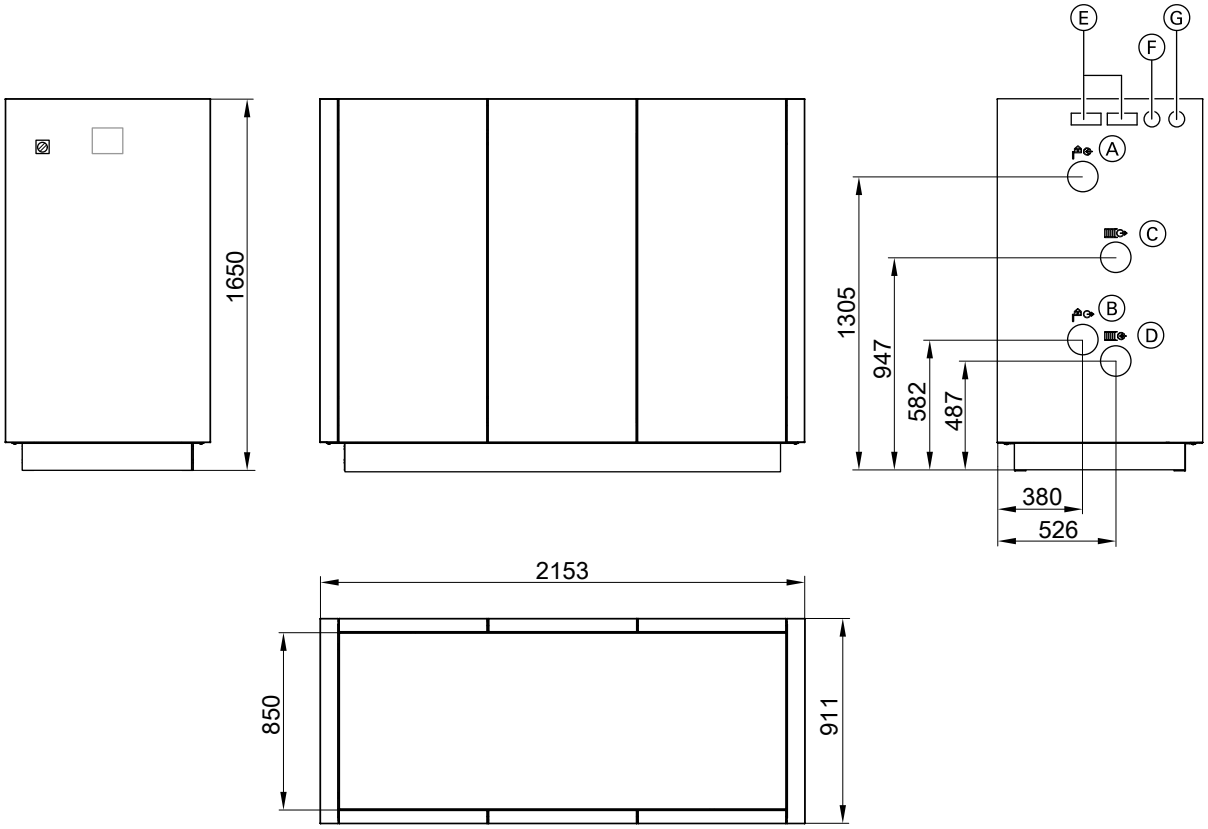

Fig. 11

Ⓐ Primary circuit flow (brine inlet)
Ⓑ Primary circuit return (brine outlet)
Ⓒ Secondary circuit flow (outlet)
Ⓓ Secondary circuit return (inlet)
Ⓔ Extra low voltage (ELV) < 50 V
Ⓕ Power supply 230 V/50 Hz
Ⓖ Power supply 400 V/50 Hz

Note
The dimensions excluding the side panels are the transport dimensions for handling.

Requirements for on-site connections (cont.)

Dimensions, types BWR/BWS 353.B172 and BWR/BWS 353.B198

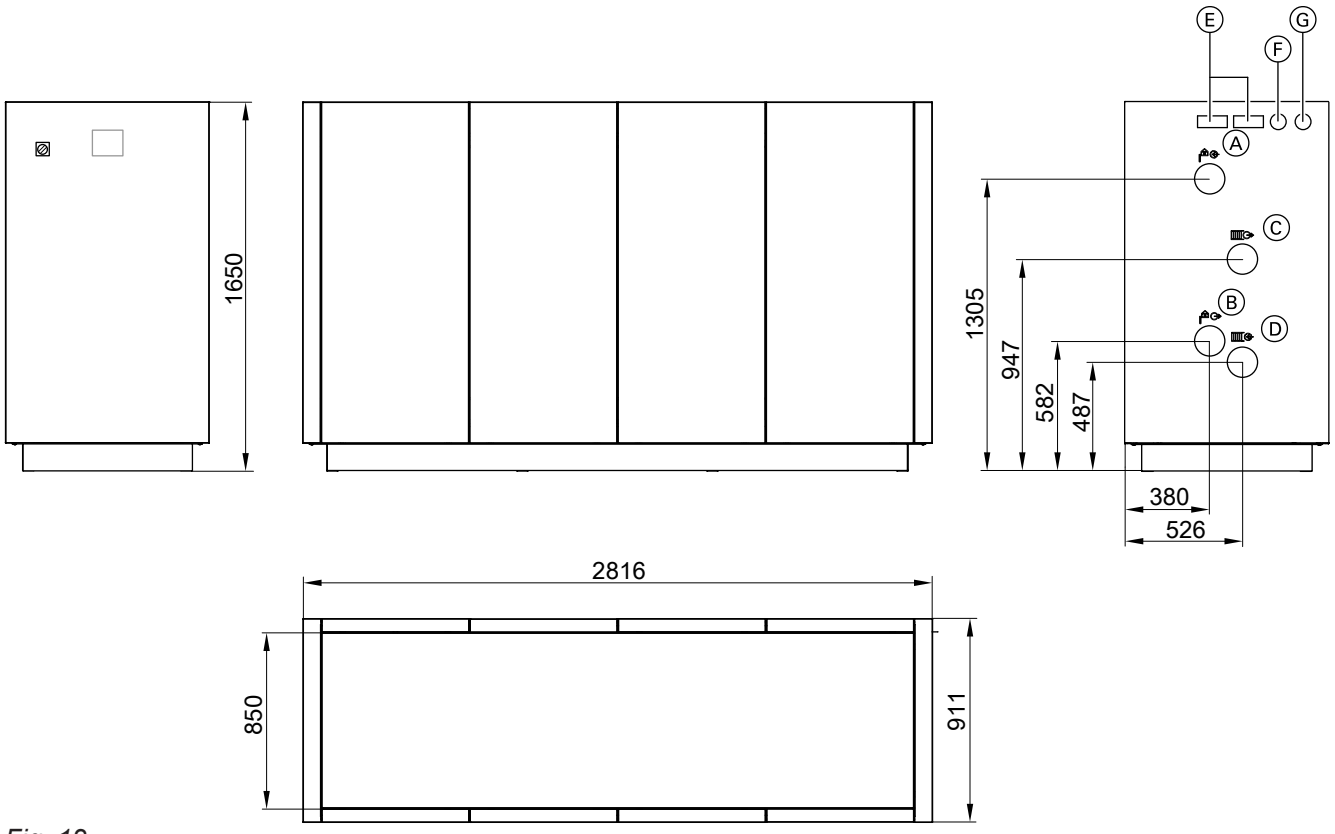

Fig. 12

Ⓐ Primary circuit flow (brine inlet)
Ⓑ Primary circuit return (brine outlet)
Ⓒ Secondary circuit flow (outlet)
Ⓓ Secondary circuit return (inlet)
Ⓔ Extra low voltage (ELV) < 50 V
Ⓕ Power supply 230 V/50 Hz
Ⓖ Power supply 400 V/50 Hz

Note
The dimensions excluding the side panels are the transport dimensions for handling.

Hydraulic connection requirements

- Make on-site hydraulic connections stress-free.
- Make the hydraulic connections between several heat pumps on site.
- All components required for the cooling circuit must be provided on site. This must be achieved with an appropriately sized plate heat exchanger.

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Hydraulic connection requirements (cont.)

Overall hydraulic diagram for heat sources geothermal and water

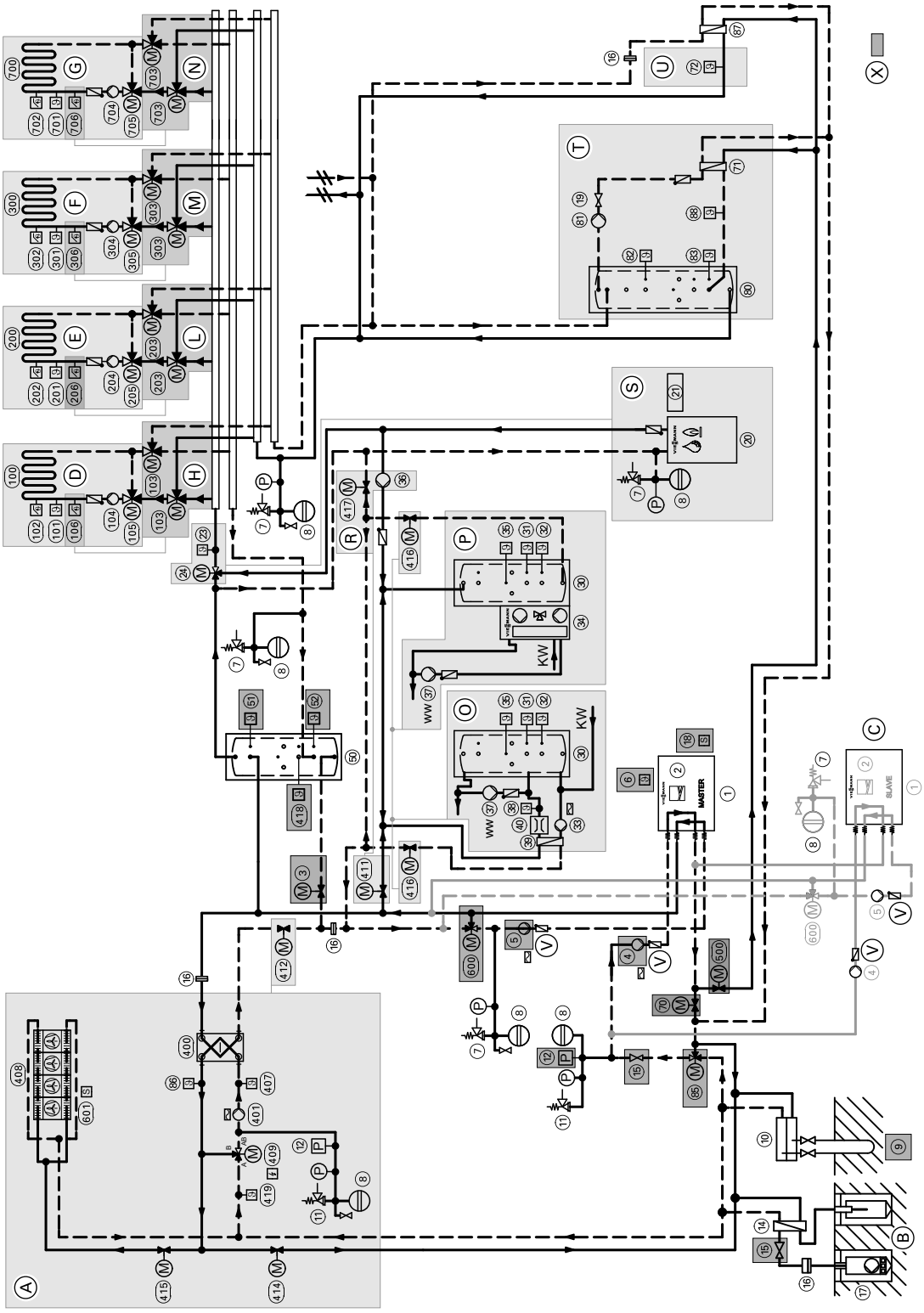

Fig. 13

Black: Hydraulics of master heat pump
Grey: Hydraulics of slave heat pump and DHW circulation

Ⓐ Extension for residual heat, ZK03853

Ⓑ Well circuit/groundwater (standard unit), ZK04292

Ⓒ Master/slave (only one master and one slave heat pump)
Heat pump communication via Modbus Ethernet or BACnet
With external Modbus communication: Modbus Ethernet connection to master heat pump

Ⓓ Extension for heating circuit 1 (HC1), ZK03862

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Hydraulic connection requirements (cont.)

Ⓔ Extension for heating circuit 2 (HC2), ZK03863
Ⓕ Extension for heating circuit 3 (HC3), ZK03864
Ⓖ Extension for heating circuit 4 (HC4), ZK03865
Ⓗ Extension for cooling via HC1, ZK03866
Ⓛ Extension for cooling via HC2, ZK03867
Ⓜ Extension for cooling via HC3, ZK03868
Ⓝ Extension for cooling via HC4, ZK03869
Ⓞ Extension for DHW heating, DHW cylinder, ZK03856
Ⓟ Extension for DHW heating, freshwater module, ZK03857
Ⓡ Extension for DHW heating with oil/gas boiler, ZK03855
Ⓢ Extension for second heat generator (oil/gas boiler), ZK03854
Ⓣ Extension AC/NC (AC/NC parallel and alternative), ZK03859
Ⓤ Extension NC, ZK03858
Ⓥ Non-return valve
- For master/slave heat pump, one each downstream of primary pump
- Without 3-way mixer high temperature maintenance: Downstream of secondary pump

Ⓧ Standard unit
Ⓨ External natural cooling
External start command

Note
This diagram is a general example without shut-off valves or safety equipment. This does not replace the need for on-site engineering. Determine the type of heat source, groundwater or geothermal probe during the engineering process.

Required components

Pos.	Designation
①	Heat pump
②	Heat pump control unit
③	2-way motorised damper, heating water buffer cylinder outlet (on-site sizing for type BWR 352.B027, 034 and 056)
④	Primary pump (on-site sizing)
⑤	Secondary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑦	Safety assembly, secondary circuit
⑧	Expansion vessel (on-site sizing)
⑨	Geothermal probes (on-site sizing)
⑩	Geothermal probe manifold (on-site sizing)
⑪	Safety assembly, primary circuit (on-site sizing)
⑫	Pressure switch, primary circuit
⑭	Separating heat exchanger, groundwater-brine
⑮	Primary side flow switch
⑯	Dirt filter (on-site sizing)
⑰	Circulation pump for well/groundwater (on-site sizing)
⑱	Refrigerant sensor
⑲	Flow switch, coolant buffer cylinder
⑳	External heat generator (on-site sizing)
㉑	Control of external heat generator (on-site sizing)
㉓	Temperature sensor, main flow, heating circuits
㉔	3-way mixer, main flow, heating circuits (on-site sizing)
㉚	DHW cylinder (on-site sizing)
㉛	DHW cylinder temperature sensor, bottom
㉜	Immersion heater, DHW cylinder (on-site sizing)
㉝	Cylinder loading pump, high temperature maintenance, DHW heating (on-site sizing)
㉞	Freshwater module (on-site sizing)
㉟	DHW cylinder temperature sensor, top
㊱	Circulation pump for external heat generator (on-site sizing)
㊲	DHW circulation pump (on-site sizing)
㊳	Temperature sensor, high temperature maintenance, DHW heating (component selection according to on-site conditions)
㊴	Heat exchanger, loading, DHW heating
㊵	Flow limiter, DHW heating (on-site sizing)
㊿	Heating water buffer cylinder (on-site sizing)
㊶	Buffer temperature sensor, top
㊷	Buffer temperature sensor, bottom
㊿	2-way motorised damper, primary circuit (on-site sizing for type BWR 352.B027 and 034)
㊶	Heat exchanger, coolant buffer cylinder
㊷	Temperature sensor, flow, natural cooling (component selection according to on-site conditions)
㊿	Coolant buffer cylinder (on-site sizing)
㊶	Circulation pump, coolant buffer cylinder (on-site sizing)
㊷	Buffer temperature sensor, top
㊸	Buffer temperature sensor, bottom
㊹	Circulation pump NC, loading (on-site sizing)
㊺	3-way mixer, low temperature maintenance/ frost protection (on-site sizing)
㊻	Temperature sensor, heat exchanger, residual heat, brine outlet (on-site sizing)
㊼	Heat exchanger, natural cooling
㊽	Temperature sensor flow NC/AC (component selection according to on-site conditions)
⑩⓪	Heating/cooling circuit HC1 (on-site sizing)
⑩①	Flow temperature sensor HC1 (component selection according to on-site conditions)
⑩②	Temperature limiter HC1

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Hydraulic connection requirements (cont.)

Pos.	Designation
(103)	3-way diverter valve, heating/cooling HC1 (on-site sizing)
(104)	Heating circuit pump HC1 (on-site sizing)
(105)	3-way mixer HC1 (on-site sizing)
(106)	Contact humidistat HC1
(200)	Heating/cooling circuit HC2 (on-site sizing)
(201)	Flow temperature sensor HC2 (component selection according to on-site conditions)
(202)	Temperature limiter HC2
(203)	3-way diverter valve, heating/cooling HC2 (on-site sizing)
(204)	Heating circuit pump HC2 (on-site sizing)
(205)	3-way mixer HC2 (on-site sizing)
(206)	Contact humidistat HC2
(300)	Heating/cooling circuit HC3 (on-site sizing)
(301)	Flow temperature sensor HC3 (component selection according to on-site conditions)
(302)	Temperature limiter HC3
(303)	3-way diverter valve, heating/cooling HC3 (on-site sizing)
(304)	Heating circuit pump HC3 (on-site sizing)
(305)	3-way mixer HC3 (on-site sizing)
(306)	Contact humidistat HC3
(400)	Heat exchanger, residual heat
(401)	Circulation pump, heat exchanger, residual heat, brine (on-site sizing)
(407)	Temperature sensor, heat exchanger, residual heat, brine inlet
(408)	Air/brine heat exchanger (on-site sizing)
(409)	3-way mixer, residual heat, heat exchanger, brine (on-site sizing)
(411)	2-way motorised damper, DHW heating flow with external heat generator
(412)	2-way motorised damper, heat exchanger, residual heat, water (on-site sizing for type BWR 352.B027, 034 and 056)

Pos.	Designation
(414)	2-way motorised damper, residual heat source (on-site sizing for type BWR 352.B027, 034 and 056)
(415)	2-way motorised damper, air/brine heat exchanger, residual heat (on-site sizing for type BWR 352.B027, 034 and 056)
(416)	2-way motorised damper, DHW heating, inlet, heat pump (on-site sizing for type BWR 352.B027, 034 and 056)
(417)	2-way motorised damper, external heat generator, outlet (on-site sizing for type BWR 352.B027, 034 and 056)
(418)	Immersion heater, heating water buffer cylinder (on-site sizing)
(419)	Temperature sensor, geothermal probe outlet
(500)	2-way motorised damper, primary circuit, cooling (on-site sizing for type BWR 352.B027 and 034)
(600)	3-way mixer, high temperature maintenance, secondary (on-site sizing)
(601)	Brine sensor, drip pan, air/brine heat exchanger (on-site sizing)
(700)	Heating/cooling circuit HC4 (on-site sizing)
(701)	Flow temperature sensor HC4 (component selection according to on-site conditions)
(702)	Temperature limiter HC4
(703)	3-way diverter valve, heating/cooling HC4 (on-site sizing)
(704)	Heating circuit pump HC4 (on-site sizing)
(705)	3-way mixer HC4 (on-site sizing)
(706)	Contact humidistat HC4
⟶	Valve switching state on delivery

Hydraulic connection requirements (cont.)

Hydraulic connection, geothermal probe

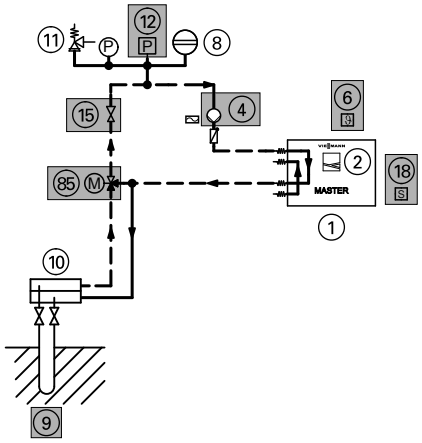

Fig. 14

Required components

Pos.	Designation
①	Heat pump
②	Heat pump control unit
④	Primary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑧	Expansion vessel (on-site sizing)
⑨	Geothermal probe (on-site sizing)
⑩	Geothermal probe manifold (on-site sizing)
⑪	Safety assembly, primary circuit (on-site sizing)
⑫	Pressure switch, primary circuit
⑮	Primary side flow switch
⑱	Refrigerant sensor
⑱⑤	3-way mixer, low temperature maintenance/ frost protection (on-site sizing)

Hydraulic connection, groundwater

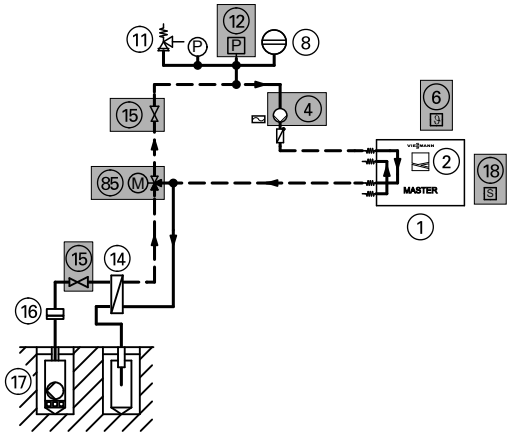

Fig. 15

Required components

Pos.	Designation
①	Heat pump
②	Heat pump control unit
④	Primary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑧	Expansion vessel (on-site sizing)
⑪	Intermediate circuit safety assembly (on-site sizing)
⑫	Pressure switch, intermediate circuit
⑭	Separating heat exchanger, groundwater-brine
⑮	Flow switch, groundwater
⑯	Groundwater filter (on-site sizing)
⑰	Circulation pump, well (on-site sizing)
⑱	Refrigerant sensor
⑱⑤	3-way mixer, low temperature maintenance/ frost protection (on-site sizing)

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Hydraulic connection requirements (cont.)

Hydraulic connection, coolant (from industrial waste heat)

Note
The max. inlet temperature for water/water heat pumps is 20 °C. At higher coolant temperatures, a low end controller (on site) must limit the inlet temperature.

Note
The separating heat exchanger must be resistant to the substances contained in the coolant.

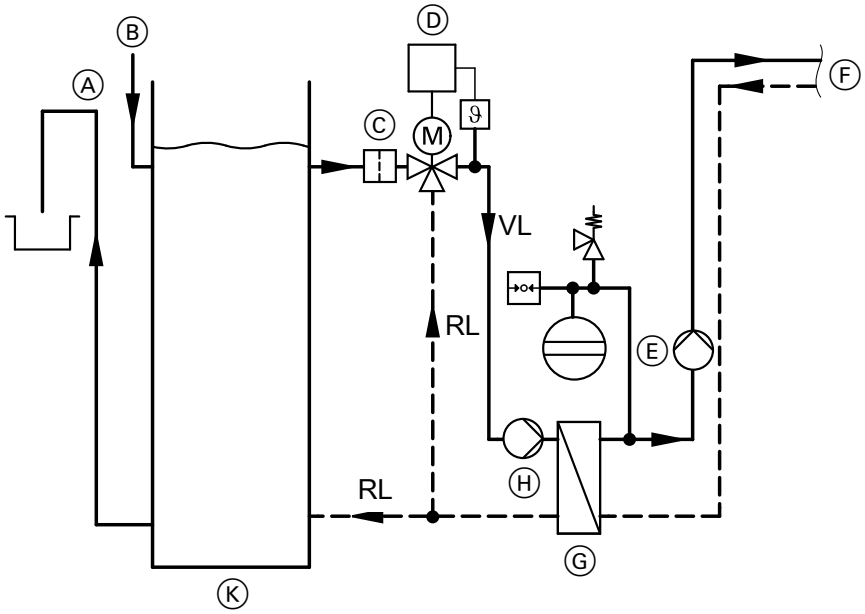

Fig. 16

Ⓐ Overflow
Ⓑ Inlet
Ⓒ Dirt filter (on site)
Ⓓ Low end controller and valve (on site)
Ⓔ Primary pump
Ⓕ To the heat pump
Ⓖ Separating heat exchanger, primary circuit
Ⓗ Circulation pump (≙ well pump)
Ⓚ Water container
(min. 3000 l capacity, on site)

Hydraulic connection, heating water buffer cylinder

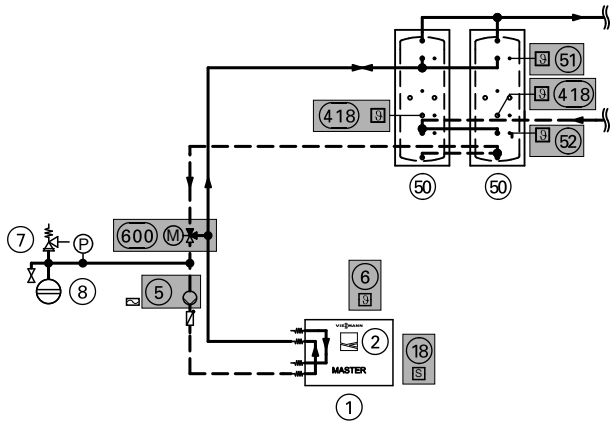

Fig. 17

Required components

Pos.	Designation
①	Heat pump
②	Heat pump control unit
⑤	Secondary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑦	Safety assembly, secondary circuit
⑧	Expansion vessel (on-site sizing)
⑱	Refrigerant sensor
㊿	Heating water buffer cylinder (on-site sizing)
51	Buffer temperature sensor, top
52	Buffer temperature sensor, bottom
418	Immersion heater, heating water buffer cylinder (on-site sizing)
600	3-way mixer, secondary high temperature maintenance (on-site sizing)

Hydraulic connection requirements (cont.)

Hydraulic connection AC/NC (alternative operation) with coolant buffer cylinder

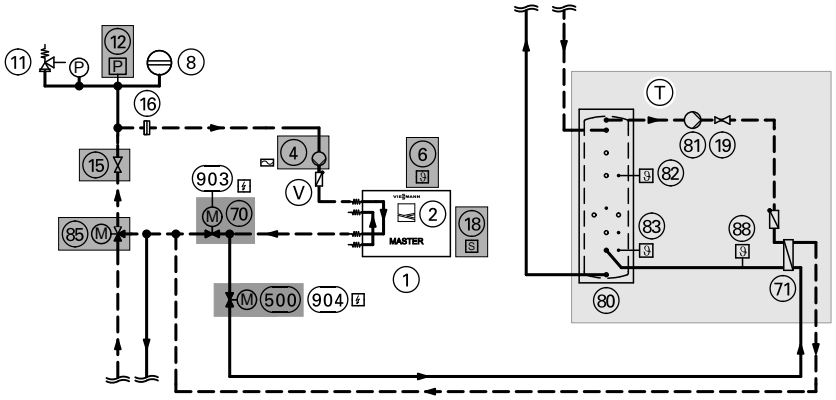

Fig. 18

Required components

Pos.	Designation
①	Heat pump
②	Heat pump control unit
④	Primary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑧	Expansion vessel (on-site sizing)
⑪	Safety assembly, primary circuit (on-site sizing)
⑫	Pressure switch, primary circuit
⑱	Refrigerant sensor
⑲	Flow switch, coolant buffer cylinder
⑦⓪	2-way motorised damper, primary circuit (on-site sizing for type BWR 352.B027 and 034)
⑦①	Heat exchanger, coolant buffer cylinder
⑧⓪	Coolant buffer cylinder (on-site sizing)

Pos.	Designation
⑧①	Circulation pump, coolant buffer cylinder (on-site sizing)
⑧②	Buffer temperature sensor, top
⑧③	Buffer temperature sensor, bottom
⑧⑤	3-way mixer, low temperature maintenance/frost protection (on-site sizing)
⑧⑧	Flow temperature sensor NC/AC (component selection according to on-site conditions)
⑤⓪⓪	2-way motorised damper, primary circuit, cooling (on-site sizing for type BWR 352.B027 and 034)
⑤⓪②	2-way motorised damper, well/groundwater, geothermal probes (on-site sizing for type BWR 352.B027 and 034)

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Hydraulic connection requirements (cont.)

Hydraulic connection, residual heat exchanger (air conditioning mode)

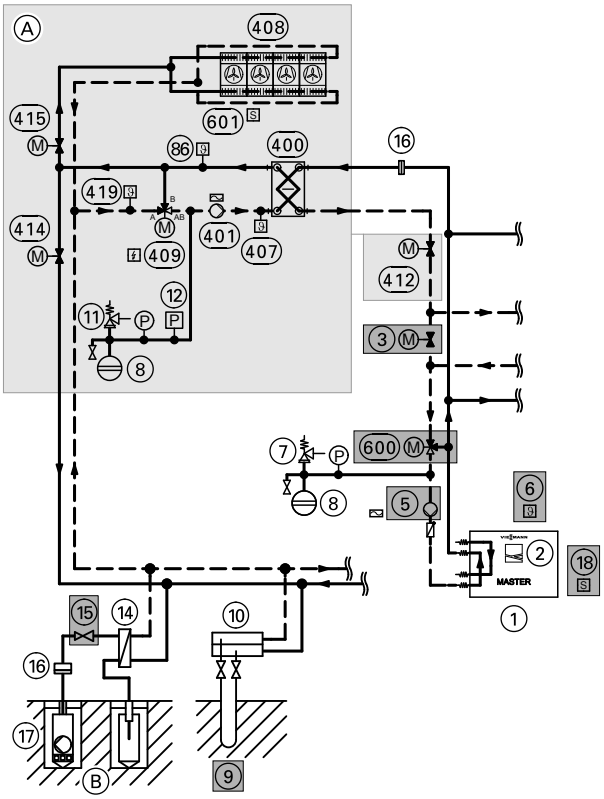

Fig. 19

Required components

Pos.	Designation
Ⓐ	Extension for residual heat, ZK03853
Ⓑ	Extension for well circuit/groundwater, ZK04292
①	Heat pump
②	Heat pump control unit
③	2-way motorised damper, heating water buffer cylinder outlet (on-site sizing for type BWR 352.B027, 034 and 056)
⑤	Secondary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑦	Safety assembly, secondary circuit
⑧	Expansion vessel (on-site sizing)
⑨	Geothermal probes (on-site sizing)
⑩	Geothermal probe manifold (on-site sizing)
⑪	Safety assembly, primary circuit (on-site sizing)
⑫	Pressure switch, primary circuit
⑭	Separating heat exchanger, groundwater-brine
⑮	Primary side flow switch
⑯	Dirt filter (on-site sizing)
⑰	Circulation pump for well/groundwater (on-site sizing)
⑱	Refrigerant sensor
86	Temperature sensor, heat exchanger, residual heat, brine outlet (on-site sizing)
400	Heat exchanger, residual heat
401	Circulation pump, heat exchanger, residual heat, brine (on-site sizing)
407	Temperature sensor, heat exchanger, residual heat, brine inlet
408	Air/brine heat exchanger (on-site sizing)
409	3-way mixer, residual heat, heat exchanger, brine (on-site sizing)
412	2-way motorised damper, heat exchanger, residual heat, water (on-site sizing for type BWR 352.B027, 034 and 056)
414	2-way motorised damper, residual heat source (on-site sizing for type BWR 352.B027, 034 and 056)
415	2-way motorised damper, air/brine heat exchanger, residual heat (on-site sizing for type BWR 352.B027, 034 and 056)
419	Temperature sensor, geothermal probe outlet
600	3-way mixer, secondary high temperature maintenance (on-site sizing)
601	Brine sensor, drip pan, air/brine heat exchanger (on-site sizing)

Hydraulic connection requirements (cont.)

Hydraulic connection, cylinder loading system

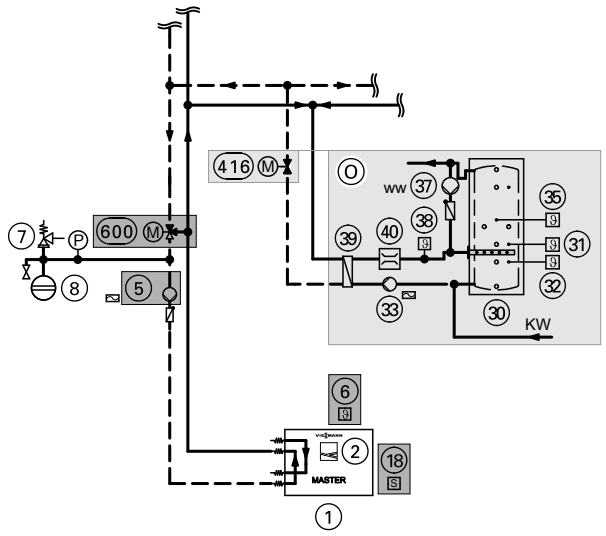

Fig. 20

Required components

Pos.	Designation
Ⓞ	Extension for DHW heating, DHW cylinder, ZK03856
①	Heat pump
②	Heat pump control unit
⑤	Secondary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑦	Safety assembly, secondary circuit
⑧	Expansion vessel (on-site sizing)
⑱	Refrigerant sensor
㉚	DHW cylinder (on-site sizing)
㉛	DHW cylinder temperature sensor, bottom
㉜	Immersion heater, DHW cylinder (on-site sizing)
㉝	Cylinder loading pump, high temperature maintenance, DHW heating (on-site sizing)
㉟	DHW cylinder temperature sensor, top
㊲	DHW circulation pump (on-site sizing)
㊳	Temperature sensor, high temperature maintenance, DHW heating (component selection according to on-site conditions)
㊴	Heat exchanger, loading, DHW heating
㊵	Flow limiter, DHW heating (on-site sizing)
416	2-way motorised damper, DHW heating, inlet, heat pump (on-site sizing for type BWR 352.B027, 034 and 056)
600	3-way mixer, secondary high temperature maintenance (on-site sizing)

Hydraulic connection, external heat generator

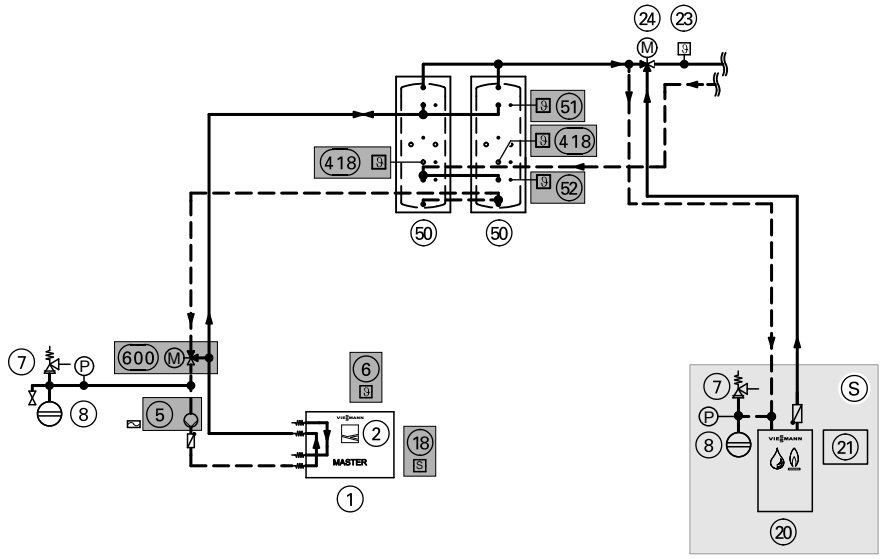

Fig. 21 External heat generator and heating water buffer cylinder

Hydraulic connection requirements (cont.)

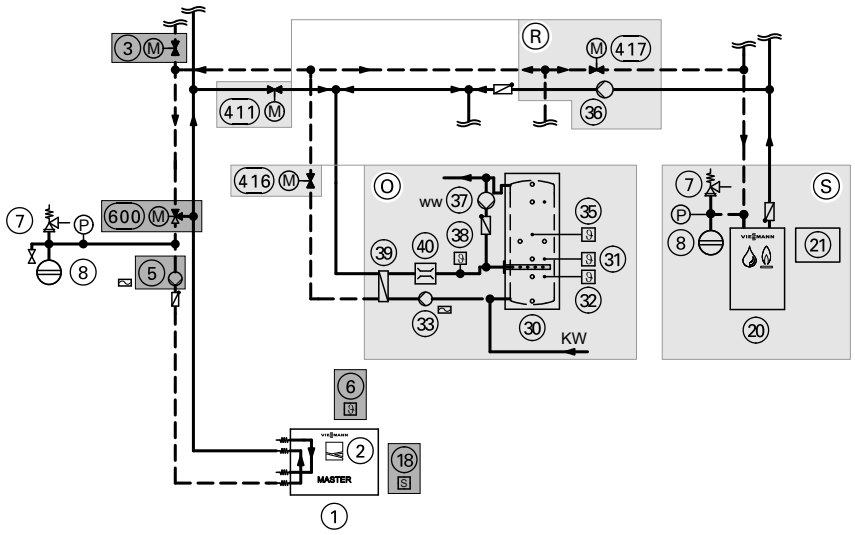

Fig. 22 External heat generator and DHW cylinder

Required components

Pos.	Designation
Ⓞ	Extension for DHW heating, DHW cylinder, ZK03856
Ⓡ	Extension for DHW heating with oil/gas boiler, ZK03855
Ⓢ	Extension for oil/gas boiler control (external heat generator), ZK03854
①	Heat pump
②	Heat pump control unit
③	2-way motorised damper, heating water buffer cylinder outlet (on-site sizing for type BWR 352.B027, 034 and 056)
⑤	Secondary pump (on-site sizing)
⑥	Outside temperature sensor (on-site sizing)
⑦	Safety assembly
⑧	Expansion vessel (on-site sizing)
⑱	Refrigerant sensor
⑳	External heat generator (on-site sizing)
㉑	Control of external heat generator (on-site sizing)
㉓	Temperature sensor, main flow, heating circuits
㉔	3-way mixer, main flow, heating circuits (on-site sizing)
㉚	DHW cylinder (on-site sizing)
㉛	DHW cylinder temperature sensor, bottom
㉜	Immersion heater, DHW cylinder (on-site sizing)

Pos.	Designation
㉝	Cylinder loading pump, high temperature maintenance, DHW heating (on-site sizing)
㉟	DHW cylinder temperature sensor, top
㊱	Circulation pump for external heat generator (on-site sizing)
㊲	DHW circulation pump (on-site sizing)
㊳	Temperature sensor, high temperature maintenance, DHW heating (component selection according to on-site conditions)
㊴	Heat exchanger, loading, DHW heating
㊵	Flow limiter, DHW heating (on-site sizing)
㊿	Heating water buffer cylinder (on-site sizing)
(51)	Buffer temperature sensor, top
(52)	Buffer temperature sensor, bottom
(411)	2-way motorised damper, DHW heating flow with external heat generator
(416)	2-way motorised damper, DHW heating, inlet, heat pump (on-site sizing for type BWR 352.B027, 034 and 056)
(417)	2-way motorised damper, external heat generator, outlet (on-site sizing for type BWR 352.B027, 034 and 056)
(418)	Immersion heater, heating water buffer cylinder (on-site sizing)
(600)	3-way mixer, secondary high temperature maintenance (on-site sizing)

Hydraulic connection requirements (cont.)

Hydraulic connection, heating circuit/cooling circuit

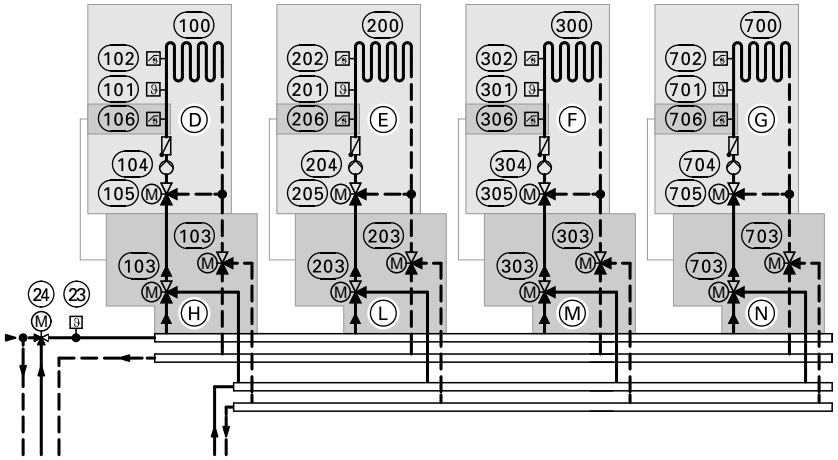

Fig. 23

Required components

Pos.	Designation
Ⓓ	Extension for heating circuit 1 (HC1), ZK03862
Ⓔ	Extension for heating circuit 2 (HC2), ZK03863
Ⓕ	Extension for heating circuit 3 (HC3), ZK03864
Ⓖ	Extension for heating circuit 4 (HC4), ZK03865
Ⓗ	Extension for cooling via HC1, ZK03866
Ⓛ	Extension for cooling via HC2, ZK03867
Ⓜ	Extension for cooling via HC3, ZK03868
Ⓝ	Extension for cooling via HC4, ZK03869
㉓	Temperature sensor, main flow, heating circuits
㉔	3-way mixer, main flow, heating circuits (on-site sizing)
⑩⓪	Heating/cooling circuit HC1 (on-site sizing)
⑩①	Flow temperature sensor HC1 (component selection according to on-site conditions)
⑩②	Temperature limiter HC1
⑩③	3-way diverter valve, heating/cooling HC1 (on-site sizing)
⑩④	Heating circuit pump HC1 (on-site sizing)
⑩⑤	3-way mixer HC1 (on-site sizing)
⑩⑥	Contact humidistat HC1
②⓪⓪	Heating/cooling circuit HC2 (on-site sizing)
②⓪①	Flow temperature sensor HC2 (component selection according to on-site conditions)

Pos.	Designation
②⓪②	Temperature limiter HC2
②⓪③	3-way diverter valve, heating/cooling HC2 (on-site sizing)
②⓪④	Heating circuit pump HC2 (on-site sizing)
②⓪⑤	3-way mixer HC2 (on-site sizing)
②⓪⑥	Contact humidistat HC2
③⓪⓪	Heating/cooling circuit HC3 (on-site sizing)
③⓪①	Flow temperature sensor HC3 (component selection according to on-site conditions)
③⓪②	Temperature limiter HC3
③⓪③	3-way diverter valve, heating/cooling HC3 (on-site sizing)
③⓪④	Heating circuit pump HC3 (on-site sizing)
③⓪⑤	3-way mixer HC3 (on-site sizing)
③⓪⑥	Contact humidistat HC3
⑦⓪⓪	Heating/cooling circuit HC4 (on-site sizing)
⑦⓪①	Flow temperature sensor HC4 (component selection according to on-site conditions)
⑦⓪②	Temperature limiter HC4
⑦⓪③	3-way diverter valve, heating/cooling HC4 (on-site sizing)
⑦⓪④	Heating circuit pump HC4 (on-site sizing)
⑦⓪⑤	3-way mixer HC4 (on-site sizing)
⑦⓪⑥	Contact humidistat HC4

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Siting the heat pump

Levelling the heat pump

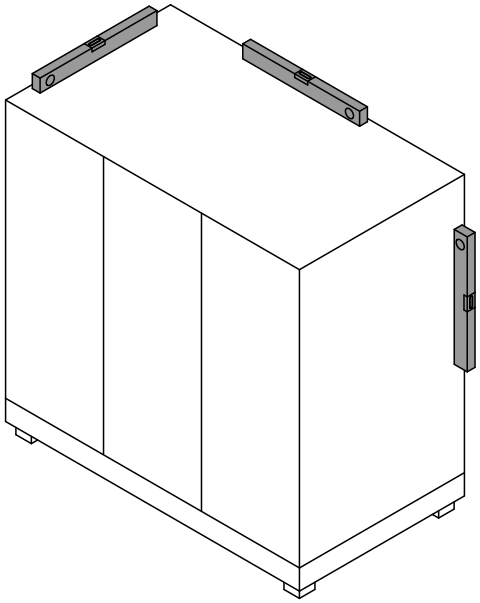

Fig. 24

Site and level the heat pump horizontally as described on page 18 onwards.

Removing the transport brackets

! **Please note**
Operating the appliance without first removing the transport brackets may cause vibrations and excessive noise.
Remove **all 4** transport brackets fully from below and dispose of them correctly.

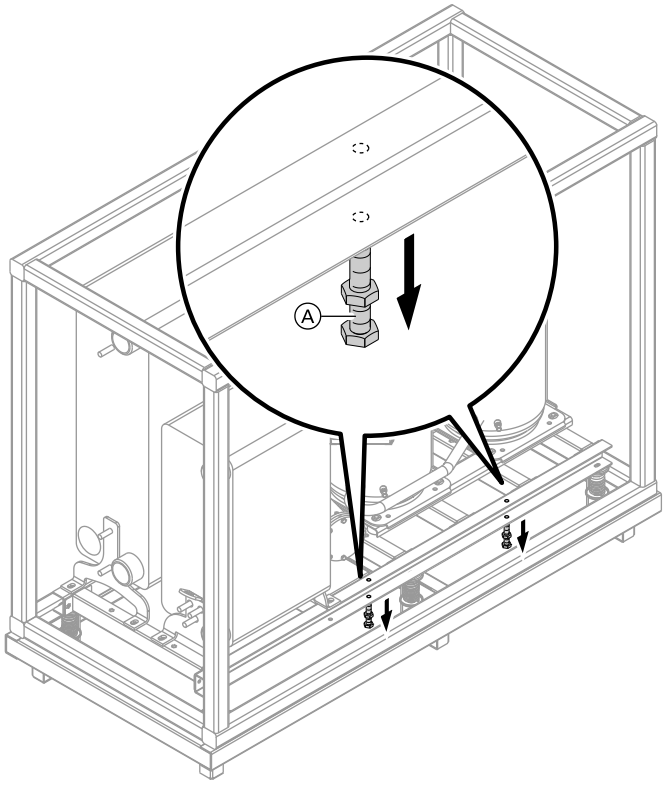

Fig. 25

Ⓐ Transport locking screws

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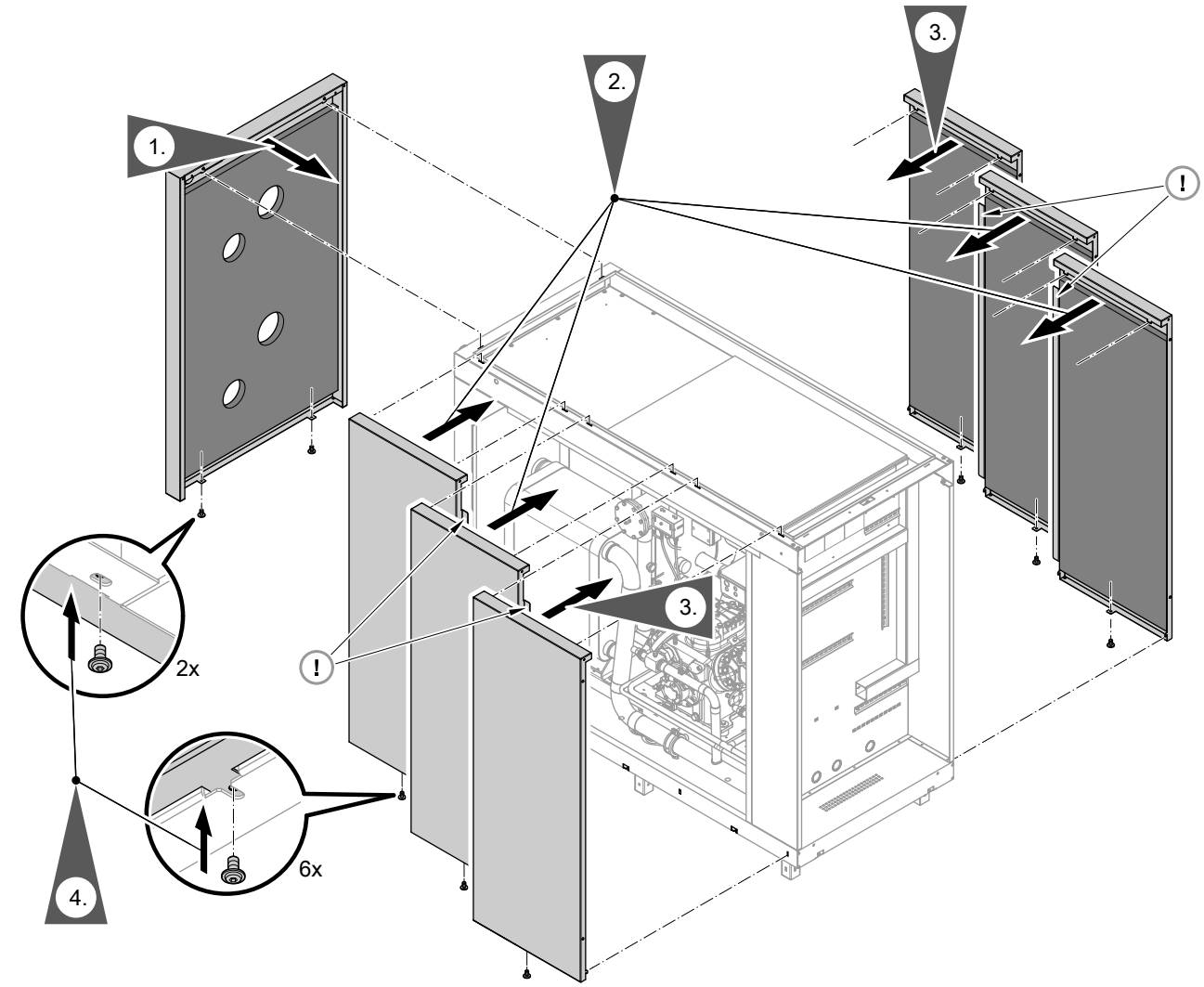
Siting the heat pump (cont.)

Fitting the back panel, side panels and kicking plates

Note
After fitting the back panel, make the hydraulic and electrical connections. See following chapter.



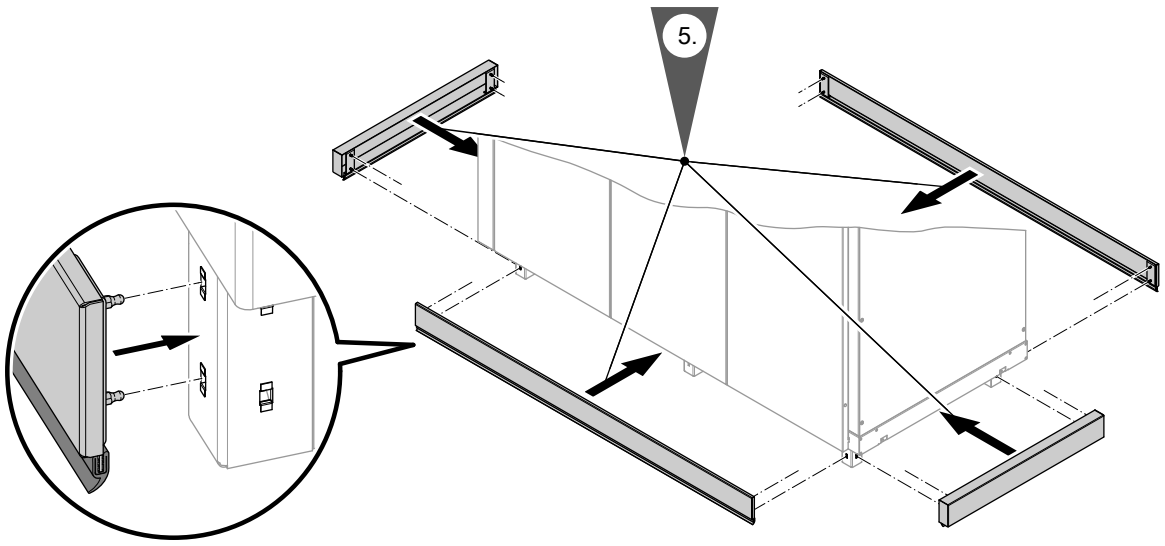


Fig. 26

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Making the hydraulic connections

Overview of hydraulic connections

For information on the position of the hydraulic connections, see page 21 onwards.

Connecting the heat pump

Note
The back panel must be fitted before the hydraulic connection is made.

Note
A connection set (accessories) must be used to connect the heat pump to the primary and secondary circuits.

Installation accessories
Technical guide

Using the connection set and anti-vibration expansion joints (accessories)

Note
The diagram is for illustrative purposes only. For the position of the hydraulic connections, see page 21 onwards.

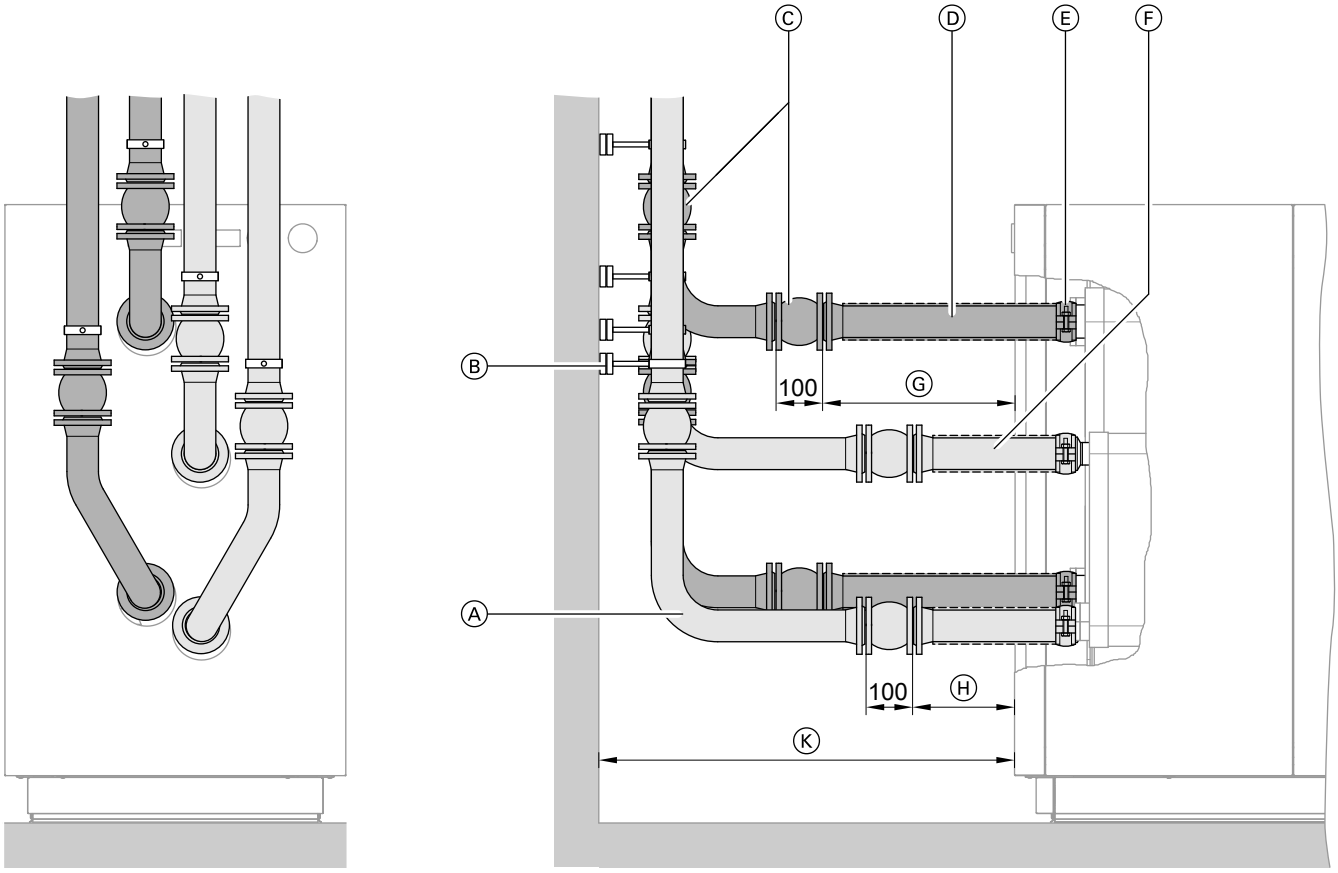

Fig. 27 Example: Type BWR/BWS 353.B198 with optimised sound insulation

Ⓐ Bend (on site)
Ⓑ Hydraulic line fixings
Ⓒ Anti-vibration expansion joints
Ⓓ Adaptor with flange (see table), primary side, without sound insulation elements
Ⓔ Victaulic coupling
Ⓕ Adaptor with flange (see table), secondary side, without sound insulation elements
Ⓖ See table
Ⓗ See table
Ⓚ Minimum distance between wall and back panel (see table)

Making the hydraulic connections (cont.)

Dimensions

Type BWR/BWS	Ⓓ	Ⓖ in mm	Ⓕ	Ⓗ in mm	Ⓚ in mm
352.B027	DN 65/PN 10, 380 mm	209	DN 65/PN 10, 540 mm	135	≥ 700
352.B034	DN 65/PN 10, 380 mm	231	DN 65/PN 10, 540 mm	150	≥ 800
352.B056	DN 65/PN 10, 380 mm	308	DN 65/PN 10, 540 mm	150	≥ 800
352.B076	DN 65/PN 10, 380 mm	160	DN 65/PN 10, 380 mm	145	≥ 700
352.B097	DN 80/PN 10, 380 mm	160	DN 80/PN 10, 380 mm	145	≥ 700
352.B114	DN 80/PN 10, 380 mm	160	DN 80/PN 10, 380 mm	145	≥ 700
352.B132	DN 80/PN 10, 600 mm	364	DN 80/PN 10, 380 mm	145	≥ 1000
352.B156	DN 80/PN 10, 600 mm	364	DN 80/PN 10, 380 mm	145	≥ 1000
353.B172	DN 80/PN 10, 600 mm	464	DN 80/PN 10, 380 mm	245	≥ 1000
353.B198	DN 80/PN 10, 600 mm	464	DN 80/PN 10, 380 mm	245	≥ 1000

Sound insulation of hydraulic lines

Heat pumps generate vibrations and structure-borne noise. In case of incorrect installation, these can be transmitted even to far away rooms via the pipework. The transfer of "airborne noise" is reduced to such an extent by a sound-insulating casing that a sound power level below 58 dB is achieved.
When thermally insulating the hydraulic connections, the line entries to the heat pump should also be sound-insulated: See "Requirements for heat pump siting".

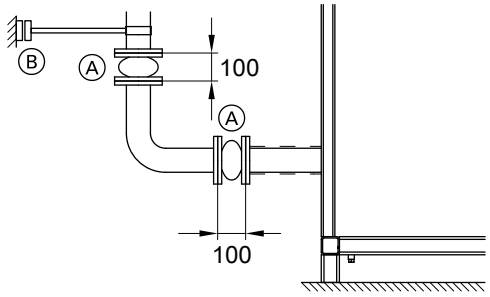

Fig. 28 Optimised sound insulation

Ⓐ Rubber expansion joint
Ⓑ Rubber-mounted base plate

Spring-mounted compressors

Spring-mounted compressors substantially reduce the transfer of vibrations to the floor. For other structural measures, e.g. anti-vibration bases, see chapter "Requirements for heat pump siting".

Rubber expansion joints

Rubber expansion joints prevent the transmission of jolts and vibrations through the hydraulic lines to the walls.

- Basic sound insulation with one rubber expansion joint per connection for the standard application (installation in connection direction)
- Optimised sound insulation with two rubber expansion joints per connection for challenging applications (with on-site 90° bend)

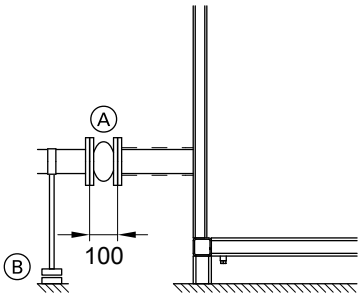

Fig. 29 Basic sound insulation

Ⓐ Rubber expansion joint
Ⓑ Rubber-mounted base plate

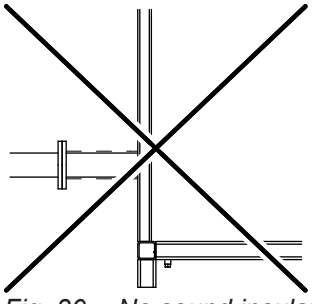

Fig. 30 No sound insulation

Making the hydraulic connections (cont.)

Note
If adaptors are used, compensators must always be installed for vibration isolation.
For sound insulation without rubber expansion joints, an on-site solution must be provided.

Fastening of pipes to the wall/floor

Standard rubber pipe clamps only dampen flow noises. Rubber-mounted base plates reduce the transfer of low-frequency vibrations and structure-borne noise to a minimum.

Note
*Do **not** secure the lines between the expansion joints and the heat pump.*

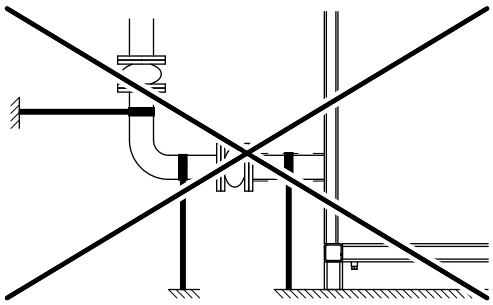

Fig. 31 No sound insulation, due to incorrect fixing points

Fitting the Victaulic couplings

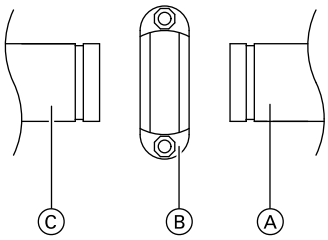

Fig. 32

1. Clean all Victaulic connections.
2. Open Victaulic coupling Ⓑ around 1 cm.
3. Push Victaulic coupling Ⓑ with inserted gasket as far as it will go onto connection pipe Ⓐ in the heat pump.
4. Insert adaptor connector Ⓒ as far as it will go into Victaulic coupling Ⓑ.
5. Engage Victaulic coupling Ⓑ with a positive interlock and no gaps.
6. Carry out a pressure test.

Note
Only use the adaptor connector with flange (accessories) provided.

Connecting the primary circuit

! **Please note**
The heat transfer medium can cause corrosion damage to on-site lines and components.
Use components and pipes that are resistant to the heat transfer medium. Never use zinc-plated/galvanised pipes.

1. Equip the primary circuit with an expansion vessel and safety valve (in accordance with DIN 4757).

   Note
   - *The expansion vessel must be approved to DIN 4807. Diaphragms of the expansion vessel and safety valve must be suitable for the heat transfer medium.*
   - *Discharge and drain pipes must terminate in a container that can hold the maximum possible expansion volume of the heat transfer medium.*

2. Ensure adequate thermal and anti-vibration insulation of all pipes routed through walls.
3. Connect the primary pipes to the heat pump.

   ! **Please note**
   Hydraulic connections subjected to mechanical stress lead to leaks, vibrations and appliance damage.
   Connect on-site lines so that they are free of load and torque stress.

   ! **Please note**
   If the casing is not carefully closed, damage from condensation may occur.
   - When inserting cables, ensure the diaphragm grommets are seated correctly.
   - Ensure airtight sealing of the grommets around the hydraulic lines.

Making the hydraulic connections (cont.)

4. Insulate primary lines inside the building with thermally insulating and vapour diffusion-proof materials.
5. Fill the primary circuit with Viessmann heat transfer medium and vent. See page 62.

Connecting the secondary circuit

1. Equip the secondary circuit on site with an expansion vessel and safety assembly (in accordance with DIN 4757).
   Fit the safety assembly to the on-site line in the heating water return.
2. Connect the secondary lines to the heat pump.

   Please note
   Hydraulic connections subjected to mechanical stress lead to leaks, vibrations and appliance damage.
   Connect on-site lines so that they are free of load and torque stress.

   Please note
   If the casing is not carefully closed, damage from condensation may occur.
   - When inserting cables, ensure the diaphragm grommets are seated correctly.
   - Ensure airtight sealing of the grommets around the hydraulic lines.

3. Fill and vent the secondary circuit in line with VDI 2035. See page 63.
4. Thermally insulate lines inside the building.

Note
- *In underfloor heating circuits, install a temperature limiter on site to restrict the maximum temperature of the underfloor heating system.*
- *Ensure the minimum flow rate (see "Specification" from page 82).*

Electrical connections

Routing cables to the heat pump wiring chamber

Danger
Damaged cable insulation can cause injury and damage to the appliance.
Route cables so that they cannot touch very hot, vibrating or sharp-edged components.

Danger
Incorrect wiring can lead to serious injury from electrical current and result in appliance damage.
Ensure that, in the event of a fault, e.g. if a wire becomes detached, the wires cannot drift into the adjacent voltage area:
- Route extra low voltage (ELV) leads < 50 V separately from cables > 50 V/230 V~/400 V~.
- Strip the cables of a small amount of insulation close to the terminals and bundle tightly to the corresponding terminals.
- Secure cables with cable ties/strain relief fittings.

When routing the on-site cables, note the location of the cable entries into the appliance on the back panel. See page 21 onwards.

Electrical connections (cont.)

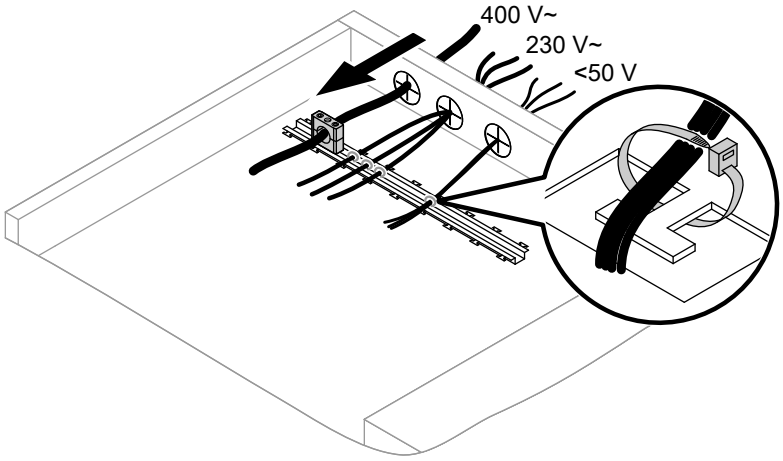

Fig. 33

1. Route extra low voltage (ELV) leads through "< 50 V" entry to heat pump wiring chamber.

2. Route 230 V cables through "230 V" entry to heat pump wiring chamber.
   Secure 230 V cables with cable ties.

   Note
   Route extra low voltage (ELV) leads and 230 V cables far apart.

3. Route power cable for compressor through "400 V~" entry to heat pump wiring chamber.
   Always secure the power cable with strain relief fittings.

   Note
   On-site strain relief fittings are required since the wall clearance is ≥ 80 mm.

   For power supply, see page 55 onwards.

Overview of electrical connections

Note
- *Route 230 V~ cables and extra low voltage (ELV) leads separately and bundle them tightly together at the terminals. This ensures that, in the event of a fault, e.g. if a wire becomes detached, the wires cannot drift into the adjacent voltage area.*
- *Strip as little of the insulation as possible, close to the terminals.*
- *If 2 components are connected to the same terminal, press both cores together in a **single** wire ferrule.*

Electrical connections (cont.)

Wiring chamber

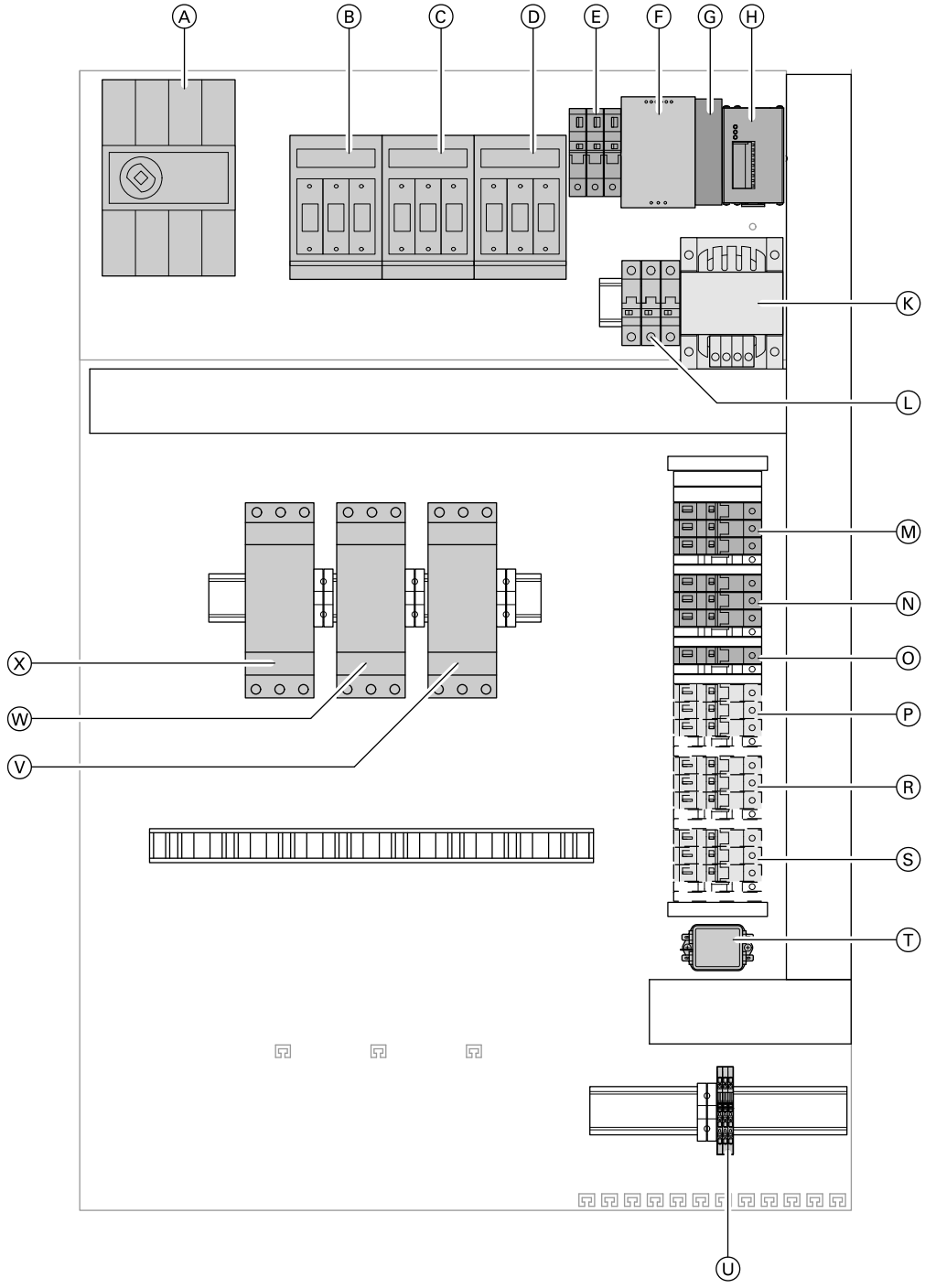

Fig. 34

Ⓐ Mains isolator
Ⓑ Load fuse, compressor 3
Ⓒ Load fuse, compressor 2
Ⓓ Load fuse, compressor 1
Ⓔ Backup fuse, plug-in socket system
Ⓕ Power supply unit 24 V–
Ⓖ 5-port switch
Ⓗ UPS module
Ⓚ Transformer
Ⓛ Secondary fuses 24 V–/24 V~
Ⓜ Fuse, primary and secondary pumps
Ⓝ Fuse, circulation pump, groundwater/waste heat

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Electrical connections (cont.)

Ⓞ Control fuse 230 V~
Ⓟ Fuse, circulation pump, control extension, residual heat
Ⓡ Fuse, circulation pump, control extension, DHW heating
Ⓢ Fuse, circulation pump, control extension, AC/NC cooling
Ⓣ EMC filter
Ⓤ Terminals, oil sump heaters
Ⓥ Soft start, compressor 1
Ⓦ Soft start, compressor 2
Ⓧ Soft start, compressor 3

External connections

⚠ **Danger**
Incorrectly executed electrical installations can result in injuries from electrical current and damage to the appliance.
All sensor and signal leads (0 to 10 V) must be shielded with copper braiding and have a minimum cross-section of 0.5 mm^2.
Specified lead type: CV

Terminals	No. in diagram	Function	Explanation
100QB1 100XD1		Power supply	Connect the power cable to the control feed-in terminals (top) in accordance with local regulations. Separate "connection and wiring diagram"
192XD1 1: 24 VDC 2: 0 VDC 3: Signal 4-20 mA	⑱	Refrigerant sensor	Signal 4 to 20 mA
200XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	④	Primary pump load	Fuse protection from load fuse 104FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
200XD3 1: Start command EB 2: Start command EB 3: Set value 0-10 V 4: GND 5: Operating message COM 6: Operating message NO PE: Shield connection	④	Primary pump control signals	Floating N/O contact: Closed: Primary pump demand Open: No demand Signal 0 to 10 V Contact closed: Primary pump operation
201XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	⑤	Secondary pump load	Fuse protection from load fuse 104FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~

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Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
201XD3 1: Start command EB 2: Start command EB 3: Set value 0-10 V 4: GND 5: Operating message COM 6: Operating message NO PE: Shield connection	⑤	Secondary pump control signals	Floating N/O contact: Closed: Secondary pump demand Open: No demand Signal 0 to 10 V Contact closed: Secondary pump operation
202XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	⑰	Well circulation pump load, groundwater	Fuse protection from load fuse 104FC4 (observe the total current of max. 13 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
202XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	⑰	Well circulation pump control signals, groundwater	Floating N/O contact: Closed: Well circulation pump demand, groundwater Open: No demand Contact closed: Well circulation pump operation, groundwater
203XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	㉛	Circulation pump load, coolant buffer cylinder	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
203XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	㉛	Circulation pump control signals, coolant buffer cylinder	Floating N/O contact: Closed: Circulation pump demand, coolant buffer cylinder Open: No demand Contact closed: Circulation pump operation, coolant buffer cylinder
204XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	㊵①	Circulation pump load, heat exchanger, residual heat, brine	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
204XD3 1: Start command EB 2: Start command EB 3: Set value 0-10 V 4: GND 5: Operating message COM 6: Operating message NO PE: Shield connection	㊵①	Circulation pump control signals, heat exchanger, residual heat, brine	Floating N/O contact: Closed: Circulation pump demand, heat exchanger, residual heat, brine Open: No demand Signal 0 to 10 V Contact closed: Circulation pump operation, heat exchanger, residual heat, brine

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
205XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	㊱	Circulation pump load, external heat generator	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
205XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	㊱	Circulation pump control signals, external heat generator	Floating N/O contact: Closed: Circulation pump demand, external heat generator Open: No demand Contact closed: Circulation pump operation, external heat generator
206XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	㊽	Circulation pump load, NC charge	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
206XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	㊽	Circulation pump control signals, NC charge	Floating N/O contact: Closed: Circulation pump demand, NC charge Open: No demand Contact closed: Circulation pump operation NC charge
207XD1 1: Phase conductor L1 2: Phase conductor L2 3: Phase conductor L3 N: Neutral conductor PE: Protective conductor	㊺㊿	Circulation pump load, NC parallel	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 4000 W/2200 W ▪ Voltage: 400 V~/230 V~
207XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	㊺㊿	Circulation pump control signals, NC parallel	Floating N/O contact: Closed: Circulation pump demand, NC parallel Open: No demand Contact closed: Circulation pump operation NC parallel
208XD1 1: Phase conductor L1 N: Neutral conductor PE: Protective conductor	㉝	Cylinder loading pump load, DHW heating, high temperature maintenance	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~
208XD3 1: Start command EB 2: Start command EB 3: Set value 0-10 V 4: GND 5: Operating message COM 6: Operating message NO PE: Shield connection	㉝	Cylinder loading pump control signals, DHW heating, high temperature maintenance	Floating N/O contact: Closed: Cylinder loading pump demand, DHW heating, high temperature maintenance Open: No demand Signal 0 to 10 V Contact closed: Operation, cylinder loading pump, DHW heating, high temperature maintenance

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
209XD1 1: Phase conductor L1 N: Neutral conductor PE: Protective conductor	(37)	DHW circulation pump load	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~
209XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	(37)	DHW circulation pump control signals	Floating N/O contact: Closed: DHW circulation pump demand Open: No demand Contact closed: DHW circulation pump operation
210XD1 1: Phase conductor L2 N: Neutral conductor PE: Protective conductor	(104)	Heating circuit pump load, heating circuit 1	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~
210XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	(104)	Heating circuit pump control signals, heating circuit 1	Floating N/O contact: Closed: Heating circuit pump demand, heating circuit 1 Open: No demand Contact closed: Heating circuit pump operation, heating circuit 1
211XD1 1: Phase conductor L2 N: Neutral conductor PE: Protective conductor	(204)	Heating circuit pump load, heating circuit 2	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~
211XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	(204)	Heating circuit pump control signals, heating circuit 2	Floating N/O contact: Closed: Heating circuit pump demand, heating circuit 2 Open: No demand Contact closed: Heating circuit pump operation, heating circuit 2
212XD1 1: Phase conductor L3 N: Neutral conductor PE: Protective conductor	(304)	Heating circuit pump load, heating circuit 3	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~
212XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	(304)	Heating circuit pump control signals, heating circuit 3	Floating N/O contact: Closed: Heating circuit pump demand, heating circuit 3 Open: No demand Contact closed: Heating circuit pump operation, heating circuit 3
213XD1 1: Phase conductor L3 N: Neutral conductor PE: Protective conductor	(704)	Heating circuit pump load, heating circuit 4	Fuse protection from load fuse 105FC1 (observe the total current of max. 16 A) Connection values: ▪ Max. output: 2200 W ▪ Voltage: 230 V~

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
213XD3 1: Start command EB 2: Start command EB 3: Operating message COM 4: Operating message NO	(704)	Heating circuit pump control signals, heating circuit 4	Floating N/O contact: Closed: Heating circuit pump demand, heating circuit 4 Open: No demand Contact closed: Heating circuit pump operation, heating circuit 4
310XD1 1: Phase conductor N: Neutral conductor PE: Protective conductor	(34)	Freshwater module load	Fuse protection from load fuse 105FC1 (observe the total current of max. 13 A) Connection values: ▪ Voltage: 230 V~
380XD3 1: Start command EB 2: Start command EB	(408)	Air/brine heat exchanger control signals	Floating N/O contact: Closed: Air/brine heat exchanger demand Open: No demand Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1) (connection air/brine heat exchanger terminal 1, 2)
380XD4 1: Set value 0-10 V 2: GND PE: Shield connection	(408)	Air/brine heat exchanger control signals	Signal 0 to 10 V Connection air/brine heat exchanger terminal X_CTRL 3: GND 4: Set value 0-10 V
380XD5 1: Operating message COM 2: Operating message NO	(408)	Air/brine heat exchanger control signals	Closed: Operation, air/brine heat exchanger Connection air/brine heat exchanger terminal X_CTRL 1: COM 2: NO
380XD7 1: Brine sensor COM 2: Brine sensor NO	(601)	Brine sensor, drip pan, air/brine heat exchanger	Potential 24 VDC from heat pump Open: Fault Insert jumper if not installed.
430XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(3)	2-way motorised damper, heating water buffer cylinder outlet	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
431XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(70)	2-way motorised damper, primary circuit	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
432XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(500)	2-way motorised damper, primary circuit, cooling	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
433XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(502)	2-way motorised damper, well/groundwater, geothermal probes	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
434XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(414)	2-way motorised damper, residual heat source	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
435XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(415)	2-way motorised damper, air/brine heat exchanger, residual heat	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
436XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(412)	2-way motorised damper, heat exchanger, residual heat, water	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
437XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(417)	2-way motorised damper, external heat generator outlet	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
438XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(416)	2-way motorised damper, DHW heating inlet, heat pump	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
439XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(103)	3-way diverter valve, heating/cooling, heating circuit 1	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
439XD7 1: External potential 2: Signal (digital)	(103)	Operating message, cooling, heating circuit 1	Floating N/O contact: Closed: Operation Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
440XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(203)	3-way diverter valve, heating/cooling, heating circuit 2	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A

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Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
440XD7 1: External potential 2: Signal (digital)	(203)	Operating message, cooling, heating circuit 2	Floating N/O contact: Closed: Operation Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
441XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(303)	3-way diverter valve, heating/cooling, heating circuit 3	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
441XD7 1: External potential 2: Signal (digital)	(303)	Operating message, cooling, heating circuit 3	Floating N/O contact: Closed: Operation Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
442XD1 1: Valve OPEN 2: Valve CLOSED 3: 24 VDC 4: 0 VDC PE: Protective conductor	(703)	3-way diverter valve, heating/cooling, heating circuit 4	Connection values: ▪ Voltage: 24 VDC ▪ Max. switching current: 5 A
442XD7 1: External potential 2: Signal (digital)	(703)	Operating message, cooling, heating circuit 4	Floating N/O contact: Closed: Operation Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
460XD1 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(85)	3-way mixer, low temperature maintenance/frost protection	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
460XD5 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(600)	3-way mixer, secondary high temperature maintenance	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
461XD1 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(409)	3-way mixer, residual heat, heat exchanger, brine	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
461XD5 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(24)	3-way mixer, main flow, heating circuits	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
462XD1 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(105)	3-way mixer, heating/cooling circuit 1	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
462XD5 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(205)	3-way mixer, heating/cooling circuit 2	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
463XD1 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(305)	3-way mixer, heating/cooling circuit 3	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
463XD5 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(705)	3-way mixer, heating/cooling circuit 4	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
464XD1 1: 24 VDC 2: 0 VDC 3: Set value 0-10 V 4: GND PE: Shield connection	(504)	3-way mixer NC parallel	Connection values: ▪ Voltage: 24 VDC ▪ Signal 0 to 10 V
500XD1 1: Contact COM 2: Contact NO PE: Protective conductor	(12)	Pressure switch, primary circuit	Open: Fault
501XD1 1: 24 VDC 2: 0 VDC 3: Contact NO	(15)	Primary side flow switch	Closed: Operation Open: Fault
501XD5 1: 24 VDC 2: 0 VDC 3: Contact NO	(19)	Flow switch, coolant buffer cylinder	Closed: Operation Open: Fault
502XD1 1: 24 VDC 2: Contact NC PE: Protective conductor	(102)	Temperature limiter, heating circuit 1	Open: Fault
502XD3 1: 24 VDC 2: Contact NC PE: Protective conductor	(202)	Temperature limiter, heating circuit 2	Open: Fault

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
502XD5 1: 24 VDC 2: Contact NC PE: Protective conductor	(302)	Temperature limiter, heating circuit 3	Open: Fault
502XD7 1: 24 VDC 2: Contact NC PE: Protective conductor	(702)	Temperature limiter, heating circuit 4	Open: Fault
503XD1 1: 24 VDC 2: 0 VDC 3: NC 4: NO PE: Protective conductor	(106)	Contact humidistat, heating circuit 1	Open: Fault
503XD3 1: 24 VDC 2: 0 VDC 3: NC 4: NO PE: Protective conductor	(206)	Contact humidistat, heating circuit 2	Open: Fault
503XD5 1: 24 VDC 2: 0 VDC 3: NC 4: NO PE: Protective conductor	(306)	Contact humidistat, heating circuit 3	Open: Fault
503XD7 1: 24 VDC 2: 0 VDC 3: NC 4: NO PE: Protective conductor	(706)	Contact humidistat, heating circuit 4	Open: Fault
551XD1 1: R+ 2: R–	(6)	Outside temperature sensor	Pt1000
551XD3 1: R+ 2: R–	(51)	Heating water buffer cylinder temperature sensor, top	Pt1000
551XD5 1: R+ 2: R–	(52)	Heating water buffer cylinder temperature sensor, bottom	Pt1000
551XD7 1: R+ 2: R– PE: Shield connection	(72)	Flow temperature sensor NC	Pt1000
552XD1 1: R+ 2: R– PE: Shield connection	(82)	Coolant buffer cylinder temperature sensor, top	Pt1000
552XD3 1: R+ 2: R– PE: Shield connection	(83)	Coolant buffer cylinder temperature sensor, bottom	Pt1000

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Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
552XD5 1: R+ 2: R– PE: Shield connection	(88)	Flow temperature sensor NC/AC	Pt1000
552XD7 1: R+ 2: R– PE: Shield connection	(86)	Temperature sensor, heat exchanger, residual heat, water outlet	Pt1000
553XD1 1: R+ 2: R– PE: Shield connection	(407)	Temperature sensor, heat exchanger, residual heat, brine inlet	Pt1000
553XD3 1: R+ 2: R– PE: Shield connection	(23)	Temperature sensor, main flow, heating circuits	Pt1000
553XD5 1: R+ 2: R– PE: Shield connection	(31)	DHW cylinder temperature sensor, bottom	Pt1000
553XD7 1: R+ 2: R– PE: Shield connection	(35)	DHW cylinder temperature sensor, top	Pt1000
554XD1 1: R+ 2: R– PE: Shield connection	(38)	Temperature sensor, DHW heating, high temperature maintenance	Pt1000
554XD3 1: R+ 2: R– PE: Shield connection	(101)	Flow temperature sensor, heating/cooling circuit 1	Pt1000
554XD5 1: R+ 2: R– PE: Shield connection	(201)	Flow temperature sensor, heating/cooling circuit 2	Pt1000
554XD7 1: R+ 2: R– PE: Shield connection	(301)	Flow temperature sensor, heating/cooling circuit 3	Pt1000
555XD1 1: R+ 2: R– PE: Shield connection	(701)	Flow temperature sensor, heating/cooling circuit 4	Pt1000
555XD3 1: R+ 2: R– PE: Shield connection	(506)	Temperature sensor, NC parallel	Pt1000
600XD1 1: 24 VDC 2: Signal (digital)	(2)	Peak block, heat pump	External N/O contact Potential 24 VDC from heat pump Closed: Active

Electrical connections (cont.)

Terminals	No. in diagram	Function	Explanation
600XD2 1: 24 VDC 2: Signal (digital)	②	Start command, stage 1	External N/O contact Potential 24 VDC from heat pump Closed: Active
600XD3 1: 24 VDC 2: Signal (digital)	②	Start command, stage 2	External N/O contact Potential 24 VDC from heat pump Closed: Active
600XD4 1: 24 VDC 2: Signal (digital)	②	Start command, stage 3	External N/O contact Potential 24 VDC from heat pump Closed: Active
600XD5 1: 24 VDC 2: Signal (digital)	(800)	Enable heating water buffer cylinder	External N/O contact Potential 24 VDC from heat pump Closed: Active
600XD6 1: 24 VDC 2: Signal (digital)	(801)	Enable coolant buffer cylinder	External N/O contact Potential 24 VDC from heat pump Closed: Active
600XD7 1: 24 VDC 2: Signal (digital)	(802)	Enable DHW cylinder	External N/O contact Potential 24 VDC from heat pump Closed: Active
601XD1 1: 24 VDC 2: Signal (digital)	⑳	Operating message, external heat generator	External N/O contact Potential 24 VDC from heat pump Closed: Active
601XD2 1: 24 VDC 2: Signal (digital)	⑳	Fault message, external heat generator	External N/O contact Potential 24 VDC from heat pump Closed: Active
610XD2 +1: Signal 4-20 mA -1: GND PE: Shield connection	(803)	Set temperature, heating water buffer cylinder	External signal 4 to 20 mA 0 to 100 °C
610XD4 +1: Signal 4-20 mA -1: GND PE: Shield connection	(804)	Set temperature, coolant buffer cylinder	External signal 4 to 20 mA 0 to 50 °C
620XD2 +1: Signal 0-10 V -1: GND PE: Shield connection	⑳	Set default value, external heat generator	Signal 0 to 10 V
630XD1 1: External potential 2: Signal (digital)	②	Collective message, priority 1 Fault Heat pump	Floating N/O contact: Closed: Standard mode Open: Fault Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD2 1: External potential 2: Signal (digital)	②	Collective message, priority 2 Warning Heat pump	Floating N/O contact: Closed: Standard mode Open: Fault Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)

Electrical connections (cont.)

Terminals	No. in dia-gram	Function	Explanation
630XD3 1: External potential 2: Signal (digital)	②	Collective message, priority 3 Note Heat pump	Floating N/O contact: Closed: Standard mode Open: Fault Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD4 1: External potential 2: Signal (digital)	②	Refrigerant alarm	Floating N/O contact: Closed: Standard mode Open: Fault Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD5 1: External potential 2: Signal (digital)	②	Operating message, heat pump	Floating N/O contact: Closed: Operation Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD6 1: External potential 2: Signal (digital)	④⑱	Immersion heater demand, heating water buffer cylin-der	Floating N/O contact: Closed: No demand Open: Demand Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD7 1: External potential 2: Signal (digital)	⑳	Start command, external heat generator	Floating N/O contact: Closed: Demand Open: No demand Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
630XD8 1: External potential 2: Signal (digital)	㉜	Immersion heater demand, cylinder	Floating N/O contact: Closed: No demand Open: Demand Connection values: ▪ Max. voltage: 250 V~ ▪ Max. switching current: 5 A (AC1)
800KF0 X102: LAN1		Modbus TCP/BACnet IP ADS DHCP is active	Connection with RJ45 plug directly to socket of panel PC 800KF0
880XF1		Slave heat pump	Connection with RJ45 plug directly to socket of Ethernet switch 880XF1
880XF1		Modbus TCP/BACnet IP ADS DHCP is active	Connection with RJ45 plug directly to socket of Ethernet switch 880XF1

Power supply

Isolators for non-earthed conductors
- The integral ON/OFF switch must simultaneously isolate all non-earthed conductors from the mains with a minimum contact separation of 3 mm.
- We additionally recommend installing an AC/DC-sensitive RCD (RCD class B ⏦⎓) for DC (fault) currents that can occur with energy efficient equipment.
- Select and size residual current devices to DIN VDE 0100-530.

⚠ **Danger**
Incorrect electrical installations can lead to life threatening injuries from electrical current and result in appliance damage.

Connect the power supply and implement all safety measures (e.g. RCD circuit) in accordance with the following regulations:
- IEC 60364-4-41
- VDE regulations
- TAR medium voltage VDE-AR-N-4110

⚠ **Danger**
The absence of system component earthing can lead to serious injury from electric current if an electrical fault occurs.
- Restore all protective conductor connections of the heat pump.
- Heat pump and pipework **must** be grounded to the equipotential bonding of the building.

⚠ **Danger**
Incorrect core assignment can result in serious injury and damage to the appliance.
Never interchange cores "L" and "N".

- Consult your power supply utility, which may offer different supply tariffs for the power circuits.
  Observe the technical connection requirements of the power supply utility.
- The power-OFF assignment is made via the type of connection.
  In Germany, the power supply can be cut off for up to 3 x 2 hours per day (24 h).
- The power supply to the control circuit must be **without** interruption by the power supply utility. The control circuit therefore requires a separate power supply.
- A separate power supply for the control circuit necessitates a change to the internal wiring. This may only be carried out by an electrician according to the electrical connection diagram.
- Protect the power cable to the heat pump control unit with a fuse of max. 25 A.
- If the power supply to the appliance is connected with a flexible power cable, ensure that the live conductors are pulled taut before the earth conductor in the event of strain relief failure. The length of the earth conductor wire will depend on the design.

Information on the compressor power supply
(power circuit)
- ! **Please note**
  Incorrect phase sequence can cause damage to the appliance.
  Make the compressor power supply **only** in the phase sequence specified (see terminals) with a **clockwise** rotating field.
- The compressor power fuses must have C characteristics.

Power supply for control circuit (230 V~) and power circuit (400 V~)

Make the connection in accordance with the separate "Connection and wiring diagram".

Electrical connection requirements

Notes
- *The type and cross-section of connecting cables must be determined by an authorised electrician in accordance with the local regulations.*
- *The control circuit power supply and the cable for the power-OFF signal can be combined in a single 5-core cable.*

Cable lengths in the heat pump plus distance to wall

Control circuit power supply (230 V~ if on site)	3.3 m
Power circuit power supply (400 V~)	2.3 m
Additional connecting cables	2.3 m

See also "Electrical values, heat pump" on page 82 onwards.

Power supply with power-OFF without on-site load disconnect (delivered condition)

The power-OFF signal is connected directly potential-free to the heat pump control unit. The compressors are shut down when power-OFF is enabled.

Note
Observe the technical connection requirements of the relevant power supply utility.

Mains monitoring

Electronic soft starter, type SMC

Electronic soft starter functions:
- Monitoring the compressor mains feed
- Reducing the compressor starting current during the starting procedure
- Overload protection

Delivered condition:
- Rotating field, phase asymmetry: 20 %
- Max. compressor operating current "Imax": Dependent on compressor output

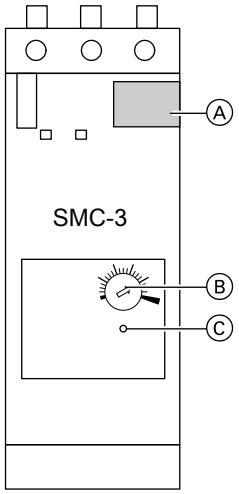

Fig. 35

Ⓐ DIP switch for starting characteristics
Ⓑ Rotary switch for max. compressor operating current "Imax"
Ⓒ Status LED

Status LED explanation

- Status LED illuminates:
  Mains monitoring active
- Status LED flashes: Fault
  Number of consecutive flashes:
  1 Overload
  2 Excess temperature
  3 Phase reversal
  4 Phase loss/motor not connected
  5 Phase asymmetry
  6 Short-circuited thyristor
  7 Test

Starting characteristics

The starting characteristics are set at the DIP switches behind the transparent protective flap of the electronic soft starter. At the factory, the DIP switches are set to suit the respective heat pump type.
Prior to commissioning, compare the DIP switch settings with the details in the separate "Connection and wiring diagram", and adjust if necessary.

Overload protection

If the tolerance ranges of the electronic soft starter are exceeded, the soft starter will automatically separate the appliance from the mains.
Remove the cause if the relay has responded. The relay does not need to be reset.

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Connecting the programming unit

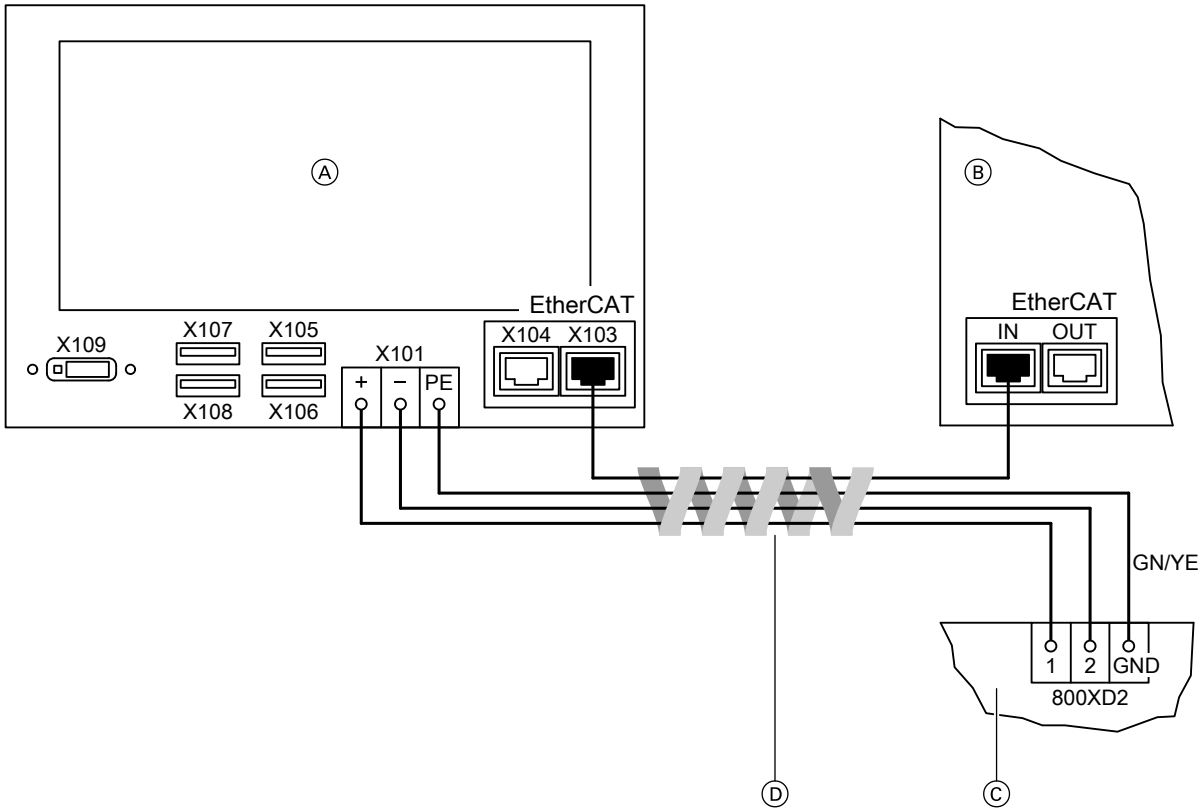

Fig. 36

Ⓐ Programming unit
Ⓑ Bus coupler EK1100
Ⓒ Terminal 800XD2
Ⓓ Panel wiring (7930812)

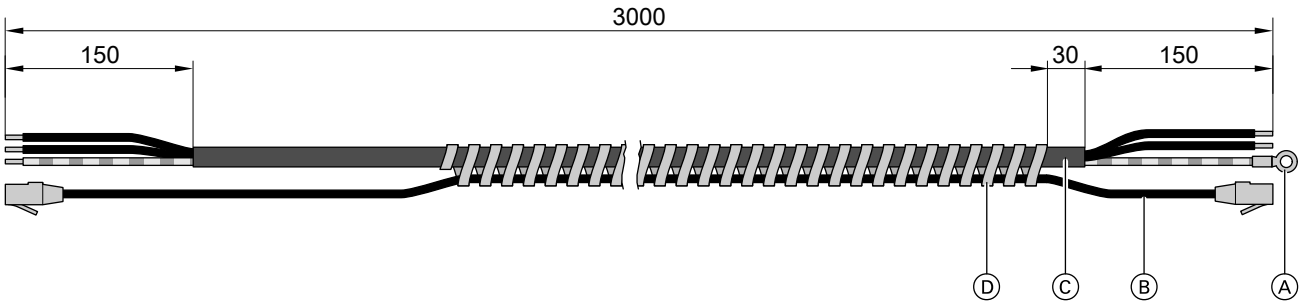

Fig. 37 Panel wiring (7930812)

Ⓐ M4 ring lug
Ⓑ RJ45 patch cable
Ⓒ 3x100 control cable
Ⓓ Spiral hose

Fitting the shaft and dial for the ON/OFF switch and installing the programming unit

Note
The shaft and dial for the ON/OFF switch as well as the programming unit are delivered inside the wiring chamber of the heat pump. Only fit the programming unit after all electrical connections have been made.

Fitting the shaft and dial for the ON/OFF… (cont.)

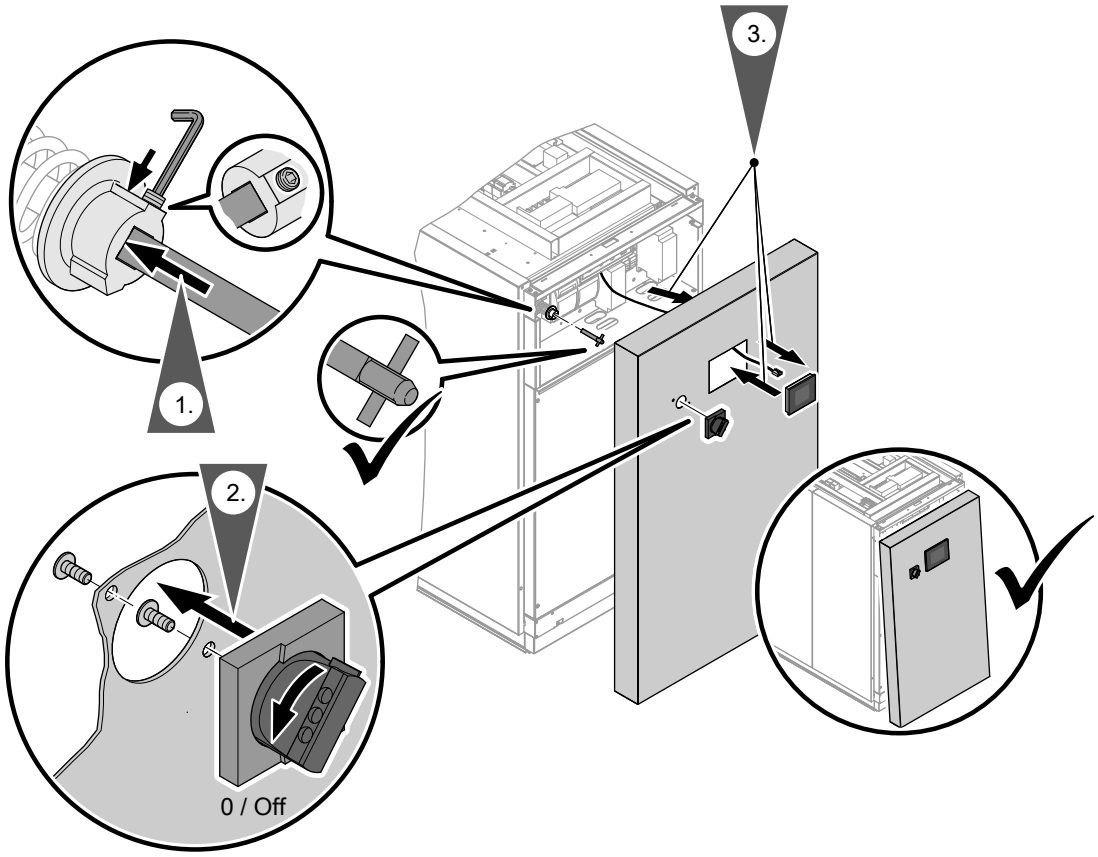

Fig. 38

3. Position the front panel tightly against the front of the heat pump.
Route the data cable through the opening and connect it to the programming unit.
Click the programming unit into place in the opening and check for firm seating.
Securely lean the front panel against the heat pump.

Closing the heat pump

⚠ **Danger**
The absence of component earthing can result in serious injury from electrical current and in component damage in the event of an electrical fault.
Restore all protective conductor connections.

! **Please note**
Leaking hydraulic connections lead to appliance damage.
- Check the internal hydraulic connections for tightness.

! **Please note**
If a casing door is not securely closed this can lead to damage from condensation, vibrations and excessive noise.
Seal the appliance so it is soundproof and diffusion-proof.

Prior to closing the heat pump, check the following:
- Are all cables inside the wiring chamber sufficiently secured (strain relief, cable ties)?
- Has the programming unit been fitted and connected?
- Have all protective conductors been fitted?
- Have all cable entries been correctly applied and sealed against moisture ingress?
- Do all hydraulic connections have airtight sealing and insulation with thermal and vapour diffusion-proof materials?

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Closing the heat pump (cont.)

- Have transport brackets been removed?
- Are the back and side panels securely attached?

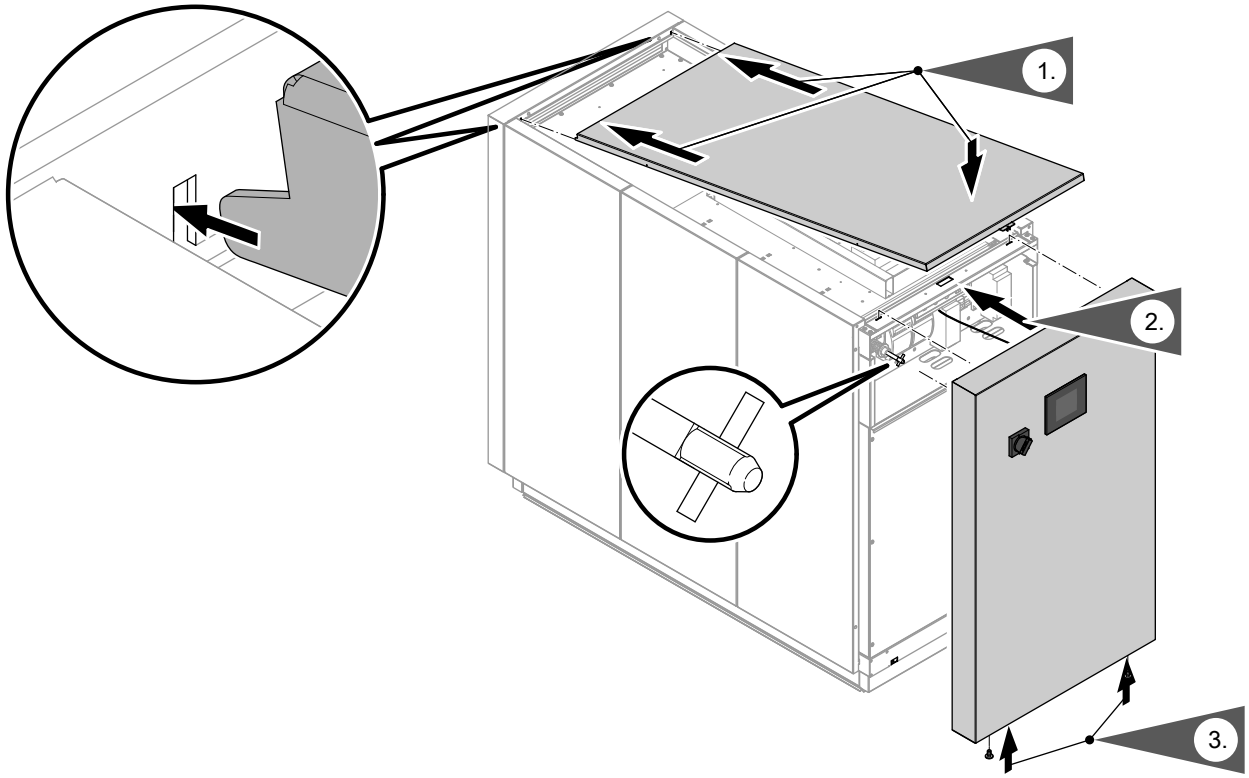

Fig. 39

2. Carefully position the front panel. Pay particular attention to the shaft between the dial and the ON/OFF switch.

4. Hand over the product documentation for servicing and the Allen key to the system operator.

Steps - commissioning, inspection and maintenance

Commissioning steps
Inspection steps
Maintenance steps

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Opening the heat pump

Danger
Contact with live components can lead to serious injury from electric current.
- **Never touch** the terminal areas for the heat pump control unit or power supply; see page 41.
- When working on the appliance, isolate the system from the power supply, e.g. at a separate fuse or mains isolator. Check the system is no longer live and safeguard against reconnection.

Danger
The absence of component earthing can result in serious injury from electrical current and in component damage in the event of an electrical fault.
Restore all protective conductor connections.

Please note
Commissioning immediately after installation can lead to appliance damage.
Wait **at least 30 min** between installing and commissioning the appliance.

Note
Work on the refrigerant circuit must only be carried out by qualified refrigeration engineers in accordance with EN 13313. Work on electrical equipment may only be carried out by qualified electricians.

1. Remove the front panel and top panel; see page 68.

2. When work is complete, close the heat pump; see page 58.

For commissioning this appliance, see also the operating instructions.

Compiling reports

Enter readings taken during commissioning (described below) into the reports. (Enter into a commissioning report)

Set values and parameters must also be documented. See also the operating manual or country-specific document for guidance.

Checking the refrigerant circuit for leaks

Applicable regulations and standards for heat pumps

The siting, operation and maintenance of heat pumps are generally subject to EN 378 and the applicable EU Regulation 517/2014 on fluorinated greenhouse gases.
EU Regulation 517/2014 stipulates the following:
The objective of this regulation is environmental protection through a reduction in the emission of fluorinated greenhouse gases.

Accordingly, this regulation sets out the following:
- Rules for limited emission, use, recovery and destruction of fluorinated greenhouse gases, as well as relevant additional measures
- Conditions for bringing into circulation certain products and equipment that contain fluorinated greenhouse gases or require them in order to operate
- Conditions for certain uses of fluorinated greenhouse gases
- Quantity limits for bringing into circulation partially fluorinated hydrocarbons

Additional, country-specific directives and standards must also be observed.

Checking the refrigerant circuit for leaks (cont.)

Required tightness check (operator obligation) in the European Union

Type	CO_2 equivalent	Standard	With leak detection system (also gas detector)
BWR/BWS 352.B027	> 5 t (6006 kg)	Annually	24 months
BWR/BWS 352.B034	> 5 t (7436 kg)	Annually	24 months
BWR/BWS 352.B056	> 5 t (9295 kg)	Annually	24 months
BWR/BWS 352.B076	> 10 t (10725 kg)	Annually	24 months
BWR/BWS 352.B096	> 10 t (14300 kg)	Annually	24 months
BWR/BWS 352.B114	> 10 t (17160 kg)	Annually	24 months
BWR/BWS 352.B132	> 20 t (20020 kg)	Annually	24 months
BWR/BWS 352.B156	> 20 t (24310 kg)	Annually	24 months
BWR/BWS 353.B172	> 20 t (27170 kg)	Annually	24 months
BWR/BWS 353.B198	> 30 t (31460 kg)	Annually	24 months

Check the floor area, valves and all visible solder joints for traces of oil.

Note
Traces of oil indicate a leak in the refrigerant circuit. Have your heat pump checked over by a refrigeration engineer.

The leak test must be carried out using a leak tester.

Danger
The refrigerant is a non-poisonous gas that displaces air. Uncontrolled escape of refrigerant in enclosed spaces can result in breathing difficulties and suffocation.
- Ensure adequate ventilation in enclosed spaces.
- Always observe regulations and guidelines on handling this type of refrigerant.

The leak test must only be carried out with the heat pump switched off.

Danger
Direct contact with refrigerant can be harmful to the skin.
Wear safety goggles and protective gloves when working on the refrigerant circuit.

Check all brazed joints and threaded fittings of the refrigerant lines for refrigerant leaks.

Please note
Refrigerant can escape when working on the refrigerant circuit.
Work on the refrigerant circuit must **only** be carried out by a certified contractor (in accordance with Regulations (EU) No 517/2014 and 2015/2067).

Filling and venting on the primary side

Please note
Commissioning when the primary circuit is empty causes appliance damage.
Fill and vent the primary circuit before connecting the power supply.

1. Check the Victaulic connections in the heat pump for leaks. The Victaulic couplings must be engaged with a positive interlock and no gaps.

2. Check the pre-charge pressure of the expansion vessel.

3. Fill the primary circuit with Viessmann heat transfer medium and vent.

   Note
   A minimum frost protection level of –16.1 °C (freezing point) must be observed.

Please note
Leaking hydraulic connections lead to appliance damage.
- Check the internal and on-site hydraulic connections for leaks.
- In the event of leaks, switch off the appliance immediately. Drain the primary circuit and check the seating of the seals.
  Always replace damaged or displaced seal rings.

Filling and venting on the secondary side

Please note
Commissioning when the secondary circuit is empty causes appliance damage.
Fill and vent the secondary circuit before connecting the power supply.

Note
***Before** filling the system, observe VDI 2035 part 1.*

1. Check the Victaulic connections in the heat pump for leaks. The Victaulic couplings must be engaged with a positive interlock and no gaps.
2. Open any on-site non-return valves if installed.
3. Check the pre-charge pressure of the expansion vessel.
4. Fill (flush) and vent the secondary circuit.

   Please note
   Leaking hydraulic connections lead to appliance damage.
   - Check the internal and on-site hydraulic connections for leaks.
   - In the event of leaks, switch off the appliance immediately. Drain the secondary circuit and check the seating of the seals. **Always** replace damaged or displaced seal rings.
5. Check the system pressure and top up with water if necessary.
   Minimum system pressure: 0.8 bar (80 kPa)
   Permiss. operating pressure: 2.5 bar (0.25 MPa)

Checking expansion vessels and primary circuit/secondary circuit pressure

Observe engineering information.
Heat pump technical guide

Checking the electrical connections for firm seating

Commissioning the system

Commissioning is carried out in 3 stages:
1. Configuring the system
2. Configuring the operating mode
3. Adjusting operating parameters

The parameters and system controller configuration must be matched individually as required (see following chapters and service instructions for the "Vitotronic SPS heat pump control unit, type 2.0").

Note
The type and extent of parameters depend on the heat pump type and the system configuration.
Observe the instructions in the separate service instructions for the Vitotronic SPS heat pump control unit, type 2.0, otherwise the appliance warranty will be void.

Note
Commissioning must only be carried out by trained and authorised contractors.

Configuration procedure

Service instructions for "Vitotronic SPS, type 2.0"

Checking the compressor safety chain

Safety high pressure switch

The function of the safety high pressure switch must be checked on each compressor.

Note
Work on the refrigerant circuit must only be carried out by qualified refrigeration engineers in accordance with EN 13313.

Checking the compressor safety chain (cont.)

System must be shut down.

1. Connect the bridge pressure gauge.
2. Close the casing.
3. Shut off the secondary side. Close either the shut-off valve in the flow or in the return.

   Danger
   Closing both shut-off valves will cause over-pressure in the condenser
   Close only one of the two shut-off valves.
   The safety high pressure switch must only be tripped with the casing closed.

4. Provisionally adjust set values in the heat pump control unit (application limit or set value for high pressure).
5. Start up the system or generate a heat command.
6. Monitor the high pressure (set value: 25 bar) on the bridge pressure gauge.
   If the compressor is switched off via the safety high pressure switch, the safety high pressure switch is OK.
7. After the test, restore the system to its operating state.

Checking the electronic flow switch, type IFM

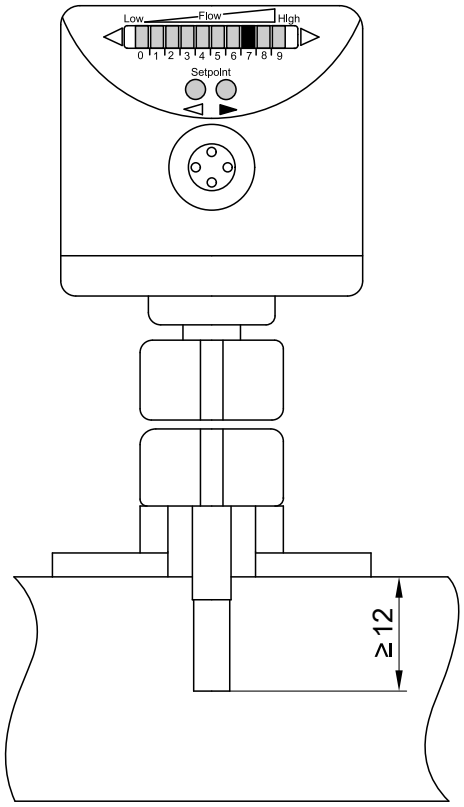

Fig. 40

The flow switch monitors the minimum flow rate required for operating the heat pump.

1. Check the tip of the sensor regularly for deposits.
2. Clean the tip of the sensor with a cloth if necessary.
   Remove stubborn deposits (such as limescale) with commercially available vinegar-based cleaners.
3. Switch on the power supply.
   LEDs "0" to "9" illuminate green in sequence and then extinguish again.
   The operating display then appears.

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Checking the electronic flow switch, type IFM (cont.)

Flow switch operating displays

LED	Meaning
Several LEDs illuminate green.	Indication between no flow rate (no LED illuminates) and maximum flow rate (all LEDs illuminate green). The higher the flow rate, the more LEDs illuminate green.
LED "9" flashes green.	Flow rate higher than nominal flow rate If necessary, carry out an operating display adjustment (high flow balancing, see below), for example if a circulation pump had to be sized for higher flow rates.
LED "0" flashes green.	Flow rate below minimum flow rate ***Note*** *A fault is triggered at the heat pump control unit if the flow rate falls below the switching point. Fault message; see service instructions for "Vitotronic SPS, type 2.0".*
LED for switching point illuminates orange.	Switching output closed; heat pump ready for operation
LED for switching point illuminates red.	Switching output open; heat pump in a fault state (compressor switches off. Fault message; see service instructions for "Vitotronic SPS, type 2.0".).
All LEDs illuminate alternately red and green.	Short circuit at the switching output ***Note*** *The current operating mode is displayed once the short circuit has been remedied.*
No LEDs illuminate.	Operating voltage < 19 VDC or power supply failure.

Carry out an operating display adjustment (high flow balancing if necessary)

High flow balancing establishes the existing (higher) flow rate as the nominal flow rate. For the corresponding values for operating mode "water/water with intermediate circuit", see "Specification".

Note
High flow balancing can shift the switching point of the flow switch.

1. Start the appliance with the existing flow rate.
2. Press and hold the ▶ button for around 5 s until LED "9" flashes.
3. Release the ▶ button.

Fitting the top panel and front panel (closing the heat pump)

See page 58.

Checking the heat pump for unusual operating noise

Instructing the system user

The system installer should hand the operating instructions to the system user and instruct the user in operating the system.

This includes all components installed as accessories, e.g. remote control units. In addition, the system installer must make the user aware of the required maintenance work.

Instructing the system user (cont.)

For further details of operation
Operating instructions for
"Vitotronic SPS, type 2.0"

Diagnosis

Excessive noise

Possible causes:
- Transport bracket not removed
- Front panel not tightly closed
- Side panels not securely closed
- Hydraulic line is touching the heat pump casing (back panel).
- Hydraulic line not connected free of load and torque stress
- Anti-vibration elements for hydraulic connection are missing

High pressure fault

Possible causes:
- A closed shut-off valve on the compressor or in the refrigerant circuit
- Excessively high water temperatures in the return
- Incorrect parameter settings in the heat pump control unit
- Dirt in the condenser (plate heat exchanger)
- Flow rate too low (faulty circulation pump)
- Temperature sensor on the pressure line limits the compressor(s) if the temperature is too high.
- Optional safety overtemperature switch has tripped. The temperature on the water side has exceeded the set limit (approx. 70 °C depending on machine type; see operating instructions for the "Vitotronic PLC, type 2.0").

Pressure too high (shutdown)

- Pressure sensor switches off the compressors and monitors the current system pressure.
- Pressure switch switches the compressor(s) off mechanically (if the pressure continues to rise).

Removing the front panel and top panel (access to control system)

1. Set the ON/OFF switch to OFF or 0.
2. Undo both screws on the underside of the front panel.
3. **Please note**
   The cables between the programming unit and the wiring chamber can sustain damage.
   Take care when removing the front panel and observe the length of the cable (approx. 60 cm tolerance).

   Put the front panel to one side and ensure it cannot fall over.
4. Carefully remove the top panel (see page 59).

Removing the side panels (access to refrigerant circuit)

Note
The side panels must only be removed with the heat pump switched off.

1. Undo the screws on the underside of the side panels.
2. Place the side panels to one side and ensure they cannot fall over.

Maintenance work on the refrigerant circuit

For scope of work, see "Checklist in accordance with VDMA 24186-3" on page 69.
The intervals for periodic tasks are guide values. They are dependent on the system in question and the operating conditions.
When devising the system-specific maintenance schedule, the time intervals must be extended and adjusted accordingly.

Notes
- *Maintenance must only be carried out by qualified refrigeration engineers in accordance with EN 13313.*
- *The warranty will be restricted if the maintenance work is not verified by the appropriate qualified personnel.*
- *Work must only be carried out by an authorised contractor or by a qualified professional.*
- *The qualified professional must compile a report (certificate) listing the tests conducted, the set switching points and the maintenance work completed. The report must be stored at the place of operation.*

Information on wearing parts (replacement of wearing parts in refrigeration technology)
- *The parts and materials to be replaced are based on the maintenance measures in accordance with VDMA 24186-3.*
- *Components/parts should only be replaced by identical components/parts of the same specification.*
- *When replacing components/parts, the relevant documentation should be updated.*

Regular inspection and work

- Monitor pressures, temperatures, currents, voltages and frequencies.
- Check valves/fittings for ease of movement.
- Check system for leaks.
- Look for deformation.
- Check retainers.

Maintenance work on the refrigerant circuit (cont.)

- Check all system parts for leaks.
- Look out for any unusual system behaviour.
- Perform maintenance work in accordance with the maintenance schedule.
- Check/ensure the following:
  - All shut-off devices are open for system operation.
  - All control units are set correctly.
  - All pressures and temperatures are within the specified limit ranges.
  - There are no faults.

Measures after completion of maintenance

After completing the maintenance work and before switching on the system, carry out the following steps.

- Check all previously loosened threaded connections for firm seating.
- Check that all previously removed protection equipment and covers have been reinstalled correctly.
- Ensure that all previously used tools, materials and miscellaneous equipment have been removed from the work area.
- Clean the work area and remove any leaked substances, e.g. fluids or similar.
- Ensure that all safety equipment on the system is working properly.

Maintenance work on the control system

For scope of work, see "Checklist in accordance with VDMA 24186-4"

Note
Work on electrical equipment may only be carried out by qualified electricians.

Maintenance log

Checklist in accordance with VDMA 24186-3

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
1	Displacement and flow devices		
1.1	**Reciprocating and rotary compressors**		
1.1.1	Check externally for dirt, damage and corrosion	X	
1.1.2	Technical cleaning to maintain functionality		X
1.1.3	Check for secure fastening and operating noise	X	
1.1.4	Measure suction pressure	X	
1.1.5	Measure suction gas temperature upstream of compressor[*1]	X	
1.1.6	Measure compression pressure[*1]	X	
1.1.7	Measure compression end temperature at pressure connection[*1]	X	
1.1.8	Check oil level (at sight glass)	X	
1.1.9	Check oil for acid content (acid test)	X	
1.1.10	Change oil		X
1.1.11	Measure oil pressure[*1]	X	
1.1.12	Adjust oil pressure		X
1.1.13	Check function of crankcase heater	X	

[*1] *Document measurements in test report.*

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
1.1.14	Check function of output control	X	
1.1.15	Check for leaks on refrigerant side	X	
2	Heat exchanger		
2.1	**Water-cooled condenser**		
2.1.1	Check externally for dirt, damage and corrosion	X	
2.1.2	Technical cleaning to maintain functionality		X
2.1.3	Measure condensing temperature*1	X	
2.1.4	Measure refrigerant-side supercooling temperature at condenser outlet*1	X	
2.1.5	Measure medium temperature and condenser inlet and outlet*1	X	
2.1.6	Determine frost protection temperature (freezing point) of heat transfer media*2*1	X	
2.1.7	Check function of coolant controller*2	X	
2.1.8	Adjust coolant controller*2		X
2.1.9	Check for leaks on refrigerant side and water side	X	
2.1.10	Check icing protection*2	X	
2.1.11	Top up antifreeze*2		X
2.2	**Evaporator (liquid/refrigerant)**		
2.2.1	Check externally for dirt, damage and corrosion	X	
2.2.2	Technical cleaning to maintain functionality		X
2.2.3	Measure evaporation pressure in evaporator*1	X	
2.2.4	Measure evaporation temperature at evaporator outlet*1	X	
2.2.5	Determine refrigerant overheating temperature*1	X	
2.2.6	Measure medium temperature at evaporator inlet and outlet*1	X	
2.2.7	Determine frost protection temperature (freezing point) of heat transfer media*2*1	X	
2.2.8	Check for leaks on water side and refrigerant side	X	
2.3	**Air cooler (defrost box)***2		
2.3.1	Check externally for dirt, damage and corrosion	X	
2.3.2	Technical cleaning to maintain functionality		X
2.3.3	Measure medium temperature at evaporator inlet and outlet*1	X	
2.3.4	Check function of condensate drain*2	X	
2.3.5	Clean condensate drain*2		X
2.3.6	Check function of defrost heater and condensate drain heater*2	X	
2.3.7	Check hygiene level	X	
3	System parts in refrigerant circuit		
3.1	**Pipework**		
3.1.1	Check externally for dirt, damage and corrosion	X	
3.1.2	Check insulation for damage	X	
3.1.3	Check for secure fastening	X	
3.1.4	Check expansion joints externally for damage*2	X	
3.1.5	Check filter dryer for possible blockages*2	X	
3.1.6	Replace filter dryer*2		X
3.1.7	Check fluid level in sight glass of liquid line	X	

*1 *Document measurements in test report.*

*2 *If applicable*

Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
3.1.8	Check fluid indicator for discolouration*2	X	
3.1.9	Check fluid level in refrigerant collector*2	X	
3.1.10	Check for leaks on refrigerant side	X	
3.2	**Valves/fittings**		
3.2.1	Check externally for dirt, damage and corrosion	X	
3.2.2	Check function of solenoid valves*2	X	
3.2.3	Check function of restrictors	X	
3.2.4	Adjust restrictors		X
3.2.5	Check function of shut-off valves	X	
3.2.6	Check for leaks on refrigerant side	X	
3.2.7	Check function of mixers	X	
3.3	**I&C and safety equipment**		
3.3.1	Check externally for dirt, damage and corrosion	X	
3.3.2	Check function	X	
3.3.3	Adjust to design data		X
3.3.4	Check for leaks on refrigerant side	X	
3.4	**Measurement and display devices***2		
3.4.1	Check externally for dirt, damage and corrosion	X	
3.4.2	Check function of pressure indicator (plausibility test)	X	
3.4.3	Check function of temperature indicator (plausibility test)	X	
3.4.4	Check function of level indicator (plausibility test)	X	
3.4.5	Check function of flow meter	X	
3.4.6	Check for leaks on refrigerant side	X	
4	Cold store*2		
4.1	**Cold store (ice, brine)**		
4.1.1	Check externally for damage, corrosion, leaks and secure fastening	X	
4.1.2	Check thermal insulation externally for damage and completeness	X	
4.1.3	Technical cleaning to maintain functionality	X	
5	Recooling systems*2		
5.1	**Dry recooling systems with switchable sprinkler (circulating water or freshwater)**		
5.1.1	Check dry recooler externally for dirt, damage and corrosion	X	
5.1.2	Technical cleaning to maintain functionality		X
5.1.3	Check frost protection equipment	X	
5.1.4	Check for leaks on water side	X	
5.1.5	Check sprinkler equipment for dirt, incrustation, damage and corrosion	X	
5.1.6	Technical cleaning to maintain functionality		X
5.1.7	Check function of water infeed and distribution system	X	
5.1.8	Check water level	X	
5.1.9	Adjust control equipment for water level		X
5.1.10	Check function of desalination equipment	X	
5.1.11	Adjust desalination equipment		X

*2 *If applicable*

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
5.1.12	Check function of conductivity gauge	X	
5.1.13	Check function of pasteurisation system	X	
5.1.14	Check function of shut-off equipment	X	
5.1.15	Check function of blow-down valve assembly		
5.1.16	Check drain and overflow for function and leaks	X	
5.1.17	Check dirt trap for contamination	X	
5.1.18	Clean dirt trap		X
5.1.19	Check function of sump heater	X	
5.1.20	Check function of ribbon heater	X	
5.1.21	Perform bacterial count (CFU/ml)	X	
5.1.22	Check hygiene level	X	
5.2	**Dry recooling systems without sprinkler**		
5.2.1	Check externally for dirt, damage and corrosion	X	
5.2.2	Technical cleaning to maintain functionality		X
5.2.3	Check frost protection equipment	X	
5.2.4	Check for leaks on water side	X	
6	Water treatment*2		
6.1	**Water treatment**		
6.1.1	Check for dirt, damage, corrosion and secure fastening	X	
6.1.2	Technical cleaning to maintain functionality		X
7	Air delivery equipment*2		
7.1	**Fans**		
7.1.1	Check for dirt, damage, corrosion and secure fastening	X	
7.1.2	Technical cleaning to maintain functionality		X
7.1.3	Check impeller for imbalance	X	
7.1.4	Check function of blade adjuster	X	
7.1.5	Check bearings for noise	X	
7.1.6	Grease bearings with regreasing device	X	
7.1.7	Check flexible connection for leaks	X	
7.1.8	Check function of anti-vibration mount	X	
7.1.9	Check function of protection equipment	X	
7.1.10	Check function of vane controller	X	
7.1.11	Check function of drainage	X	
7.1.12	Check hygiene level	X	
7.2	**Check air ducts and filters**		
7.2.1	Check accessible duct sections including existing thermal insulation for external damage and corrosion (visual inspection)	X	
7.2.2	Check function of drains	X	
7.2.3	Clean drains		X
7.2.4	Check accessible flexible connections for leaks (visual inspection)	X	
7.2.5	Spot check accessible duct sections on the inside for dirt (visual inspection), check hygiene level	X	
7.2.6	Check filter for dirt, damage and corrosion	X	
7.2.7	Clean or replace filter		X

*2 *If applicable*

Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
8	Pipework (secondary circuit)		
8.1	**Pumps**		
8.1.1	Check externally for dirt, damage, corrosion and noise	X	
8.1.2	Technical cleaning to maintain functionality		X
8.1.3	Check function	X	
8.1.4	Adjust gland		X
8.1.5	Check bearings for noise	X	
8.1.6	Grease bearings with regreasing device*2		X
8.1.7	Check for leaks (visual inspection)	X	
8.1.8	Check level control	X	
8.2	**Shut-off, balancing and control valves/fittings**		
8.2.1	Check externally for dirt, damage and corrosion	X	
8.2.2	Check function	X	
8.2.3	Check for leaks (visual inspection)	X	
8.2.4	Adjust gland		X
8.2.5	Lubricate spindle*2	X	
8.3	**Dirt trap**		
8.3.1	Check for dirt	X	
8.3.2	Clean strainer		X
8.3.3	Check strainer for damage	X	
8.4	**Pipework and expansion vessels**		
8.4.1	Check externally for dirt, damage and corrosion	X	
8.4.2	Technical cleaning to maintain functionality		X
8.4.3	Check insulation for damage	X	
8.4.4	Check thermometer function (plausibility test)	X	
8.4.5	Check manometer function (plausibility test)	X	
8.4.6	Check expansion joints for damage (visual inspection)	X	
8.4.7	Check heat transfer medium of run-around coil systems for frost protection	X	
8.4.8	Check function of ribbon heater	X	
8.4.9	Check function of safety equipment	X	
8.4.10	Venting		X
8.4.11	Check compensating tank and its connections for damage, corrosion, secure fastening and leaks	X	
8.4.12	Check pressure holding valve and shut-off valve in expansion line	X	
8.4.13	Check pressure cushion in expansion vessel	X	
8.4.14	Create pressure cushion in expansion vessel		X
8.4.15	Check the function of the safety valve	X	
9	Electrical equipment		
9.1	**Switch panels and control panels**		
9.1.1	Check for dirt, damage, corrosion and secure fastening	X	
9.1.2	Technical cleaning to maintain functionality		X
9.1.3	Check connections for firm seating	X	
9.1.4	Tighten connections		X

*2 *If applicable*

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
9.1.5	Check functional elements (e.g. operating, measuring and display devices)	X	
9.1.6	Set, adjust, tighten functional elements (e.g. operating, measuring and display devices)		X
9.1.7	Check control and switching devices for function and wear	X	
9.1.8	Check electrical/electronic/pneumatic input signals (e.g. sensors, remote dial, control variable) for compliance with the set values	X	
9.1.9	Check function of protection and safety equipment	X	
9.1.10	Check control function, control signal and safety chains	X	
9.1.11	Adjust control function and control signals		X
9.2	**Safety equipment**		
9.2.1	Check function of emergency stop switch	X	
9.2.2	Check ventilation (supply and extract air)	X	
10	Drive system elements		
10.1	**Electric motors**		
10.1.1	Check externally for dirt, secure fastening, damage and corrosion	X	
10.1.2	Technical cleaning to maintain functionality		X
10.1.3	Check the rotational direction	X	
10.1.4	Check terminals for firm seating	X	
10.1.5	Tighten terminals		X
10.1.6	Measure voltage*1	X	
10.1.7	Measure current draw*1	X	
10.1.8	Measure phase symmetry*1	X	
10.1.9	Check for quiet running and heat build-up		X
10.1.10	Check bearings for noise	X	
10.1.11	Grease bearings with regreasing device*2		X
10.1.12	Check function of protection equipment	X	
10.1.13	Check function of service switch	X	
11	Documentation and identification		
11.1	**Documents relevant to maintenance (e.g. diagrams, manufacturer's specifications)**		
11.1.1	Check presence	X	
11.2	**Existing system identification (labels, colour coding, type plate/approval mark)**		
11.2.1	Check presence	X	

Checklist in accordance with VDMA 24186-4

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
1	Control panels (central and decentralised)		
1.1	**Control section**		
1.1.1	Check for correct installation appropriate to function, check ambient conditions	x	
1.1.2	Check for dirt, damage, corrosion and secure fastening	x	

*1 *Document measurements in test report.*

*2 *If applicable*

Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
1.1.3	Check protective covers for completeness	x	
1.1.4	Check ventilation system for contamination	x	
1.1.5	Clean ventilation facilities		x
1.1.6	Replace ventilation filters		x
1.1.7	Technical cleaning to maintain functionality		x
1.1.8	Check connections	x	
1.1.9	Check functional elements (e.g. visual and acoustic indicators and controls)	x	
1.1.10	Set, adjust, tighten functional elements (e.g. visual and acoustic indicators and controls)		x
1.1.11	Check switching and control processes (e.g. frost protection function)	x	
1.1.12	Check safety equipment, safety chains, e.g. thermally activated trip element, check fuses for secure seating	x	
1.1.13	Adjustment of control panel components (e.g. time relay)	x	
1.1.14	Check manual, automatic and remote control function[*2]	x	
2	Field level		
2.1	**Sensors (e.g. sensors, transmitters, transducers, monitors, limiters)**		
2.1.1	Check for correct installation appropriate to function, check ambient conditions	x	
2.1.2	Check for dirt, damage, corrosion and secure fastening	x	
2.1.3	Technical cleaning to maintain functionality		x
2.1.4	Check connections	x	
2.1.5	Measure and log physical measured variables at the measuring location	x	
2.1.6	Check measuring signals and function	x	
2.1.7	Readjust/regenerate sensor		x
2.2	**Actuators**		
2.2.1	Check for correct installation appropriate to function, check ambient conditions	x	
2.2.2	Check for dirt, corrosion and damage (e.g. leaks) and secure fastening (visual inspection)	x	
2.2.3	Technical cleaning to maintain functionality		x
2.2.4	Check connections	x	
2.2.5	Check input signals and working control range	x	
2.2.6	Check safety position	x	
2.2.7	Check function of position/limit transducer and limit switches	x	
2.2.8	Readjust actuator		x
2.2.9	Check for correct installation appropriate to function, check ambient conditions	x	
2.3	**Meters (energy and media)**[*2]		
2.3.1	Check for correct installation appropriate to function, check ambient conditions	x	
2.3.2	Check for dirt, damage, corrosion and secure fastening	x	
2.3.3	Technical cleaning to maintain functionality		x

[*2] *If applicable*

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
2.3.4	Check connections	x	
2.3.5	Check power supply	x	
2.3.6	Replace backup battery		x
2.3.7	Check measuring signals for plausibility and document; compare data on meter with data on higher-level system	x	
2.3.8	Correction/synchronising of data in event of deviation		x
2.3.9	Check and document calibration periods	x	
2.3.10	Check sealing	x	
2.3.11	Check communication with higher-level system, e.g. DDC automation station (hardwired, wireless)	x	
2.4	**Decentralised bus-enabled assemblies (hardwired, wireless)**		
2.4.1	Perform data backup	x	
2.4.2	Check for correct installation appropriate to function, check ambient conditions	x	
2.4.3	Check for dirt, damage, corrosion and secure fastening	x	
2.4.4	Technical cleaning to maintain functionality		x
2.4.5	Check integral power supply (e.g. backup battery)	x	
2.4.6	Replace integral power supply (e.g. backup battery)		x
2.4.7	Check functional elements (e.g. operating and display devices)	x	
2.4.8	Check appliance status (e.g. memory/processor usage, fault memory)		x
2.5	**Local priority programming units**		
2.5.1	Check for correct installation appropriate to function, check ambient conditions	x	
2.5.2	Check for dirt, corrosion, damage and secure fastening (visual inspection)	x	
2.5.3	Technical cleaning to maintain functionality		x
2.5.4	Check function of connections	x	
2.5.5	Check functional elements (operating units)	x	
2.5.6	Check output signals (priority operation via e.g. remote dial, switches, buttons)	x	
3	Automation level		
3.1	**Controller**		
3.1.1	Check for correct installation appropriate to function, check ambient conditions	x	
3.1.2	Check for dirt, damage, corrosion and secure fastening	x	
3.1.3	Check ventilation system for contamination	x	
3.1.4	Clean ventilation facilities		x
3.1.5	Replace ventilation filters		x
3.1.6	Technical cleaning to maintain functionality		x
3.1.7	Check integral power supply (e.g. backup battery)	x	
3.1.8	Replace integral power supply (e.g. backup battery)		x
3.1.9	Check function of connections	x	
3.1.10	Check functional elements (e.g. operating and display devices)	x	
3.1.11	Set, adjust, tighten functional elements (e.g. operating and display devices)		x

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
3.1.12	Check input signals (e.g. sensors, remote dial, control variable)	x	
3.1.13	Check control circuit and actuating signal	x	
3.1.14	Adjust control circuit and actuating signal		x
3.1.15	Check controller status (e.g. memory/processor usage, fault memory)		x
3.1.16	Check power outage and restore behaviour	x	
3.1.17	Check redundancy function		x
4	Network		
4.1	**Network communication**		
4.1.1	Check protocol communication	x	
4.1.2	Check communication parameters, e.g. for IP address duplicates	x	
4.1.3	Check network load	x	
5	Software		
5.1	**Access permissions in accordance with VDMA 24774 (user name/password)**		
5.1.1	Check access permissions (list of authorised users, quality of password rules)	x	
5.1.2	Change access permissions		x
5.2	**IT security in accordance with VDMA 24774**		
5.2.1	Check security-relevant updates/upgrades	x	
5.2.2	Check security-relevant system adjustments	x	
5.2.3	Security/backup test	x	
5.3	**Data backup (e.g. parameters, graphics, configuration files)**		
5.3.1	Archiving of historical data		x
5.3.2	Reduction of data pool		x
5.3.3	Perform backup of system-specific data (e.g. parameters, graphics, configuration files)	x	
5.3.4	Perform a restore		x
5.3.5	Handover of most recently created data backup	x	
5.3.6	Storage of most recently created data backup		x
5.4	**Software backup (e.g. operating systems, application software, firmware, security software)**		
5.4.1	Document software versions	x	
5.4.2	Perform software backup	x	
5.4.3	Perform a restore		x
5.4.4	Check licence rights	x	
5.4.5	Handover of most recently created software backup	x	
5.4.6	Storage of most recently created software backup		x
6	Operating mode/method		
6.1	**Operating mode/method**		
6.1.1	Check operating mode (automatic/manual)	x	
6.1.2	Check implementation of control concept	x	
7	Documentation and identification		
7.1	**Documents relevant to maintenance (e.g. diagrams, manufacturer's specifications)**		
7.1.1	Check presence of wiring diagrams	x	

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Maintenance log (cont.)

Pos.	Assembly/component/task	Implementation	
		Periodically	As required
7.1.2	Check presence of function description	x	
7.1.3	Check presence of control diagram	x	
7.1.4	Check presence of datapoint lists/BA function list	x	
7.1.5	Check presence of network topology diagram	x	
7.2	**Existing system identification (labels, colour coding, type plate/approval mark)**		
7.2.1	Check presence	x	

Overview of electrical components

See page 42 onwards.

Overview of internal components

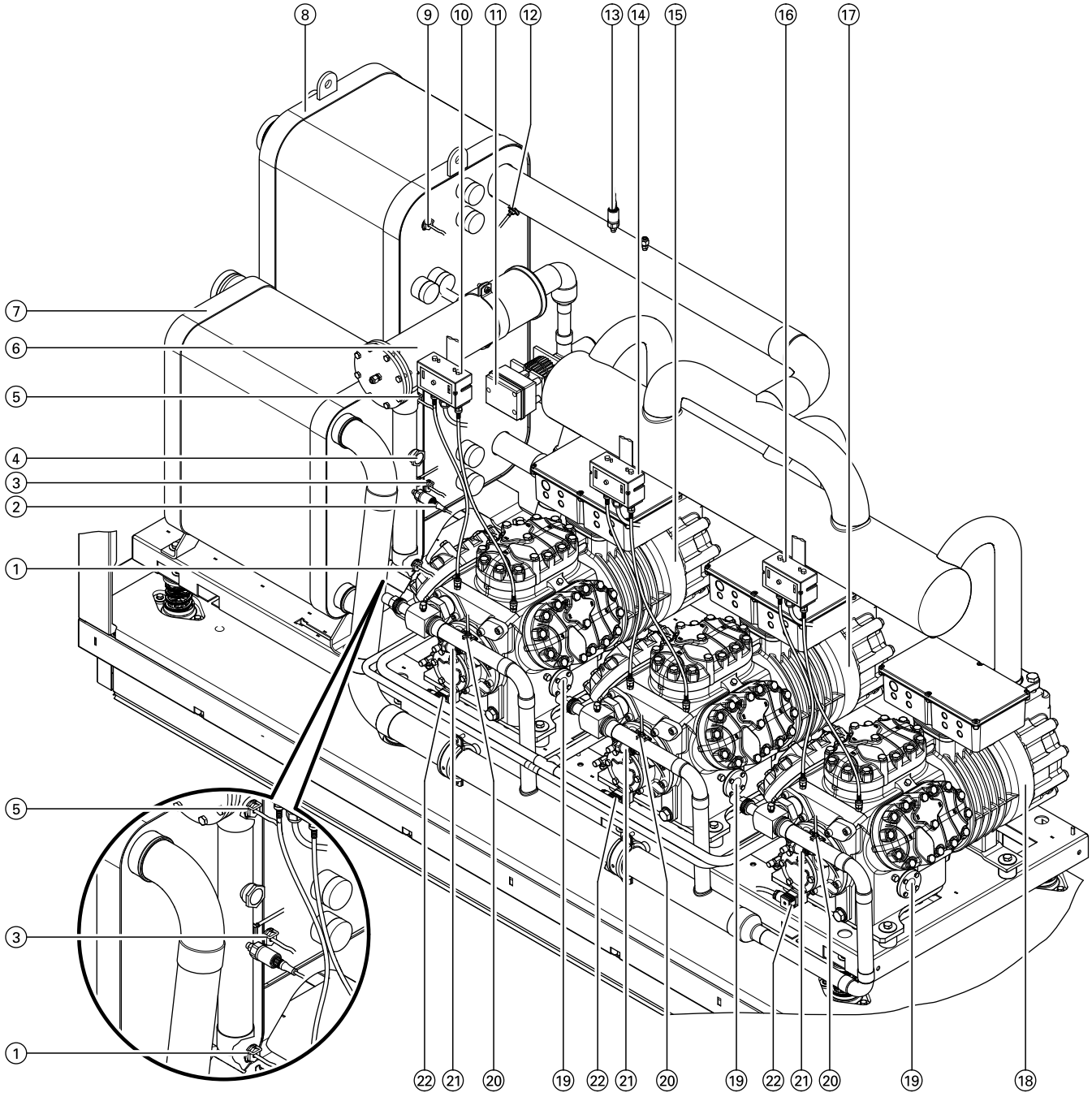

Fig. 41 Example: 3-stage heat pump

① Secondary circuit return temperature sensor (inlet)
② High pressure sensor
③ Primary circuit return temperature sensor (outlet)
④ Refrigerant sight glass
⑤ Secondary circuit flow temperature sensor (outlet)
⑥ Filter dryer
⑦ Condenser
⑧ Evaporator
⑨ Primary circuit flow temperature sensor (inlet)
⑩ Safety high pressure switch, stage 3
⑪ Electronic expansion valve (EEV)
⑫ Suction gas temperature sensor
⑬ Low pressure sensor
⑭ Safety high pressure switch, stage 2
⑮ Piston compressor 3
⑯ Safety high pressure switch, stage 1
⑰ Piston compressor 2
⑱ Piston compressor 1
⑲ Oil sight glass
⑳ Hot gas temperature sensor
㉑ Oil pressure sensor (pressure transmitter)
㉒ Oil sump heater

Draining the heat pump on the primary/secondary side

Drain the heat pump at the on-site drain valve on the primary/secondary side.

Checking the sensors

For the position of the sensors in the heat pump: See Fig. 41 on page 79.

Connect the sensors: See separate "Connection and wiring diagram".

Temperature sensors type Pt1000

Sensor	Test element
▪ Outside temperature sensor ▪ Secondary circuit flow temperature sensor ▪ Secondary circuit return temperature sensor ▪ Cooling circuit flow temperature sensor ▪ Buffer temperature sensor ▪ Cylinder temperature sensor ▪ Immersion temperature sensor	Pt1000

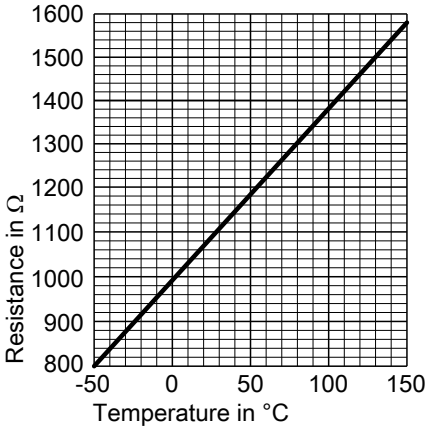

Fig. 42

Please note
Measuring device may be damaged.
All sensors can be checked via the temperature displays in the program. If a sensor still needs to be tested directly, one of the 2 sensor connections must be separated from the control. Otherwise the measuring device will indicate false values or can sustain damage.

Checking fuses

Fuses in the wiring chamber
- Power circuit fuse, compressor (see separate "Connection and wiring diagram")
  Subject to heat pump/compressor output; see chapter "Specification"
- Power circuit fuse, system components (see separate "Connection and wiring diagram")

1. Switch OFF the power supply.
2. Opening the wiring chamber.
3. Check fuses. Replace if necessary.

Danger
Incorrect or improperly fitted fuses can lead to an increased risk of fire.
- Insert fuses without using any force. Position fuses correctly.
- Only use structurally identical types with the same response characteristics.

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Checking fuses (cont.)

⚠ **Danger**
Removing the fuse does **not switch the power circuit to zero volt**. Contact with 'live' components can lead to serious injury from electric current.
Before working on the equipment, always ensure that **the power circuit is also at zero volt.**

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Specification – Vitocal 350-G Pro

Operation: Brine/water (B0/W35)

Type BWR/BWS		2-stage				
		352.B027	352.B034	352.B056	352.B076	352.B097
Performance data to EN 14511						
Rated heating output	kW	27.3	33.6	57.1	76.2	93.5
Cooling capacity	kW	21.0	26.5	45.0	54.5	70.4
Power consumption	kW	6.8	8.4	13.5	19.0	23.4
Rated current of compressors (total)	A	15.0	18.1	29.1	36.1	53.6
Coefficient of performance ε (COP)		4.0	4.0	4.2	4.0	4.1
Primary circuit (brine)						
Spread	K	3	3	3	3	3
Frost protection limit/freezing point (recommended heat transfer medium Tyfocor GE)	°C	-16.1	-16.1	-16.1	-16.1	-16.1
Heat exchanger capacity (brine)	l	4.4	5.5	9.4	12.9	17.7
Nominal flow rate (recommended value for sizing)	m^3/h	6.4	8.2	13.4	18.2	23.0
Minimum flow rate	m^3/h	4.8	6.1	10.1	13.6	17.3
Pressure drop at nominal flow rate (total pressure drop of evaporator including connections)	kPa	12	13	14	17	19
Pressure drop at minimum flow rate	kPa	7	7	8	9	11
Min. brine inlet temperature	°C	-8	-8	-8	-8	-8
Secondary circuit (water)						
Spread	K	5	5	5	5	5
Heat exchanger capacity (water)	l	3.7	4.7	7.4	10.2	12.7
Nominal flow rate (recommended value for sizing)	m^3/h	4.7	5.9	9.7	13.2	16.8
Minimum flow rate	m^3/h	3.5	4.5	7.3	9.9	12.6
Pressure drop at nominal flow rate (total pressure drop of condenser including connections)	kPa	15	15	16	16	18
Pressure drop at minimum flow rate	kPa	8	8	9	9	10
Max. flow temperature from inlet of primary circuit B –2 °C	°C	73	73	73	73	73
Min. flow temperature, ice store[*3]	°C	-10	-10	-10	-10	-10

Type BWR/BWS		2-stage			3-stage	
		352.B114	352.B132	352.B156	353.B172	353.B198
Performance data to EN 14511						
Rated heating output	kW	114.3	131.8	156.0	171.6	197.9
Cooling capacity	kW	81	96	106	125	143
Power consumption	kW	27.2	32.9	40.5	41.5	49.0
Rated current of compressors (total)	A	57.2	73.2	101.8	105.2	109.8
Coefficient of performance ε (COP)		4.2	4.0	3.9	4.1	4.0

[*3] *Parameters need to be matched in conjunction with ice store systems. Viessmann must be consulted. Always observe the minimum flow rate. It may be necessary to install a flow switch. The max. flow temperature at brine inlet temperature –10 °C is 50 °C.*

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Specification – Vitocal 350-G Pro (cont.)

Type BWR/BWS		2-stage			3-stage	
		352.B114	352.B132	352.B156	353.B172	353.B198
Primary circuit (brine)						
Spread	K	3	3	3	3	3
Frost protection limit/freezing point (recommended heat transfer medium Tyfocor GE)	°C	-16.1	-16.1	-16.1	-16.1	-16.1
Heat exchanger capacity (brine)	l	21.9	33.6	39	43.2	50.4
Nominal flow rate (recommended value for sizing)	m^3/h	27.3	31.3	36.8	40.8	47.3
Minimum flow rate	m^3/h	20.5	23.5	27.6	30.6	35.5
Pressure drop at nominal flow rate (total pressure drop of evaporator including connections)	kPa	23	32	33	34	35
Pressure drop at minimum flow rate	kPa	13	18	19	19	19
Min. brine inlet temperature	°C	-8	-8	-8	-8	-8
Secondary circuit (water)						
Spread	K	5	5	5	5	5
Heat exchanger capacity (water)	l	14.9	16.7	19.5	22.6	27.9
Nominal flow rate (recommended value for sizing)	m^3/h	19.8	22.9	26.9	29.5	34.1
Minimum flow rate	m^3/h	14.8	17.1	20.1	22.1	25.6
Pressure drop at nominal flow rate (total pressure drop of condenser including connections)	kPa	20	23	27	28	32
Pressure drop at minimum flow rate	kPa	11	13	15	16	18
Max. flow temperature from inlet of primary circuit B –2 °C	°C	73	73	73	73	73
Min. flow temperature, ice store[*3]	°C	-10	-10	-10	-10	-10

Notes

The specifications in the datasheets and the product description describe purely physical characteristics. Additional assurances or guarantees require a separate contractual agreement.

Performance data to EN 14511 corresponds to a temperature spread of 3 K at brine inlet 0 °C and brine outlet –3 °C.

The specified pressure drop refers only to the integral heat exchangers in the heat pump and the connecting flange.

A reduced flow rate results in a lower heat pump output. (This also applies in partial load operation)

Failure to achieve the minimum flow rate may lead to damage and therefore a malfunction of the heat pump.

Setting the frost protection too high (too much antifreeze) results in a reduced heating output.

Failure to achieve the minimum frost protection may lead to damage and therefore a malfunction of the heat pump.

The details are applicable to all types (BWR, BWS). The power consumption of the control unit does not need to be factored in.

*[*3] Parameters need to be matched in conjunction with ice store systems. Viessmann must be consulted. Always observe the minimum flow rate. It may be necessary to install a flow switch. The max. flow temperature at brine inlet temperature –10 °C is 50 °C.*

Specification – Vitocal 350-G Pro (cont.)

Operation: Brine/water and water/water

Type BWR/BWS		2-stage				
		352.B027	352.B034	352.B056	352.B076	352.B097
Electrical values, heat pump						
Rated voltage		3/N/PE 400 V/50 Hz				
Starting system		Soft start				
Max. starting current per compressor	A	21.5	25.9	43.2	57.2	69.2
Total starting current (per stage)	A	38.0	45.8	76.4	101.2	122.4
Max. total operating current (per compressor)	A	16.5	19.9	33.2	44.0	53.2
Max. total operating current	A	33.0	39.8	66.4	88.0	106.4
Max. total power consumption	kW	17.8	24.0	38.0	52.0	60.0
Cos φ compressor at max. output		0.78	0.87	0.85	0.85	0.82
Internal protection per compressor (3/N/PE)		gG25A	gG25A	gG40A	gG63A	gG63A
Internal protection for pumps and valves (3/N/PE)		C40A	C40A	C40A	C40A	C40A
Max. permissible power cable protection on site	A	63	63	100	100	125
IP rating		IP 20	IP 20	IP 20	IP 20	IP 20
Refrigerant circuit						
Number of refrigerant circuits		1	1	1	1	1
Number of compressors		2	2	2	2	2
Compressor type		Piston				
Refrigerant		R134a				
Refrigerant charge (standard value), see type plate	kg	4.2	5.1	7.3	9.5	12.6
Global warming potential (GWP)[*4]		1360				
CO_2 equivalent	t	5.7	6.9	9.9	12.9	17.1
Permissible operating pressure, high pressure side	bar	26	26	26	26	26
	MPa	2.6	2.6	2.6	2.6	2.6
Permissible operating pressure, low pressure side	bar	16	16	16	16	16
	MPa	1.6	1.6	1.6	1.6	1.6
Oil volume in compressor	l	5.0	6.6	6.6	9.0	10.5
Connections						
Primary circuit from evaporator (Victaulic)		2½ (DN 65)				3 (DN 80)
Primary circuit from connection set (flange)		DN 65/PN 10				DN 80/ PN 10
Secondary circuit from condenser (Victaulic)		2½ (DN 65)				3 (DN 80)
Secondary circuit from connection set (flange)		DN 65/PN 10				DN 80/ PN 10
Permiss. operating pressure[*5]						
Primary circuit	bar	10	10	10	10	10
	MPa	1.0	1.0	1.0	1.0	1.0
Secondary circuit	bar	10	10	10	10	10
	MPa	1.0	1.0	1.0	1.0	1.0

*[*4] Based on the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*

*[*5] At operating pressures higher than 10 bar (1 MPa), observe the permissible operating pressure for the accessories.*

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Specification – Vitocal 350-G Pro (cont.)

Type BWR/BWS		2-stage				
		352.B027	352.B034	352.B056	352.B076	352.B097
Dimensions						
Total length	mm	1848	1848	1848	2153	2153
Total width	mm	811	811	811	911	911
Handling width	mm	750	750	750	850	850
Total height	mm	1450	1450	1450	1650	1650
Total weight of standard unit	kg	555	672	723	963	1065
Sound power level A-weighted total sound power level at B0/W55 at rated heating output	dB(A)	53	54	58	60	63
Energy efficiency class as per Commission Regulation (EU) No 811/2013 for heating, average climatic conditions						
Low temperature applications (W35)		A+	A++	A++	N/A	N/A
Medium temperature applications (W55)		A+	A+	A+	N/A	N/A
Heating performance data as per Commission Regulation (EU) No 813/2013 (average climatic conditions)						
Low temperature applications (W35)						
▪ Energy efficiency η_S	%	147	150	153	154	154
▪ Seasonal coefficient of performance (SCOP)		3.87	3.96	4.03	4.04	4.06
Medium temperature applications (W55)						
▪ Energy efficiency η_S	%	112	115	117	118	118
▪ Seasonal coefficient of performance (SCOP)		3.01	3.08	3.12	3.14	3.15

Operation: Brine/water and water/water

Type BWR/BWS		2-stage			3-stage	
		352.B114	352.B132	352.B156	353.B172	353.B198
Electrical values, heat pump						
Rated voltage		3/N/PE 400 V/50 Hz				
Starting system		Soft start				
Max. starting current per compressor	A	83.7	96.1	125.1	83.7	96.1
Total starting current (per stage)	A	148.1	170.0	221.3	212.5	243.9
Max. total operating current (per compressor)	A	64.4	73.9	96.2	64.4	73.9
Max. total operating current	A	128.8	147.8	192.4	193.2	221.7
Max. total power consumption	kW	72.0	84.0	102.0	72.0	84.0
Cos φ compressor at max. output		0.81	0.82	0.77	0.81	0.82
Internal protection per compressor (3/N/PE)		gG63A	gG80A	gG100A	gG63A	gG80A
Internal protection for pumps and valves (3/N/PE)		C40A	C40A	C40A	C40A	C40A
Max. permissible power cable protection on site	A	160	160	200	200	250
IP rating		IP 20	IP 20	IP 20	IP 20	IP 20

Specification – Vitocal 350-G Pro (cont.)

Type BWR/BWS		2-stage			3-stage	
		352.B114	352.B132	352.B156	353.B172	353.B198
Refrigerant circuit						
Number of refrigerant circuits		1	1	1	1	1
Number of compressors		2	2	2	3	3
Compressor type				Piston		
Refrigerant				R134a		
Refrigerant charge (standard value), see type plate	kg	15.2	17.3	20.2	22.7	27.1
Global warming potential (GWP)[*4]				1360		
CO_2 equivalent	t	20.7	23.5	27.5	30.9	36.9
Permissible operating pressure, high pressure side	bar	26	26	26	26	26
	MPa	2.6	2.6	2.6	2.6	2.6
Permissible operating pressure, low pressure side	bar	16	16	16	16	16
	MPa	1.6	1.6	1.6	1.6	1.6
Oil volume in compressor	l	10.5	10.5	10.5	15.8	15.8
Connections						
Primary circuit from evaporator (Victaulic)				3 (DN 80)		
Primary circuit from connection set (flange)				DN 80/PN 10		
Secondary circuit from condenser (Victaulic)				3 (DN 80)		
Secondary circuit from connection set (flange)				DN 80/PN 10		
Permiss. operating pressure[*5]						
Primary circuit	bar	10	10	10	10	10
	MPa	1.0	1.0	1.0	1.0	1.0
Secondary circuit	bar	10	10	10	10	10
	MPa	1.0	1.0	1.0	1.0	1.0
Dimensions						
Total length	mm	2153	2153	2153	2816	2816
Total width	mm	911	911	911	911	911
Handling width	mm	850	850	850	850	850
Total height	mm	1650	1650	1650	1650	1650
Total weight of standard unit	kg	1113	1209	1260	1604	1678
Sound power level A-weighted total sound power level at B0/W55 at rated heating output	dB(A)	65	65	65	65	65
Energy efficiency class as per Commission Regulation (EU) No 811/2013 for heating, average climatic conditions						
Low temperature applications (W35)		N/A	N/A	N/A	N/A	N/A
Medium temperature applications (W55)		N/A	N/A	N/A	N/A	N/A

*[*4] Based on the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC)*

*[*5] At operating pressures higher than 10 bar (1 MPa), observe the permissible operating pressure for the accessories.*

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Specification – Vitocal 350-G Pro (cont.)

Type BWR/BWS		2-stage			3-stage	
		352.B114	352.B132	352.B156	353.B172	353.B198
Heating performance data as per Commission Regulation (EU) No 813/2013 (average climatic conditions)						
Low temperature applications (W35)						
▪ Energy efficiency η_S	%	153	150	147	153	149
▪ Seasonal coefficient of performance (SCOP)		4.03	3.95	3.89	4.02	3.92
Medium temperature applications (W55)						
▪ Energy efficiency η_S	%	117	116	114	117	115
▪ Seasonal coefficient of performance (SCOP)		3.14	3.10	3.05	3.13	3.08

Note

The specifications in the datasheets and the product description describe purely physical characteristics. Additional assurances or guarantees require a separate contractual agreement.

The details are applicable to all types (BWR, BWS). The power consumption of the control unit does not need to be factored in.

Information on refrigerant

The EC safety datasheet for the refrigerant used can be obtained from Viessmann Technical Service.

Heat pump commissioning request

Please fax the following request, together with the enclosed system scheme, to your local Viessmann sales office.

We request the presence of a professionally qualified member of your staff during commissioning.

System details:

Requester _____

_____

System location _____

_____

_____

Checklist:

- ☐ Hydraulic scheme for heating system included
- ☐ Secondary circuits fully installed, filled and vented
- ☐ Electrical installation completed
- ☐ Hydraulic lines fully thermally insulated
- ☐ All windows and external doors airtight
- ☐ Geothermal probes/well and connection lines fully installed, filled and vented
- ☐ Components for cooling mode fully installed (optional)

Preferred appointment:

1. Date _____
   Time _____
2. Date _____
   Time _____

All work ordered from Viessmann will be charged to me/us in accordance with the current Viessmann pricelist.

Place/date _____

Signature

Final decommissioning and disposal

Viessmann products can be recycled. Components and substances from the system are not part of ordinary domestic waste.

For decommissioning, isolate the system from the power supply and allow components to cool down where appropriate.
All components must be disposed of correctly.

Declaration of conformity

We, Viessmann Climate Solutions SE, D-35108 Allendorf, declare as sole responsible body that the named product complies with the European directives and supplementary national requirements in terms of its design and operational characteristics.

Using the serial number, the Declaration of Conformity can be found on the following website:
www.viessmann.co.uk/eu-conformity

The **product characteristics determined** as system values for the product **Vitocal 350-G Pro** (see technical guide) can be utilised to assess the energy efficiency of heating and ventilation systems in buildings to DIN V 4701-10 as specified by the EnEV [Germany].

Keyword index

Keyword index (cont.)

Viessmann Climate Solutions SE
35108 Allendorf / Germany
Telephone: +49 6452 70-0
Fax: +49 6452 70-2780
www.viessmann.com

Viessmann Limited
Hortonwood 30, Telford
Shropshire, TF1 7YP, GB
Telephone: +44 1952 675000
Fax: +44 1952 675040
E-mail: info-uk@viessmann.com