

an ideal tomorrow

ait
HEAT PUMPS



Operating Manual

Hydraulic station HSV 4 / HSV 180 / HSV 280

Accessory for heat pumps

UK

www.aitgroup.com

83071300eUK



Table of contents

1	About this operating manual	3	12	Overflow valve	16
1.1	Validity.....	3	13	Volumetric flow meter / heat meter	17
1.2	Reference documents	3	14	Commissioning	17
1.3	Symbols and markings.....	3	15	Maintenance	17
1.4	Contact	4	15.1	Maintenance as required	17
2	Safety	4	15.2	Yearly maintenance	17
2.1	Intended use	4	16	Faults	18
2.2	Personnel qualifications.....	4	16.1	Unlock the safety temperature limiter	18
2.3	Personal protective equipment	4	17	Dismantling and Disposal	18
2.4	Residual risks	4	17.1	Dismantling	18
2.5	Avoid damage to property	5	17.2	Disposal and Recycling.....	18
3	Operation and care.....	5	17.2.1	Buffer (standby) battery	18
3.1	Energy and environmentally conscious operation.....	5	Technical data / Scope of supply	19	
3.2	Care.....	5	HSV 4	19	
4	Compatible products	6	HSV 180 / HSV 280	20	
5	Scope of supply.....	6	Free pressing.....	21	
5.1	Accessories.....	6	HSV 4	21	
5.2	Components of the device.....	6	HSV 180.....	21	
6	Storage, transport, installation	7	HSV 280.....	21	
6.1	Storage	7	Dimensioned drawings	22	
6.2	Unpacking and transport	7	HSV 4 / HSV 180.....	22	
6.2.1	Transport with a pallet truck.....	7	HSV 280.....	23	
6.2.2	Making transport easier.....	7	Installation plans	24	
6.2.3	Transport with handcart.....	8	HSV 4 / HSV 180.....	24	
6.2.4	Carrying the unit	8	HSV 280.....	25	
6.3	Installation	9	Terminal diagrams.....	26	
7	Installing the hydraulic connections	10	HSV 4 / HSV 180.....	26	
7.1	Heating circuit.....	11	HSV 280.....	28	
7.2	Expansion vessel.....	11	Terminal diagram, mains connection heat pump 1~230V + electric heating element 3~400V.....	30	
7.3	Hydraulic connection for the domestic hot water tank.....	11	Terminal diagram, mains connection heat pump 1~230V + electric heating element 1~230V	31	
8	Electrical installation	12	Circuit diagrams	32	
8.1	Establish electrical connections	12	HSV 4 / HSV 180.....	32	
8.2	Electrical connection	12	HSV 280.....	36	
9	Installing the control panel	14			
10	Flushing, filling and venting.....	14			
10.1	Heating water quality	14			
10.2	Flush and fill the heating circuit and the domestic hot water charging circuit.....	15			
10.3	Flushing, filling and venting the domestic hot water tank	16			
11	Insulate hydraulic connections	16			



1 About this operating manual

This operating manual is part of the device.

- ▶ Before working on or with the device, read the operating manual carefully and follow it for all activities at all times, especially the warnings and safety instructions.
- ▶ Keep the operating manual to hand at the device and hand over to the new owner if the device changes hands.
- ▶ If you have any questions or anything is unclear, ask the local partner of the manufacturer or the factory's customer service.
- ▶ Note and follow all reference documents.

1.1 Validity

This operating manual exclusively refers to the device identified by the name plate (→ "Nameplate", page 7).

1.2 Reference documents

The following documents contain additional information to this operating manual:

- Planning manual hydraulic integration
- Operating manual of the heat pump
- Operating manual of the heating and heat pump controller
- Brief description of the heat pump controller
- Operating manual of the expansion board (accessory)

1.3 Symbols and markings

Identification of warnings

Symbol	Meaning
	Safety-relevant information. Warning of physical injuries.
	Safety-relevant information. Warning of physical injuries. Flammable materials / flammable (primary) refrigerant
	Safety-relevant information. Warning of physical injuries. Flammable materials / flammable (primary) refrigerant

Symbol	Meaning
	Safety-relevant information. Warning of physical injuries. Danger of fatal injury due to electric current.
DANGER	Indicates imminent danger resulting in severe injuries or death.
WARNING	Indicates a potentially dangerous situation, which can result in severe injuries or death.
CAUTION	Indicates a potentially dangerous situation, which can result in moderate or minor injuries.
IMPORTANT	Indicates a potentially dangerous situation, which can result in property damage.

Symbols in the document

Symbol	Meaning
	Information for qualified personnel
	Information for the owner/operator
✓	Requirement for action
▶	Procedural instructions: Single step action prompt
1., 2., 3., ...	Procedural instructions: Numbered step within a multi-step action prompt. Keep to the given order.
	Additional information, e.g. a tip on making work easier, information on standards
→	Reference to further information elsewhere in the operating manual or in another document
•	Listing
	Secure connections against twisting



1.4 Contact

Addresses for purchasing accessories, for service cases or for answers to questions about the device and this operating manual can be found on the internet and are kept up-to-date:

- www.ait-deutschland.eu

2 Safety

Only use the device when it is in flawless technical condition and only use it as intended, safely and aware of the hazards, and follow this operating manual.

2.1 Intended use

The unit is designed for household use and is solely intended for the following purposes:

- Heating
- Domestic hot water preparation
- ▶ Proper use includes complying with the operating conditions (→ „Technical data / Scope of supply“, from page 19) and the operating manual and noting and following the reference documents.
- ▶ When using the local regulations note: laws, standards, guidelines, directives.

All other uses of the device are not as intended.

2.2 Personnel qualifications

The operating manuals supplied with the product are intended for all users of the product.

The operation of the product via the heating and heat pump control and work on the product which is intended for end customers / operators is suitable for all age groups of persons who are able to understand the activities and the resulting consequences and can carry out the necessary activities.

Children and adults who are not experienced in handling the product and do not understand the necessary activities and the resulting consequences must be instructed and, if necessary, supervised by persons experienced in handling the product and who are responsible for safety.

Children must not play with the product.

The product may only be opened by qualified personnel.

All procedural instructions in this operating manual is solely directed at qualified, skilled personnel.

Only qualified, skilled personnel is able to carry out the work on the device safely and correctly. Interference by unqualified personnel can cause life-threatening injuries and damage to property.

- ▶ Ensure that the personnel are familiar with the local regulations, especially those on safe and hazard-aware working.
- ▶ Ensure that the personnel are qualified to handle flammable (primary) refrigerant.
- Work on the refrigerating circuit may only be carried out by qualified personnel with appropriate qualifications for refrigeration system installation.
- Work on the electrics and electronics may only be carried out by electrical technicians.
- Any other work on the system may only be carried out by qualified personnel (heating installer, plumbing installer).

During the warranty and guarantee period, service work and repairs may only be carried out by personnel authorised by the manufacturer.

2.3 Personal protective equipment

During transport and work on the unit, there is a risk of cuts due to the sharp edges of the unit.

- ▶ Wear cut-resistant protective gloves.

During transport and work on the unit, there is a risk of foot injuries.

- ▶ Wear safety shoes.

When working on liquid-conveying lines, there is a risk of injury to the eyes due to leakage of liquids.

- ▶ Wear safety goggles.

2.4 Residual risks

Electric shock

Components in the device are energised with life-threatening voltage. Before working on the unit:

- ▶ Disconnect the device from power supply.
- ▶ Protect the device against being switched back on again.



Existing earthing connections within housings or on mounting plates must not be altered. If this should nevertheless be necessary in the course of repair or assembly work:

- ▶ Restore earthing connections to their original condition after completion of the work.

Injuries caused by high temperatures

- ▶ Before working on the unit, let it cool down.

Safety instructions and warning symbols

- ▶ Observe the safety instructions and warning symbols on the packaging and on and in the unit.

2.5 Avoid damage to property

Improper action

Requirements for minimum scale and corrosion damage in hot water heating systems:

- Proper planning, design and commissioning
- Closed system with regard to corrosion
- Integration of an adequately dimensioned pressure maintaining device
- Use of demineralised heating water (VE water) or water corresponding to the VDI 2035 norm
- Regular servicing and maintenance

If a system is not planned, designed, started up and operated according to the given requirements, there is a risk that the following damage and faults will occur:

- Malfunctions and the failure of components, e.g. pumps, valves
- Internal and external leaks, e.g. from heat exchangers
- Cross-section reduction and blockages in components, e.g. heat exchanger, pipes, pumps
- Material fatigue
- Gas bubbles and gas cushion formation (cavitation)
- Negative effect on heat transfer, e.g. formation of coatings, deposits, and associated noises, e.g. boiling noises, flow noises
- ▶ Note and follow the information in this operating manual for all work on and with the device.

Unsuitable quality of the fill and make-up water in the heating circuit

The efficiency of the system and the service life of the heat generator and the heating components depend decisively on the quality of the heating water.

When the system is filled with untreated drinking water, calcium and magnesium precipitate as mineral scale. Lime scale deposits form on the heat transfer surfaces of the heating. The efficiency drops and energy costs rise. In extreme cases, the heat exchangers will be damaged.

- ▶ Fill the system with deionised heating water (VE water) or with water corresponding to the VDI 2035 norm only (low-salt operation of the system).

3 Operation and care



NOTE

The device is operated via the control panel of the heating and heat pump controller (→ operating manual of the heating and heat pump controller).

3.1 Energy and environmentally conscious operation

The generally accepted requirements for energy conscious and environmentally conscious operation of a heating system also apply to use of a heat pump. The most important measures include:

- No unnecessarily high flow temperature
- No unnecessarily high domestic hot water temperature (note and follow local regulations)
- Do not open windows with just a gap or tilt open (continuous ventilation), but instead open wide for a short time (shock ventilation)
- Always ensure that the controller settings are correct

3.2 Care

Wipe down the outside of the device only using a damp cloth or cloth with mild cleaning product (washing up liquid, neutral cleaning product). Do not use any harsh, abrasive, acid or chlorine-based cleaning products.



4 Compatible products

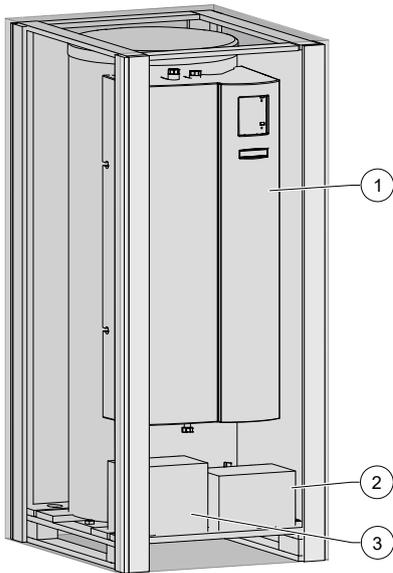
HSV 4

- Paros
- Polaris

HSV 180 / HSV 280

- Hybrox
- Helox

5 Scope of supply



- 1 Compact device (domestic hot water tank and buffer tank, without heat pump)
- 2 Accompanying parts package: safety module, pump ball valves, outdoor temperature sensor, adjustable feet
- 3 Accessory package: control panel for the heating and heat pump controller

1. Inspect the delivery for outwardly visible signs of damage.
2. Inspect the scope of supply for completeness. Any defects or incorrect deliveries must be reported immediately.

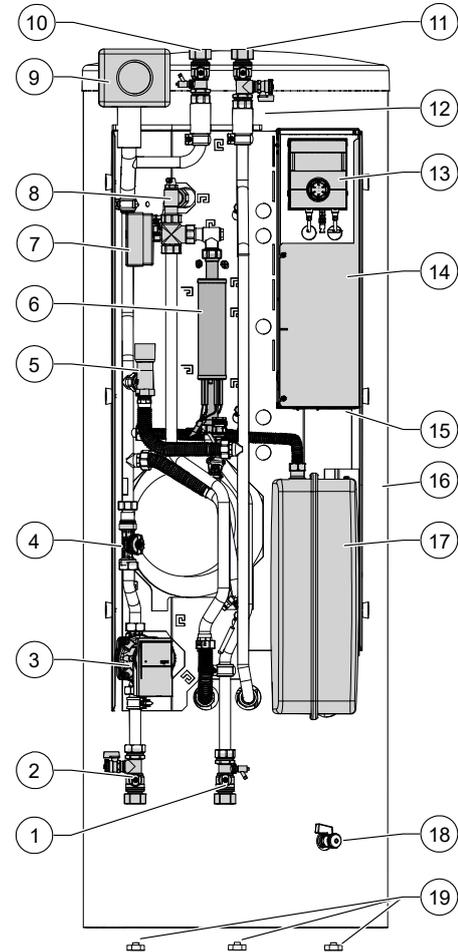
5.1 Accessories

The following accessories are available for the device through the manufacturer's local partner:

- Expansion circuit printed board with various additional functions
- Room control unit for controlling the main functions from the living room
- Electrical connection kit EVS or EVS 8

5.2 Components of the device

Example HSV 4:



- 1 Shut-off ball valve with drain tap^{*)} (HSV 280 with fill and drain tap)
- 2 Shut-off ball valve with fill and drain tap^{*)}
- 3 Heating circuit circulating pump (HUP)
- 4 Volumetric flow meter
- 5 Overflow valve
- 6 Electric heating element
- 7 Switching valve domestic hot water
- 8 Vent valve
- 9 Heating circuit safety module (insulated)^{*)}
- 10 Shut-off ball valve hot heating water inlet (return)^{*)}
- 11 Shut-off ball valve hot heating water outlet (supply)^{*)}
- 12 Protection anode
- 13 Control panel^{*)}
- 14 Switch box
- 15 Sockets for the electrical connection kit EVS or EVS 8
- 16 Domestic hot water tank and buffer tank
- 17 Expansion vessel
- 18 Draining off buffer tank
- 19 Adjustable feet^{*)}

^{*)} to be mounted at the installation location



Nameplate

A nameplate is attached to the outside of the unit at the factory.

The nameplate contains the following information at the very top:

- Model, item number
- Serial number

The nameplate also contains an overview of the most important technical data.

6 Storage, transport, installation

6.1 Storage

- ▶ Store unit protected against:
 - Moisture/damp
 - Frost
 - Dust and dirt

6.2 Unpacking and transport

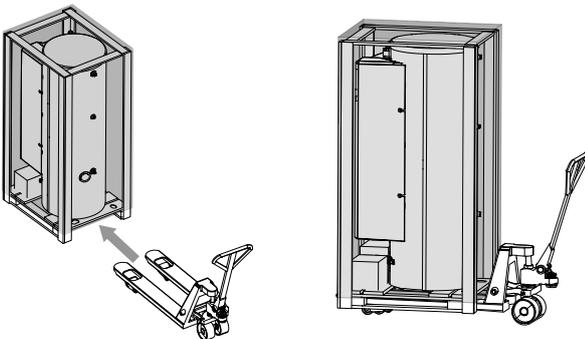
Notes on safe transport

The device is heavy (→ „Technical data / Scope of supply“, from page 19). There is a risk of injuries or damage to property if the device falls or overturns.

The hydraulic connections are not designed for mechanical loads.

- ▶ Do not lift or transport the device by the front hydraulic connections.
- ▶ Transport the device preferably with a pallet truck, alternatively with a handcart or by carrying.

6.2.1 Transport with a pallet truck



Unpacking

1. Remove plastic films. Ensure that you do not damage the device.
2. Dispose of the transport and packaging material in an environmentally friendly way and in accordance with local regulations.

If the device is to be carried, then it is recommended that the wooden pallet is not removed yet.

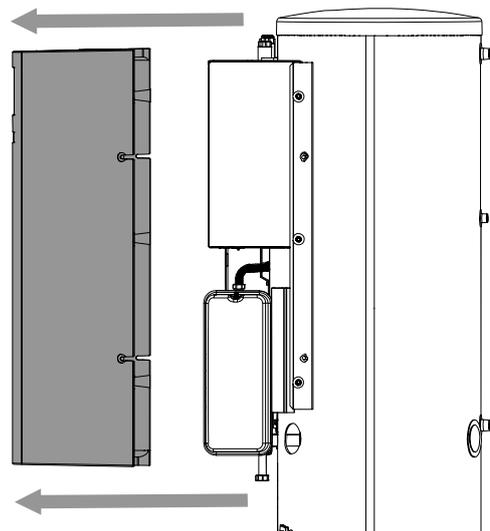
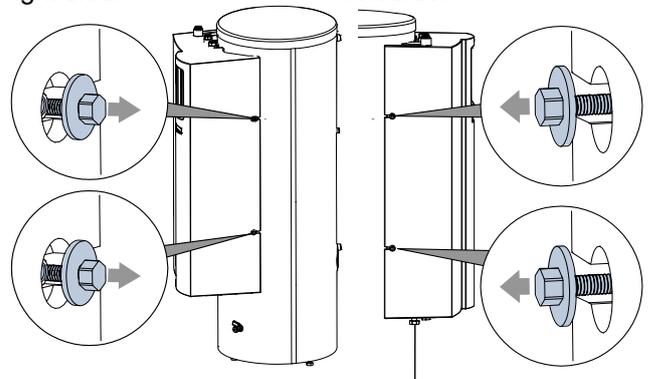
6.2.2 Making transport easier

In order to make the transport simpler and easier, the whole hydraulic system (including the controller with switch box) can be unscrewed beforehand.

1.

right side:

left side:





2. Disconnect the domestic hot water temperature sensor (TBW) inside the switch box and withdraw the sensor cable out of its grommet in the switch box.

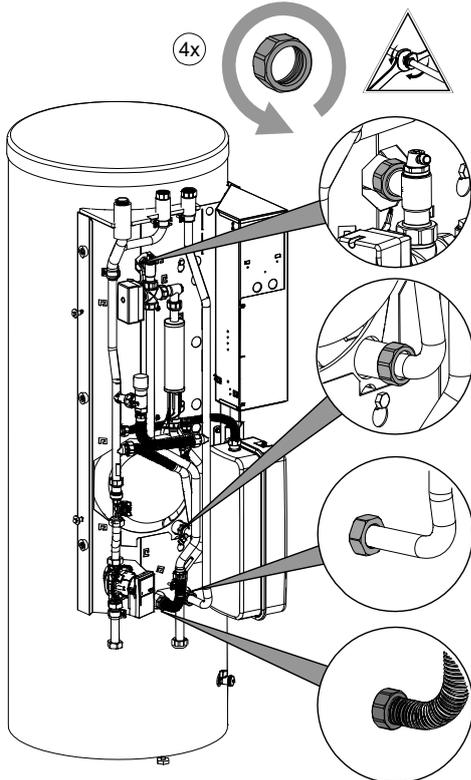
Opening and closing the switch box:

- “8.2 Electrical connection”, page 12

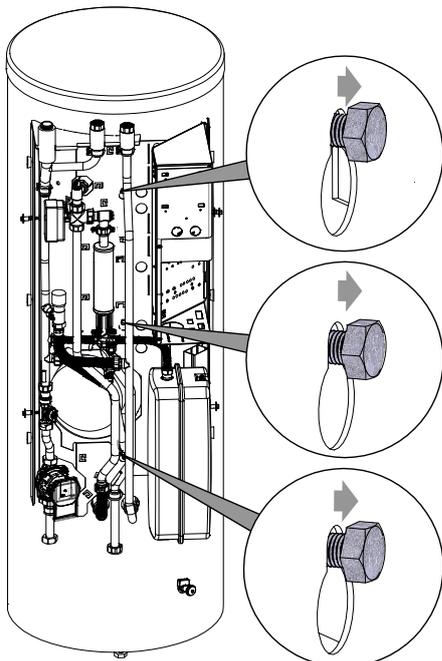
Terminals for the domestic hot water temperature sensor:

- „Terminal diagrams“, from page 26

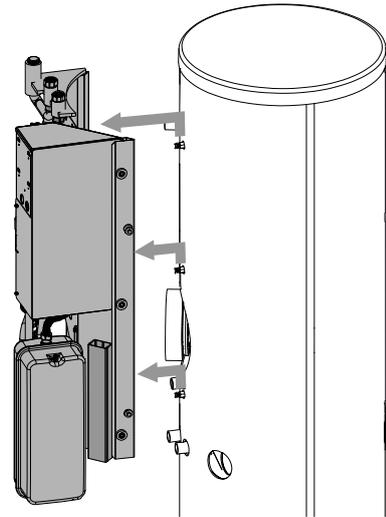
3. Example HSV 4:



4. Example HSV 4:



- 5.



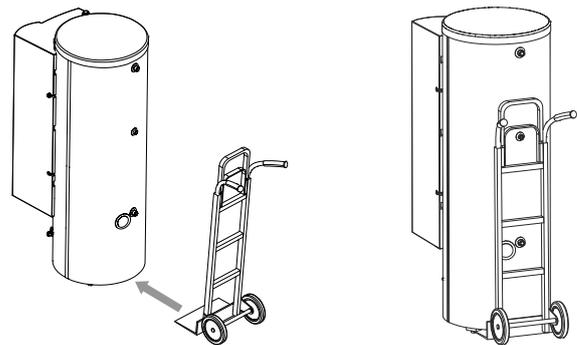
IMPORTANT

When lifting off the hydraulic system, withdraw the cable of the domestic hot water temperature sensor through its grommet in the support plate and place it behind the support plate. Be careful not to damage the cable.

6. Re-attach the hydraulics and hood after aligning the unit.

- “6.3 Installation”, page 9

6.2.3 Transport with handcart



IMPORTANT

Do not damage the hydraulic connections on the rear of the unit, the hood on the hydraulics or the insulation for the domestic hot water tank and buffer tank.

6.2.4 Carrying the unit

In order to make it easier to carry, a T-piece with two double nipples can be fitted on the domestic hot water outlet. It is recommended that the wooden pallet is only removed after carrying is complete.

- ▶ Carry the unit to the installation site with 3 – 4 persons.



6.3 Installation

Installation site

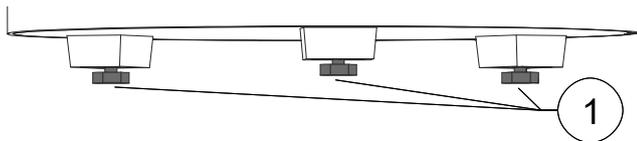
IMPORTANT

Install the unit inside buildings only.

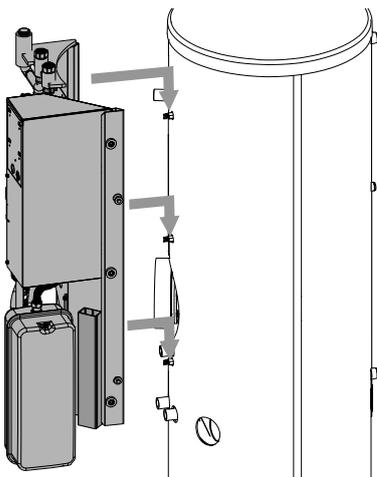
The installation area must be frost-free and dry. It must fulfil the relevant local regulations.

→ „Installation plans“, from page 24 and „Dimensioned drawings“, from page 22

1. Place the device on a stable and horizontal surface, preferably decoupled from structure-borne noise.
2. Tilt the device slowly and carefully to one side.
3. Secure the tilted device to ensure that it cannot tip back to its initial position.
4. Fit the adjustable feet (①) to all 3 feet.



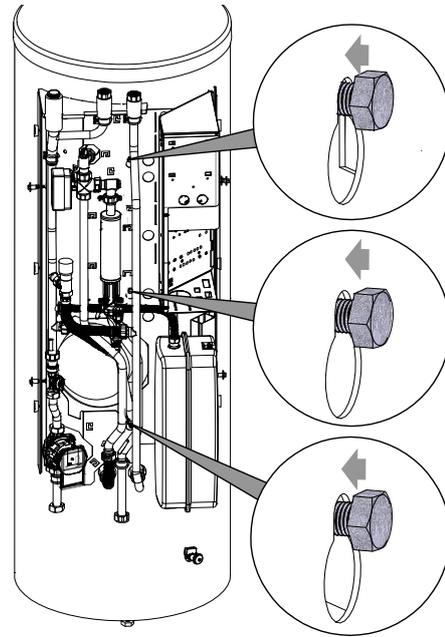
5. Tilt the device slowly and carefully back to its initial position.
 6. Level out the 3 adjustable feet.
 7. If the hydraulic system was dismantled for transport reasons, then screw it on the tank.
- 7.1.



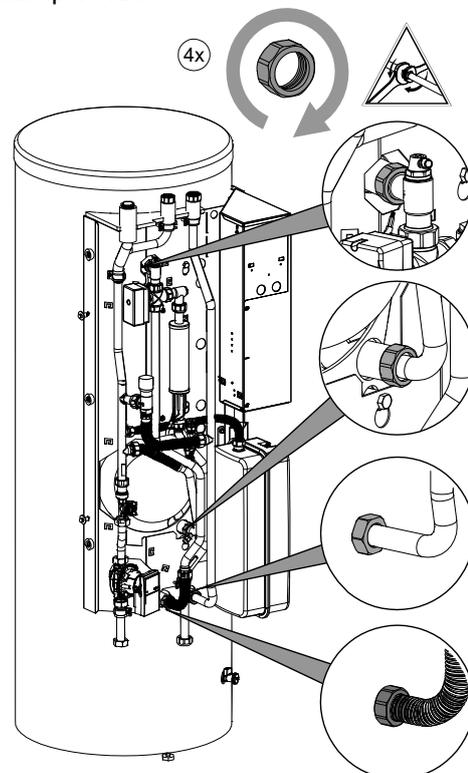
IMPORTANT

When mounting the hydraulic system, insert the cable of the domestic hot water temperature sensor through its grommet into the support plate. Take care not to damage the cable.

7.2. Example HSV 4:



7.3. Example HSV 4:





8. Feed the cable of the domestic hot water temperature sensor (TBW) through its grommet into the switch box and connect it.

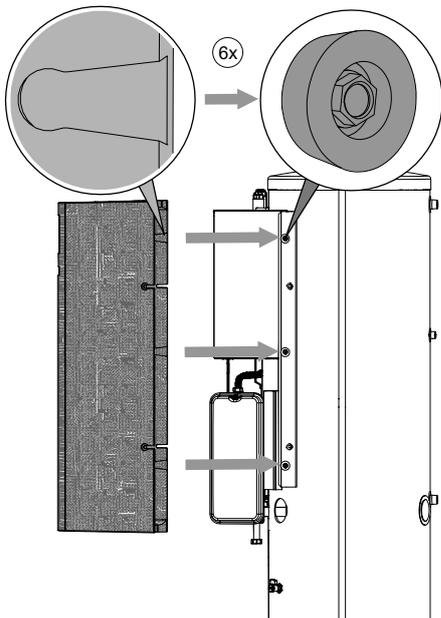
Opening and closing the switch box:

- “8.2 Electrical connection”, page 12

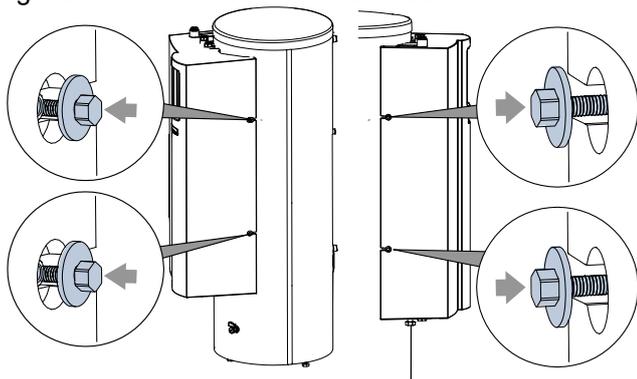
Terminals for the domestic hot water temperature sensor:

- „Terminal diagrams“, from page 26

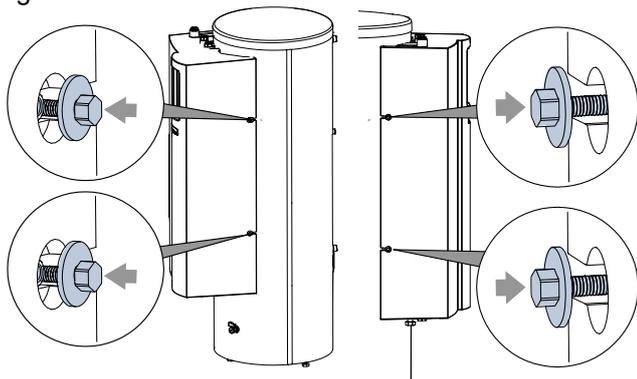
9. If no further hydraulic or electrical work is being carried out for the time being, put the hood on the hydraulics.



right side:



left side:



7 Installing the hydraulic connections



NOTE

The safety valve that is integrated or included in delivery has a tolerance of plus / minus 10% for the set pressure. If local regulations, laws, standards or directives require a smaller tolerance range, the safety valve must be replaced on site with a safety valve that meets the requirements.

IMPORTANT

Avoid open heating systems and / or heating systems that are not oxygen diffusion-tight. If this is not possible, a system separation must be installed.

Depending on the dimensioning of the heat exchanger and the additionally required circulation pump, the system separation worsens the energy efficiency of the system.

IMPORTANT

Dirt and deposits in the (existing) hydraulic system can cause damage to the heat pump.

- ▶ Ensure that a air / magnetic sludge separator is installed in the heating circuit.
- ▶ Rinse the hydraulic system thoroughly prior to establishing the hydraulic connection of the heat pump.

IMPORTANT

Damage to the copper pipes due to unacceptable loading!

- ▶ Secure all connections against twisting.
- ✓ Cross-sections and lengths of the pipes for the heating circuit are adequately dimensioned. In doing so, ensure that the connection pipework between the heat pump and hydraulic station are also taken into account.
- ✓ The free pressing of the circulation pumps in the heating circuit at least results in the throughput required for the device type (→ “Free pressing”, page 21).
- ▶ Route all hydraulic connections as fixed piping and attach them via a fixed point to the wall or ceiling at a maximum distance of 20 cm from the centre of the respective unit connection.
- ▶ Insert a vent at the highest point of the heating circuit.



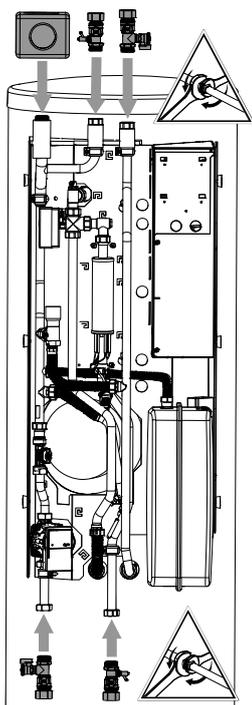
- ▶ Lift up the hood at the front of the hydraulic station (→ “6.2.2 Making transport easier”, page 7).

7.1 Heating circuit

Safety module and shut-off ball valves

1. Take the safety module and the shut-off ball valves out of the accessory pack and fit them to the connections provided. Use seals from the accessory pack.

Example HSV 4:



2. Lay the safety discharge of the safety valve into the drain via a funnel waste trap according to the relevant standards and guidelines. It is essential that the safety discharge is connected.

Heating water inlet and outlet

1. Establish the hydraulic connection to the unit.
2. Establish the hydraulic connection to the heating circuit.



- Position of the connections: „Dimensioned drawings“, from page 22

Pressure relief for hydraulic line

- ▶ If there is a shut-off valve between the heat generator and the heat sink, fit a pressure relief valve.

7.2 Expansion vessel

The expansion vessel for the heating circuit is integrated. Always inspect whether the size of the expansion vessel is large enough for the system. If necessary, an additional expansion vessel must be installed on site in accordance with the relevant valid standards.



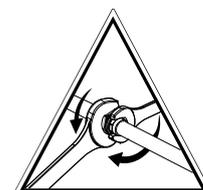
NOTE

The admission pressure of the expansion vessel must be adjusted to the system (approx. 0.5 bar less than the system filling pressure) in accordance with calculation according to the relevant standards (EN 12828).

7.3 Hydraulic connection for the domestic hot water tank

Connect the domestic hot water tank according to DIN 1988 and DIN 4753 Part 1 (or the standards and directives applicable locally).

- Position of the connections: „Dimensioned drawings“, from page 22



The working overpressure cited on the name plate must not be exceeded. Install a pressure reducer if required.

The sensor for the domestic hot water preparation is already connected in the switch box.

IMPORTANT

The electrical conductivity of the domestic hot water must be $> 100 \mu\text{S}/\text{cm}$ and must lie within the drinkable water quality limits.



8 Electrical installation

8.1 Establish electrical connections

IMPORTANT

Irreparable damage to the compressor due to wrong rotating field (only applies to units with 400V connection).

- ▶ Ensure that there is a clockwise rotating field for the compressor load infeed.

Basic information on the electrical connection

- The specifications of the local energy supply company may apply to electrical connections
 - Fit the power supply for the heat pump with an all-pole circuit breaker with at least 3 mm contact spacing (per IEC 60947-2)
 - Note the level of the tripping current (→ „Technical data / Scope of supply“, from page 19))
 - Comply with the electromagnetic compatibility regulations (EMC regulations)
 - Lay unshielded power supply cables and shielded cables (bus cable) sufficiently far apart (> 100 mm)
 - Maximum line length: 30m
- Cable extension details see operating manual of the heat pump

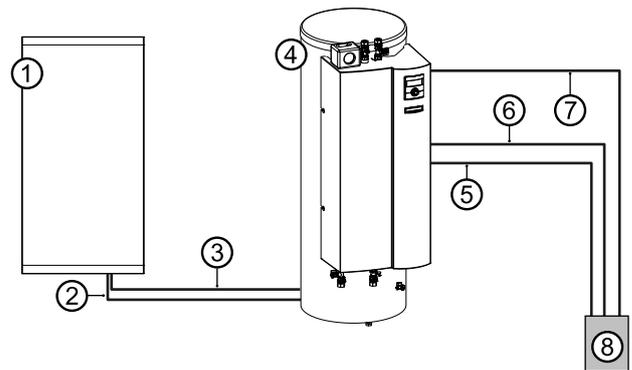
Establish the electrical connections between the heat pump and the hydraulic station

- Operating manual of the heat pump

8.2 Electrical connection

The electrical connection is established via the switch box.

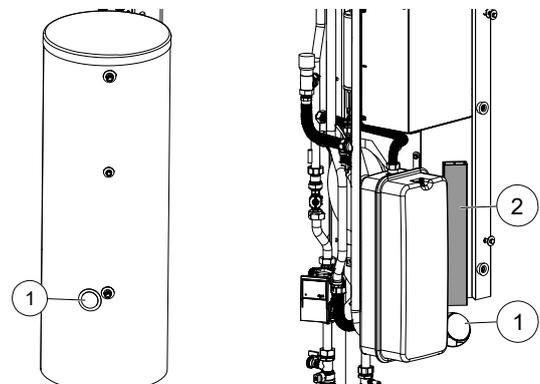
The hydraulic station is electrically connected on site to the sub-distribution according to the following scheme:



- 1 Heat pump
- 2 Load cable compressor (accessory: electrical connection kit EVS or EVS 8)
- 3 Bus cable (shielded) (accessory: electrical connection kit EVS or EVS 8)
- 4 Hydraulic station
- 5 Load line electric heating element
- 6 Control voltage
- 7 Load cable compressor
- 8 Sub-distribution

1. Feed the control and sensor cables, the Bus and load cable from the heat pump, the cable for the EVU blocking time as well as the cables of external loads through the grommet on the rear (①) of the device into the interior of the device.

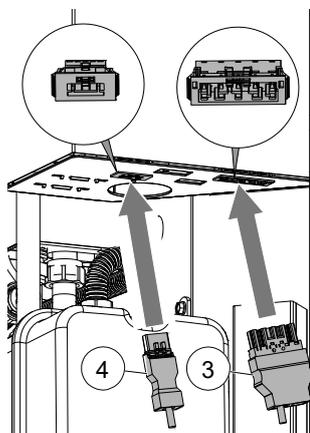
Example HSV 4:



2. Feed the cables through the cable duct (②) to the switch box.

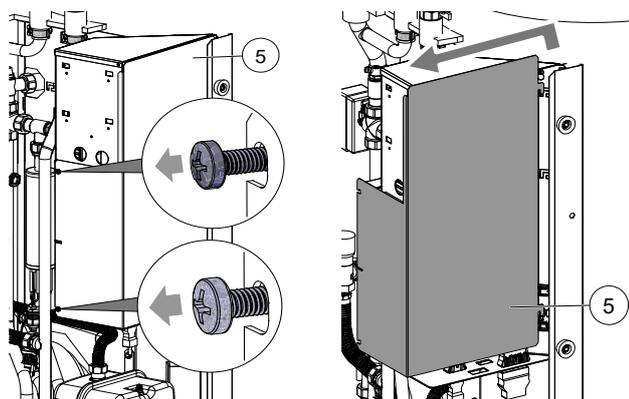


3. Insert the wired plugs of the heat pump load cable (③) and the bus cable (④) into the corresponding socket at the bottom of the electrical switch box.



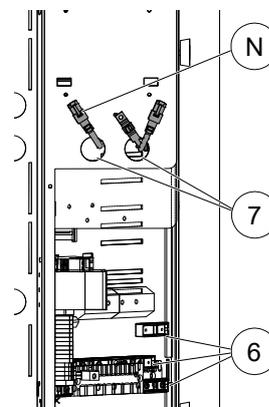
4. Strip of all other cables before feeding them into the switch box (stripping length of each of the individual wires: 6 mm).
5. Open the side cover (⑤) of the electrical switch box.

Example HSV 4:



6. Feed the cables into the cable ducts of the switch box.
7. Carry out electrical connections in accordance with the terminal diagram.
→ „Terminal diagrams“, from page 26
8. Insert all cables introduced into the switch box into the cable ducts in the switch box, route them through the strain reliefs (⑥) and screw them into the strain reliefs.

9. Route plug-in connections for the control panel out of the openings (⑦) in the front cover of the electrical switch box.



NOTE

The control panel for the heating and heat pump controller can be connected to a computer or network using a suitable network cable, enabling the heating and heat pump controller to be controlled remotely from there. If such a connection is desired, route a shielded network cable (Ⓝ, category 6, with RJ45 connector) through the electrical switch box and plug it to the corresponding socket of the control panel.

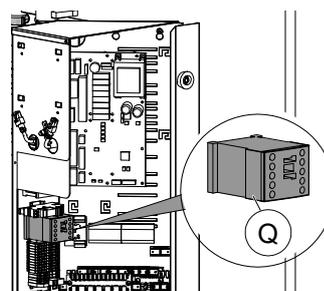
→ “Connections on the control panel“, page 14



NOTE

The integrated electric heating element is connected at 9kW (6kW) in the factory. At contactor Q, it is possible to select 6kW (4kW) = 2 phase operation. Disconnect Q5/6 for this. Or 3kW (2kW) = 1 phase operation. Disconnect Q5/6 and Q5/4 for this.

The values in brackets are for the 6kW heating element. Disconnected cables must be furnished with screw terminals. Only the phases cited above may be disconnected (safety temperature limiter).

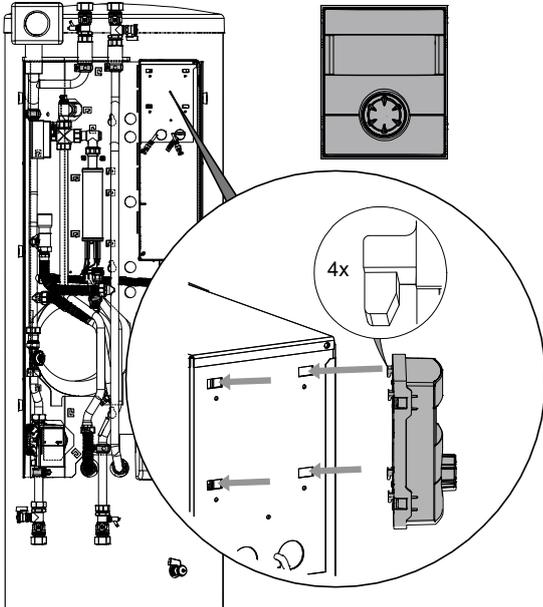


10. Close the electrical switch box by re-attaching the side cover.

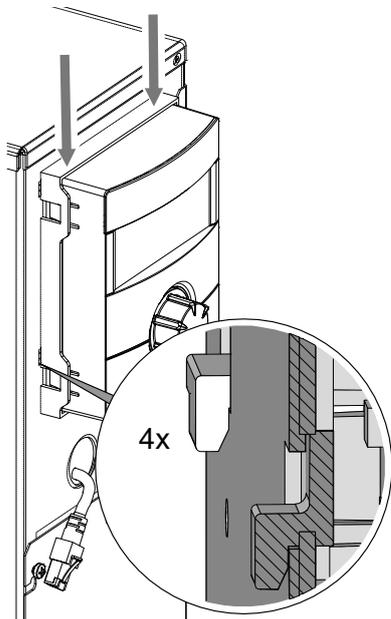


9 Installing the control panel

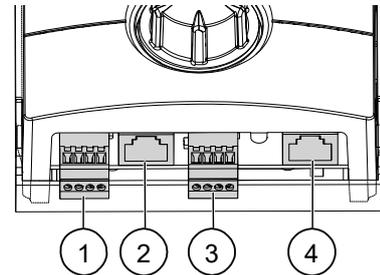
1. Example HSV 4:



2.



3. Make cable connections on the bottom of the control panel.



- 1 RS485 for connecting the room control unit RBE (accessory)
- 2 RJ45 for network cable connection
- 3 RS485 LIN bus cable connection to the control board
- 4 RJ45 connection Modbus cable to Modbus distributor.

10 Flushing, filling and venting

10.1 Heating water quality



NOTE

For detailed information refer, among other things, to the VDI Guidelines 2035 “Vermeidung von Schäden in Warmwasserheizanlagen” (preventing damage in hot water heating systems).

1. Ensure that the pH-value of the heating water is between 8.2 – 10, for aluminium materials between 8.2 – 9.
Ideally, the pH value should already be in the required range after filling. After 6 weeks at the latest, it must have adjusted to the required range.
2. Ensure that the electrical conductivity is $< 100 \mu\text{S/cm}$.



NOTE

If the required water quality is not achieved, consult a company specialising in the treatment of heating water.

3. Fill the system with deionised heating water (VE water) or with water corresponding to the VDI 2035 norm only (low-salt operation of the system).
Advantages of low-salt operation:
 - Low corrosion-promoting properties
 - No formation of mineral scale
 - Ideal for closed heating circuits
4. Keep a system log for hot water heating systems in which relevant planning data and the water quality are entered (VDI 2035).



10.2 Flush and fill the heating circuit and the domestic hot water charging circuit

- ✓ Outlet pipe of the safety valve is connected.
- ▶ Ensure that the set pressure of the safety valve is not exceeded.

IMPORTANT

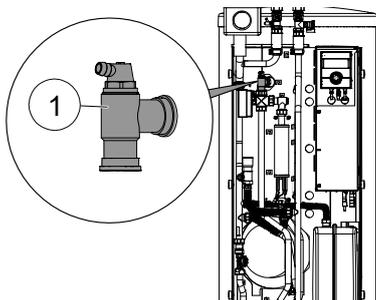
Flush the heating circuit only in its flow direction.



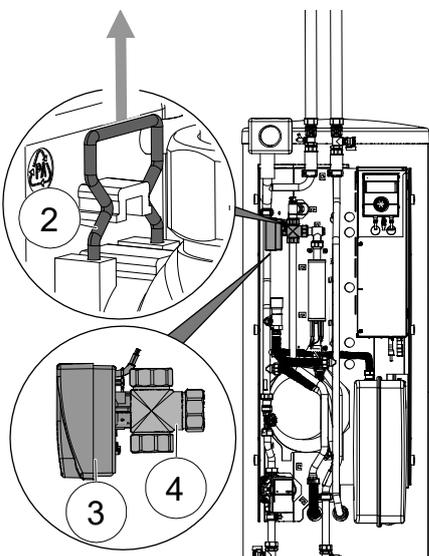
NOTE

The venting programme on the controller can also be used to support the flushing and venting process. It is possible to control individual circulating pumps and also the switching valve via the venting programme. As a result, it is not necessary to remove the valve motor.

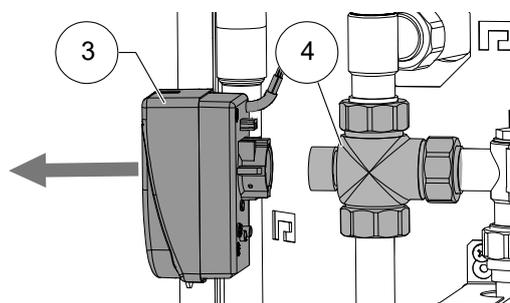
1. Vent the system at the highest point.
2. Open the vent valve (①) on the 3-way switching valve. Example HSV 4:



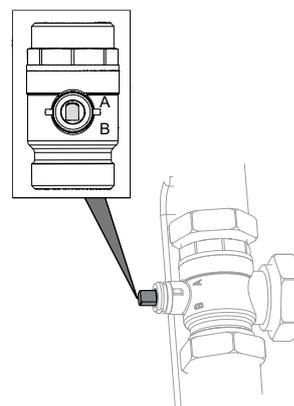
3. Pull off the U-clip (②) on the back of the valve motor (③) on the switching valve (④) upwards. Example HSV 4:



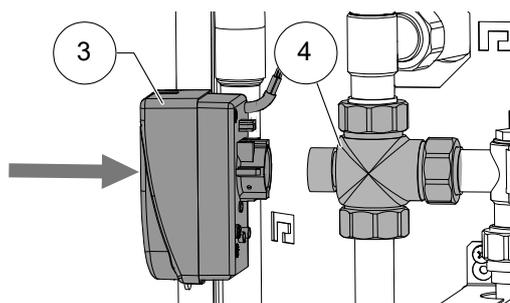
4. Carefully pull the valve motor (③) forward off the 3-way switching valve (④).



5. Turn the spindle of the 3-way switching valve so that the rounded side of the spindle points in the direction of marking A of the connections of the 3-way switching valve.

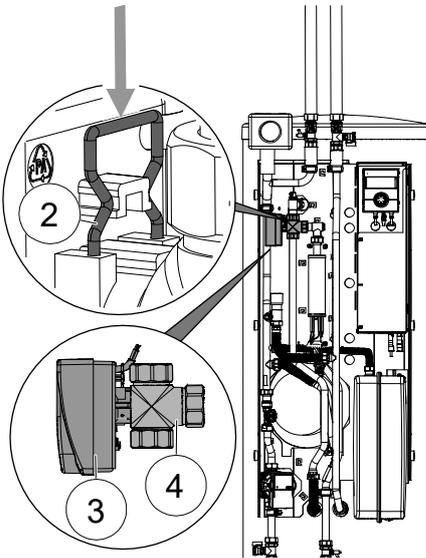


6. Flush the domestic hot water charging circuit for approx. 1 minute.
7. Turn the spindle so that the rounded side of the spindle points in the direction of marking B of the connections of the 3-way switching valve.
8. Flush heating circuit thoroughly, until no more air is discharged.
9. Position the valve motor (③) on the 3-way switching valve (④).

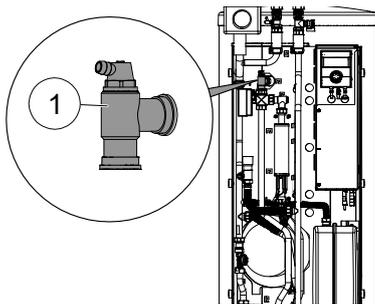




10. Insert the U-clip (②) into the base of the valve motor (③). Example HSV 4:



11. Ensure that the U-clip has latched into position correctly:
- ✓ Valve motor sits securely on the 3-way switching valve.
 - ✓ Both prongs of the U-clip sit on the lug.
 - ✓ The tips of the U-clip are not visible more than approx. 2 mm.
12. Close the vent valve (①) on the 3-way switching valve. Example HSV 4:



10.3 Flushing, filling and venting the domestic hot water tank

IMPORTANT

Before flushing and filling the domestic hot water tank, the outlet pipe of the safety valve must be connected. The set pressure of the safety valve must not be exceeded.

1. Open the domestic cold water supply valve on the domestic hot water tank.
2. Open the domestic hot water valves at the tapping points.
3. Flush the domestic hot water tank until no more air discharges from the valves at the tapping points.
4. Close the domestic hot water valves at the tapping points.

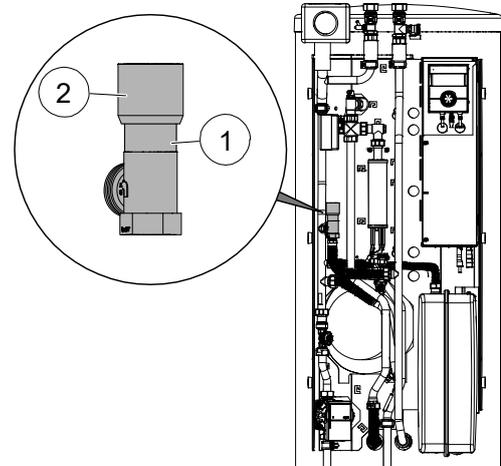
11 Insulate hydraulic connections

Insulate hydraulic lines in accordance with local regulations.

1. Open shut-off devices.
2. Perform a pressure test and check for leaks.
3. Insulate external piping on site.
4. Insulate all connections, fittings and pipes.

12 Overflow valve

Example HSV 4:



- 1 Overflow valve
- 2 Adjusting knob

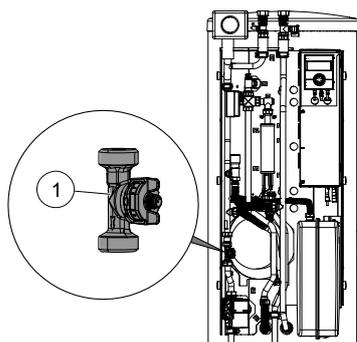
→ Operating manual of the heat pump



13 Volumetric flow meter / heat meter

The integrated volumetric flow meter / heat meter (①) is used to measure the heat quantity generated by the heating system and made available for domestic hot water preparation and building heating.

Example HSV 4:



The volumetric flow meter / heat meter measures flow and temperature difference in the charging circuit. The measuring ranges are set in the heating and heat pump controller. Measured values can be read out on the control panel display.

→ Operating manual of the heating and heat pump controller

14 Commissioning

- ✓ Water supply to the domestic hot water tank is open
- ✓ Domestic hot water tank is filled



NOTE

If the heat pump is switched on whilst the tank is empty, the control panel indicates a fault.

- Operating manual of the heating and heat pump controller
- Operating manual of the heat pump

15 Maintenance



NOTE

We recommend that you sign a maintenance agreement with an accredited heating company.

15.1 Maintenance as required

- ▶ The components of the heating circuit (valves, expansion vessels, circulating pumps, filters, dirt traps) should be inspected or cleaned as needed, at the very least annually, by qualified personnel (heating or cooling system engineers).
- ▶ Check the safety valve (provided by customer) for the hot water tank at regular intervals.
- ▶ Have the magnesium anode checked and if necessary renewed by the customer service for the first time after 2 years and then at appropriate intervals.
Renew anode if protective current lower than 0.3 mA. After replacing anode, re-install earthing cable between anode and storage tank jacket.

15.2 Yearly maintenance

- ▶ The domestic hot water tank should be cleaned once a year by qualified personnel (heating or cooling system engineers). To do this, first empty the hot water tank. Then remove the polystyrene guard over the service opening of the hot water tank. Unscrew the flange cover of the service opening.
- ▶ Determine the quality of the heating water by analysis. In the event of deviations from the specifications, take suitable measures without delay.
- ▶ Check all installed dirt traps for dirt and clean them if necessary.



16 Faults

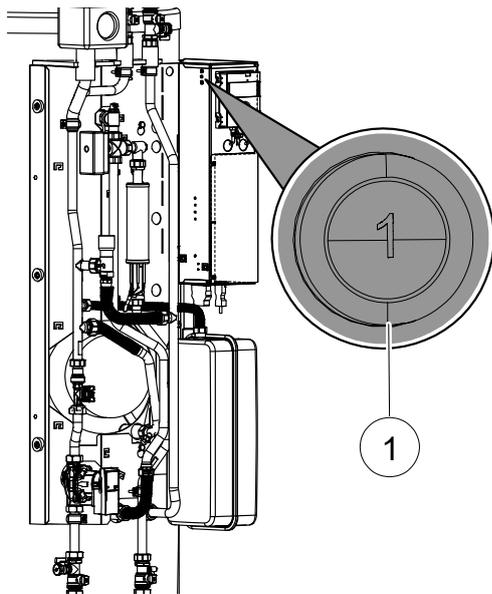
- ▶ Read out the cause of the fault via the diagnostics programme of the heating and heat pump controller.
- ▶ Contact the local partner of the manufacturer or the factory's customer service. Have the fault message and device number (→ "Nameplate", page 7) to hand.

16.1 Unlock the safety temperature limiter

A safety temperature limiter for the electric heating element is mounted on the electrical switch box. If the heat pump fails or there is air in the system:

- ▶ Check whether the reset button (①) of the safety temperature limiter has tripped.

Example HSV 4:



- ▶ If the reset button (①) has tripped, press it again.
- ▶ If the safety temperature limiter trips again, contact the local partner of the manufacturer or the factory's customer service.

17 Dismantling and Disposal

17.1 Dismantling

- ▶ Separate components by their materials.

17.2 Disposal and Recycling

- ▶ Recycle or ensure proper disposal of device components and packaging materials in accordance with local regulations.

17.2.1 Buffer (standby) battery

1. Use a screwdriver to push out the buffer battery on the processor circuit board of the heating and heat pump controller.
2. Dispose of the buffer battery (type: CR2032, lithium) in accordance with local regulations.



Technical data / Scope of supply

HSV 4

Tilbehør til varmepumpe				HSV 4
Luft / vann effektregulert	Innendørs og utendørs oppstilling	4 kW 8 kW 12 kW	• ja – nei	• – –
Luft / vann Dual effektregulert	Utendørs oppstilling	5 kW 7 kW 9 kW	• ja – nei	– – –
Luft / vann effektregulert	Utendørs oppstilling	5 kW 7 kW	• ja – nei	– –
Luft / vann	Utendørs oppstilling	14 kW 18 kW	• ja – nei	– –
Luft / vann Dual	Utendørs oppstilling	5 kW 7 kW 9 kW	• ja – nei	– – –
Oppstillingssted				
Romtemperatur		min. maks.	°C	5 35
Maksimal relativ luftfuktighet (ikke-kondenserende)			%	60
Lyd				
Lydtrykknivå på 1 m avstand		inne	dB(A)	36
Lydeffektnivå		inne	dB(A)	44
Varmekrets				
Volumstrøm: minimum maksimum (rørdimensjonering, se varmepumpe)			l/t l/t	170 1200
Eksternt trykfall trykktap volumstrøm			bar bar l/t	0,35 – 1200
Maks. tillatt driftstrykk			bar	3
Reguleringsområde sirkulasjonspumpe		min. maks.	l/t	170 1200
Generelle data				
Vekt total			kg	150
Vekt enkeltkomponenter			kg kg kg	– – –
Tappevannsbeholder				
Nettoinnhold			l	180
Offeranode	Fremmedstrømning Magnesium		• ja – nei	– •
Temperatur på tappevarmtvannet varmepumpedrift elektrisk varmekolbe			inntil °C inntil °C	60 65
Blandingsvannmengde iht. ErP: 2009/125/EF (ved 40 °C, uttak av 10 l/min)			l	230
Beredskaps varmetap iht. ErP: 2009/125/EF (ved 65 °C)			W	55
Driftstrykk Maks. trykk Testtrykk			bar bar bar	6 10 13
Elektrisk anlegg				
Spenningskode allpolet sikring varmepumpe***)	1-fas		... A	1~N/PE/230V/50Hz C10
Spenningskode allpolet sikring varmepumpe***)	3-fas		... A	– –
Spenningskode sikring styrespenning **)			... A	1~N/PE/230V/50Hz B10
Spenningskode sikring elektrisk varmekolbe **)	1-fas		... A	1~N/PE/230V/50Hz B32
Spenningskode sikring elektrisk varmekolbe **)	3-fas		... A	3~N/PE/400V/50Hz B16
Beskyttelsesgrad			IP	10B
Zmaks			Ω	–
Jordfeilbryter	dersom nødvendig		type	B
Effekt elektrisk varmekolbe	3- 2- 1-fas		kW kW kW	6 4 2
Effektøptak sirkulasjonspumpe varmekrets	min. maks.		W	3 43
Øvrig informasjon for enheter				
Sikkerhetsventil varmekrets Åpningstrykk	inngår i leveransen: • ja – nei bar			• 3
Akkumulator Volum	inngår i leveransen: • ja – nei l			• 62
Ekspansjonsbeholder varmekrets Volum Fortrykk	inngår i leveransen: • ja – nei l bar			• 12 1,5
Overløpsventil vekselventil varme - varmtvann	integrert: • ja – nei			• •
Vibrasjonsdempere varmekrets	inngår i leveransen eller integrert: • ja – nei			–
Styreenhet Varmemengdemåling Ekstra bord	inngår i leveransen eller integrert: • ja – nei			• • –

*) kun kompressor **) vær obs på lokale forskrifter | Indeks: m-Hyd

813650a



HSV 180 / HSV 280

Technical data / Scope of supply

Accessories for heat pump type				HSV 180	HSV 280
Air/water output-controlled	Indoor and outdoor installation	4 kW 8 kW 12 kW	• yes – no	– – –	– – –
Air/water dual output-controlled	Outdoor installation	5 kW 8 kW 9 kW	• yes – no	–	–
Air/water output-controlled	Outdoor installation	5 kW 7 kW	• yes – no	• •	• •
Air/water	Outdoor installation	14 kW 18 kW	• yes – no	– –	– –
Air/water Dual	Outdoor installation	5 kW 7 kW 9 kW	• yes – no	– – –	– – –
Installation location					
Room temperature		min. max.	°C	5 35	5 35
Relative humidity maximum (non-condensing)			%	60	60
Sound					
Sound pressure level at 1 m distance		inside	dB(A)	36	36
Sound power level		inside	dB(A)	44	44
Heating circuit					
Flow rate: minimum maximum (see heat pump for pipe dimensioning)			l/h l/h	500 2200	500 2600
Free pressing Pressure loss Flow rate			bar bar l/h	0.62 – 1200	0.68 – 1200
Max. allowable operating pressure			bar	3	3
Circulation pump control range		min. max.	l/h	500 2200	500 2600
General unit data					
Total weight			kg	150	220
Weight of individual components			kg kg kg	– – –	– – –
Domestic hot water tank					
Net volume			l	180	303
Magnesium sacrificial anode	Impressed current Magnesium		• yes – no	– •	– •
Domestic hot water temperature, heating pump mode Electric heating element			up to °C up to °C	60 65	60 65
Mixed water quantity according to ErP: 2009/125/EC (at 40 °C, draw-off of 10 l/min)			l	230	400
Standing loss according to ErP: 2009/125/EC (at 65 °C)			W	55	74
Operating pressure Max. pressure Test pressure			bar bar bar	6 10 13	6 10 13
Electrics					
Voltage code all-pole fuse protection for heat pump *)**)	1 phase		... A	1~N/PE/230V/50Hz B16	1~N/PE/230V/50Hz B16
Voltage code all-pole fuse protection for heat pump *)**)	3 phases		... A	– –	– –
Voltage code Control voltage fuse protection **)			... A	1~N/PE/230V/50Hz B10	1~N/PE/230V/50Hz B10
Voltage code Electric heating element fuse protection **)	1 phase		... A	1~N/PE/230V/50Hz B32	1~N/PE/230V/50Hz B40
Voltage code Electric heating element fuse protection **)	3 phases		... A	3~N/PE/400V/50Hz B16	3~N/PE/400V/50Hz B16
Degree of protection			IP	10B	20
Zmax			Ω	–	–
Residual current circuit breaker	if required		type	B	B
Electric heating element output	3 2 1 phase		kW kW kW	6 4 2	9 6 3
Circulation pump power consumption, heating circuit	min. max.		W	2 74	2 74
Other unit information					
Safety valve Heating circuit Response pressure	included in scope of supply: • yes – no bar			• 3	• 3
Buffer tank Volume	included in scope of supply: • yes – no l			• 62	• 62
Diaphragm expansion vessel Heating circuit Volume Prepressure	incl. in scope of supply: • yes – no l bar			• 12 1.5	• 12 1.5
Overflow valve Changeover valve, heating - domestic hot water	integrated: • yes – no			• •	• •
Vibration decoupling, Heating circuit Heat source	included in scope of supply or integrated: • yes – no			–	–
Controller Heat quantity recording Extension board	included in scope of supply or integrated: • yes – no			• • –	• • –
*) compressor only, **) note local regulations Index: n-Hydrox				813659	813660

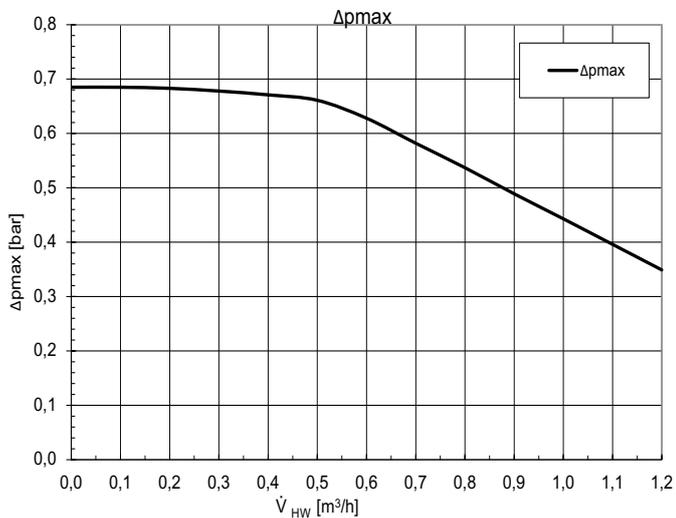


Free pressing

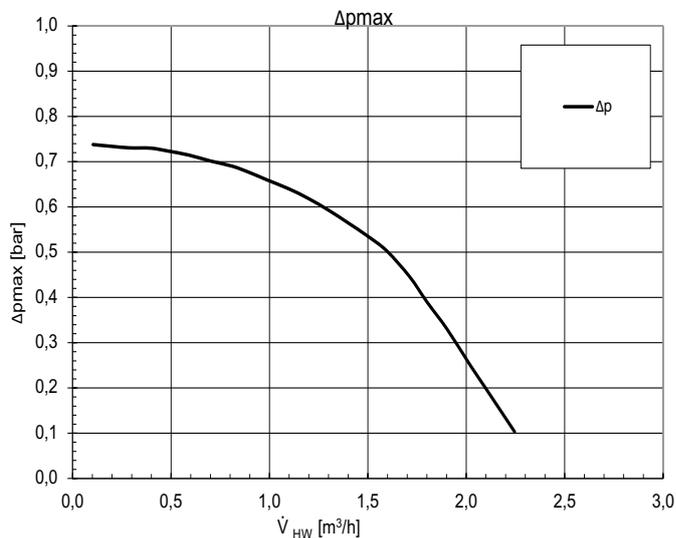
HSV 4 / HSV 180 / HSV 280

HSV 4

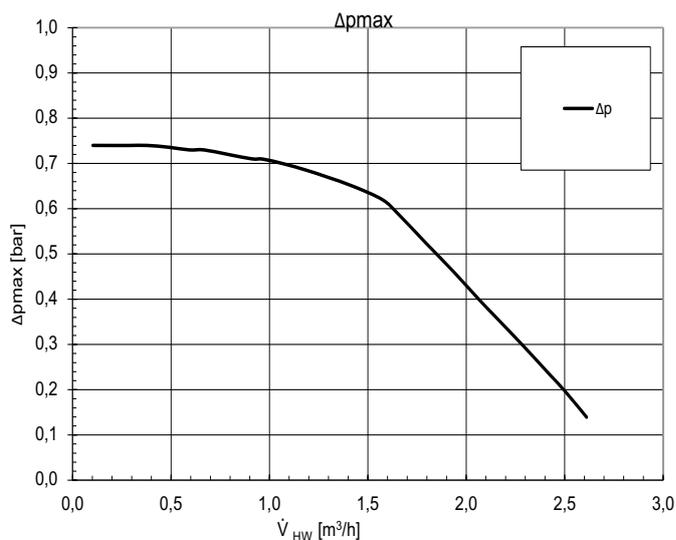
HSV 180



823330

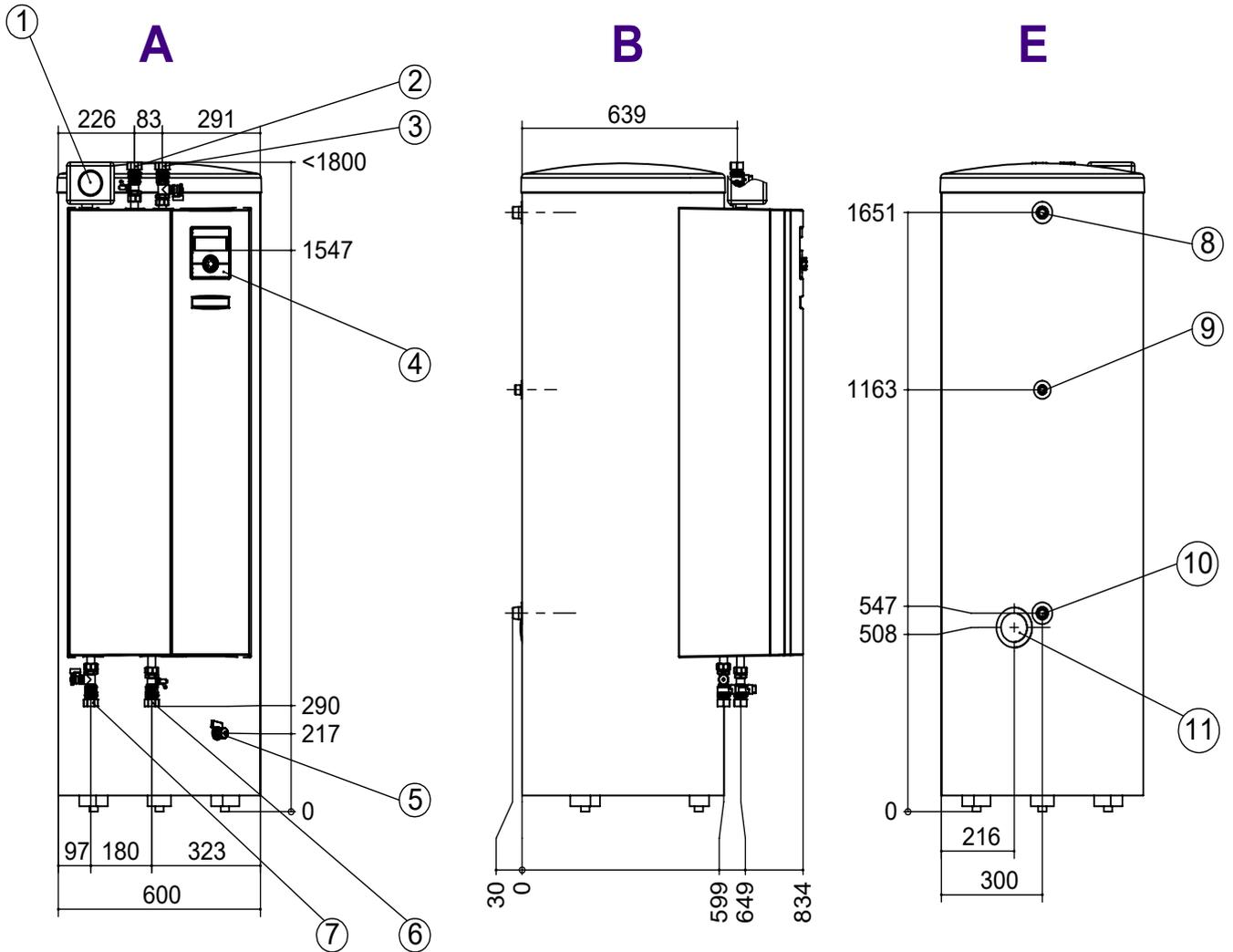


HSV 280



Key: UK823330

\dot{V}_{HW}	Volumetric flow of hot water
Δp_{max}	Maximum free pressing



Key: UK819417a

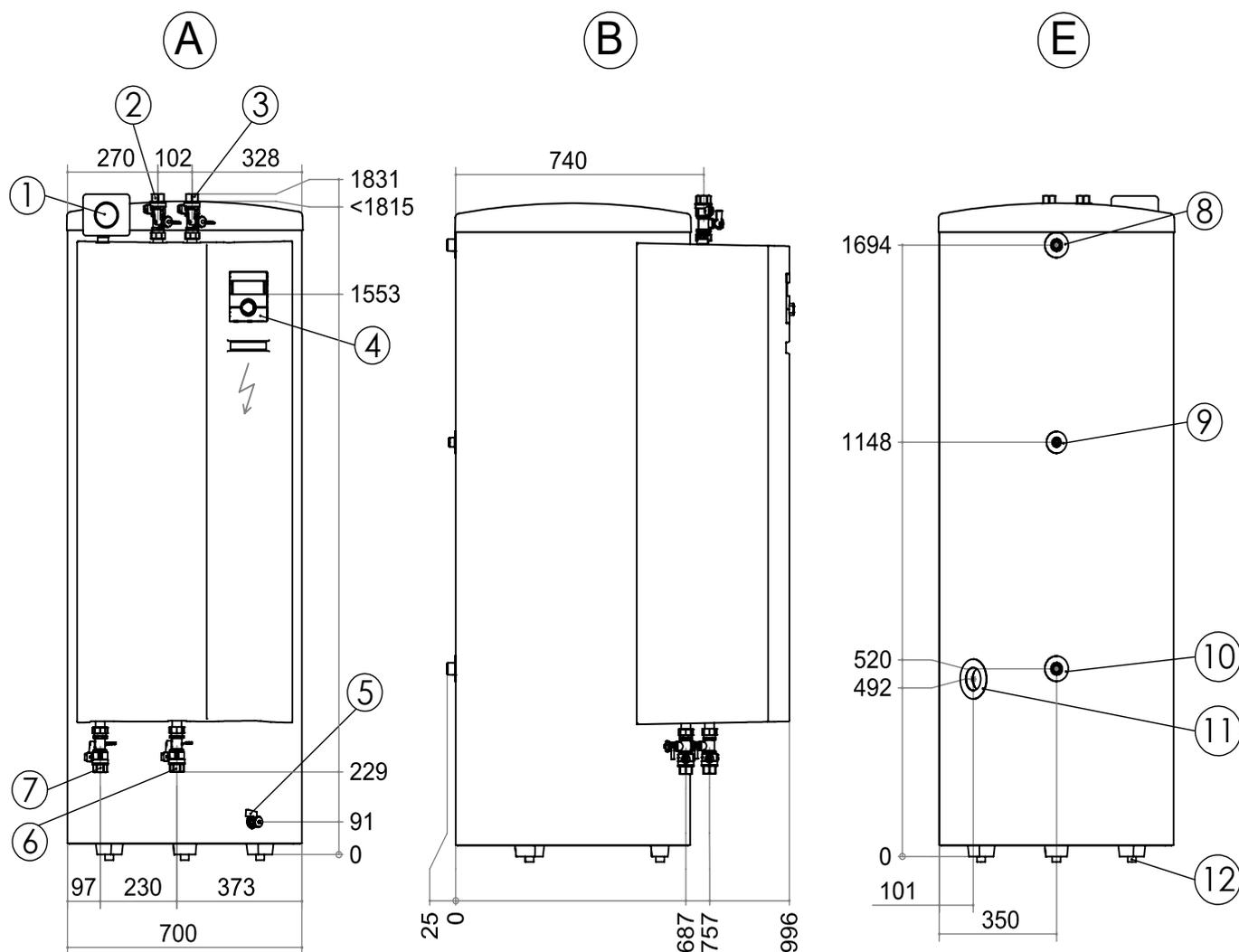
All dimensions in mm.

Pos.	Name	Dim.
A	Front view	
B	Side view from left	
E	Rear view	
1	Safety module	
2	Heating water inlet (return)	Rp 1" internal thread
3	Heating water outlet (flow)	Rp 1" internal thread
4	Control panel	
5	Emptying, buffer tank	G 1/2"
6	Hot water inlet (from heat pump)	Rp 1" internal thread
7	Hot water outlet (to heat pump)	Rp 1" internal thread
8	Domestic hot water	R 1" external thread
9	Circulation pump	R 3/4" external thread
10	Cold water	R 1" external thread
11	Penetrations for electric/sensor cables	



Dimensioned drawings

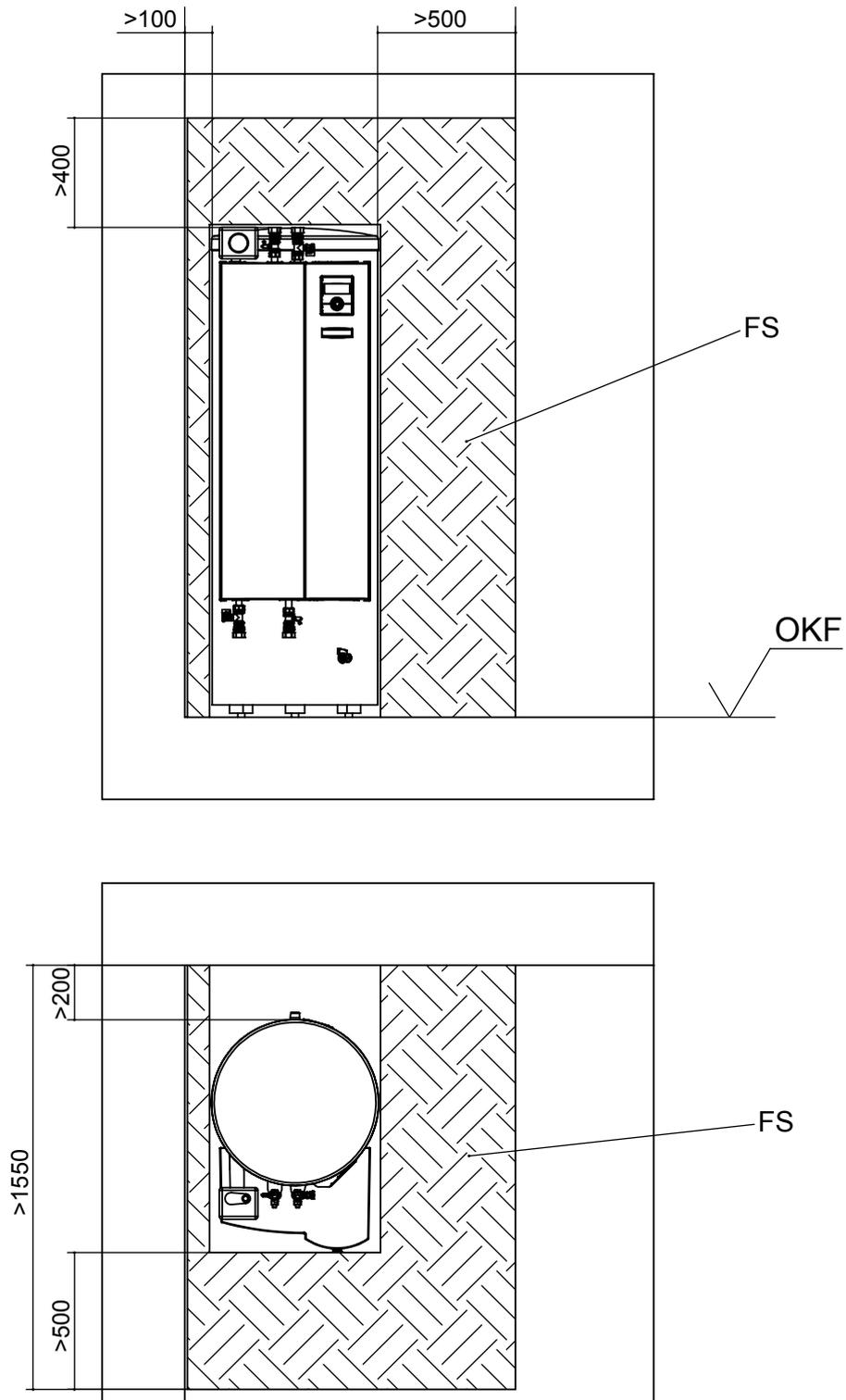
HSV 280



Keys: UK819511

All dimensions in mm.

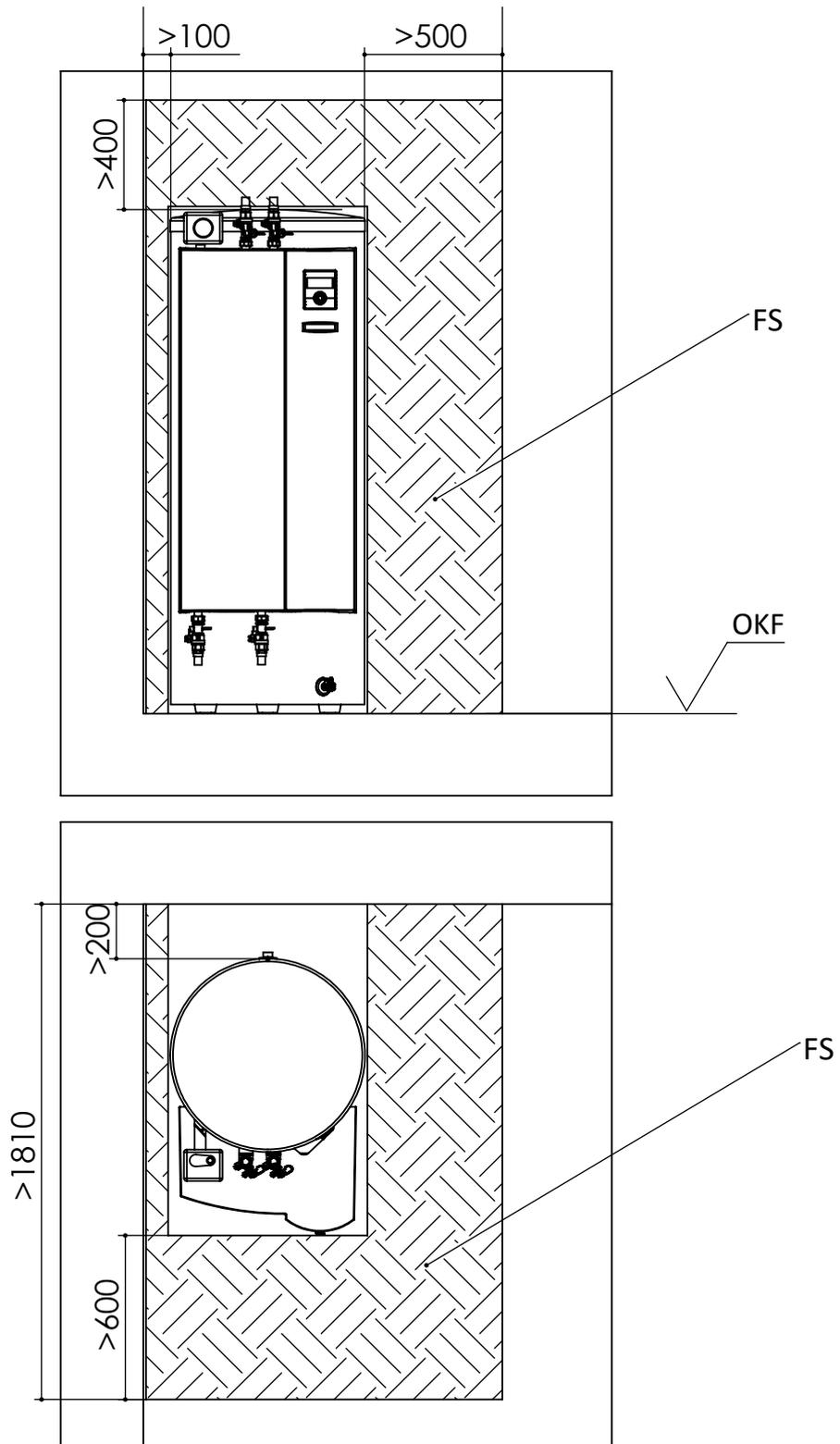
Pos.	Name	Dim.
A	Front view	
B	Side view from left	
E	Rear view	
1	Safety module	
2	Heating water inlet (return)	Rp 1" internal thread
3	Heating water outlet (flow)	Rp 1" internal thread
4	Control panel	
5	Emptying, buffer tank	Rp 1/2" internal thread
6	Hot water inlet (from heat pump)	Rp 1" internal thread
7	Hot water outlet (to heat pump)	Rp 1" internal thread
8	Domestic hot water	R 1" external thread
9	Circulation pump	R 3/4" external thread
10	Cold water	R 1" external thread
11	Penetrations for electric/sensor cables	
12	Adjusting foot M12 (3x) variable height, additional 15-30mm	



Key: UK819418

All dimensions in mm.

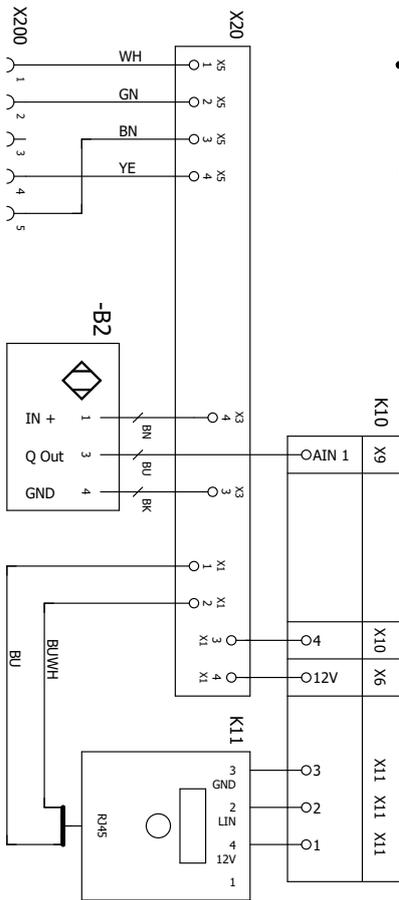
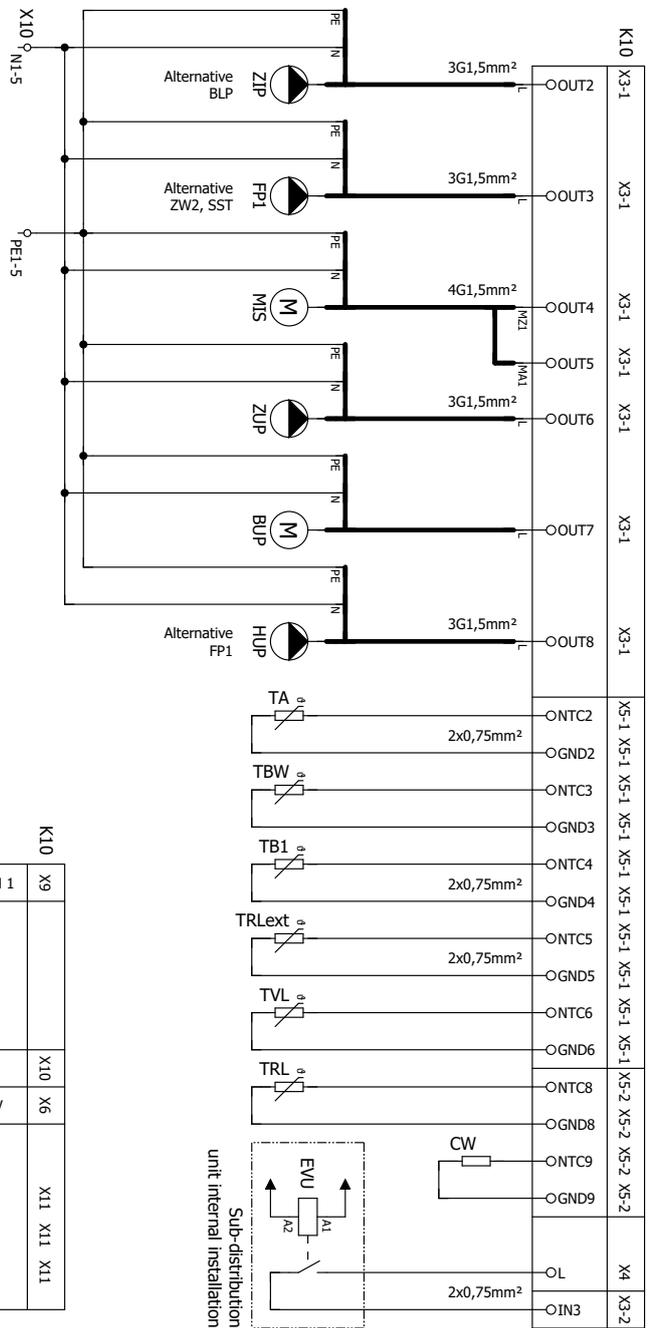
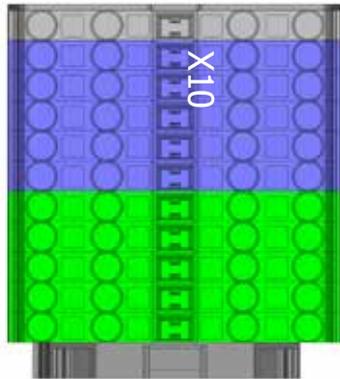
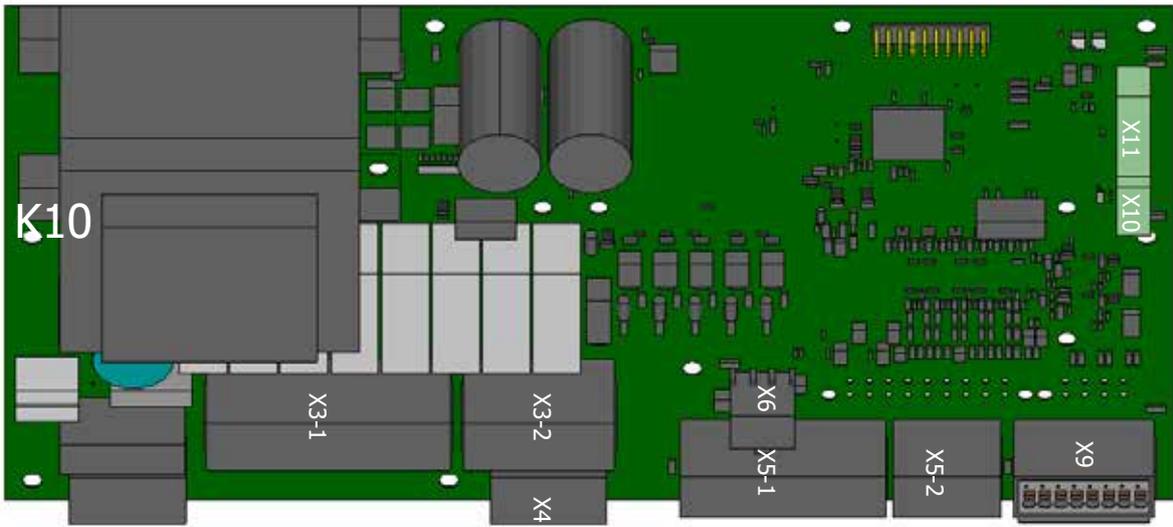
Pos.	Name
FS	Free space for service purposes
OKF	Top edge of finished floor



Keys: UK819490

All dimensions in mm.

Pos.	Name
FS	Free space for service purposes
OKF	Top edge of finished floor



IMPORTANT

The cable cross-sections shown are only intended as a guideline for the electrician! They must be adapted to the regional regulations and the conditions of use (e.g. cable length, current carrying capacity, ambient temperature, type of installation)!

UK
831249

Refer to protection notice ISO 16016.



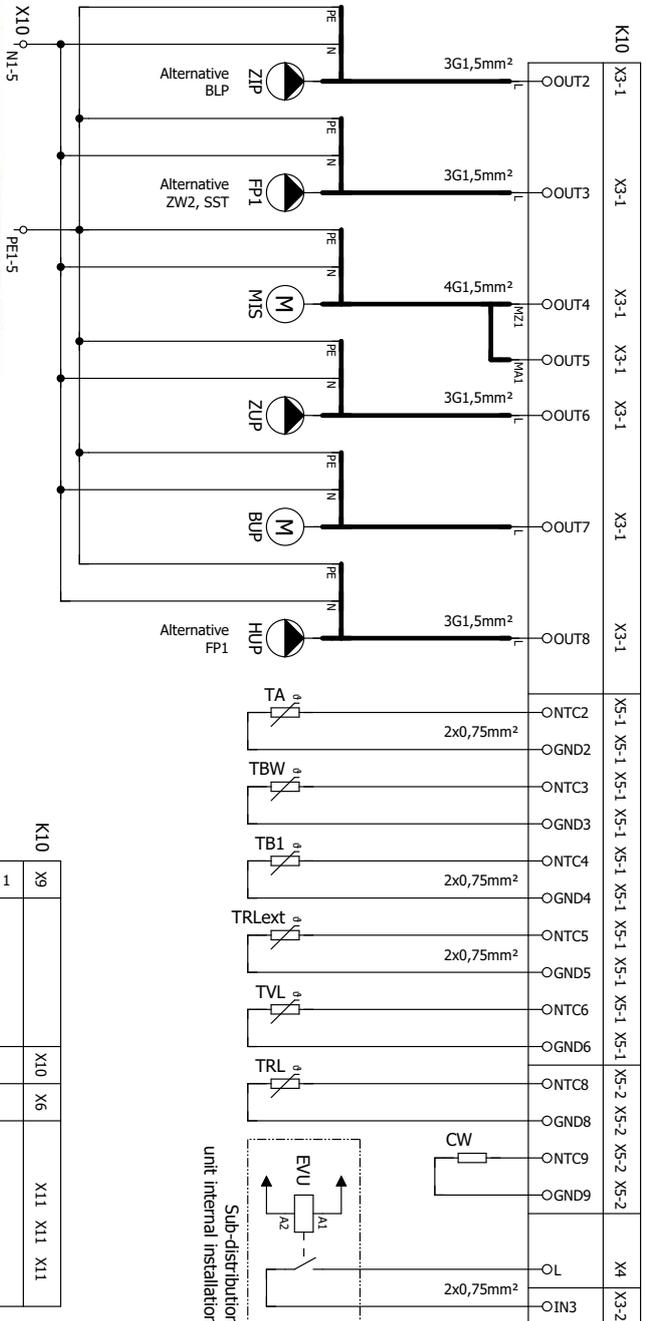
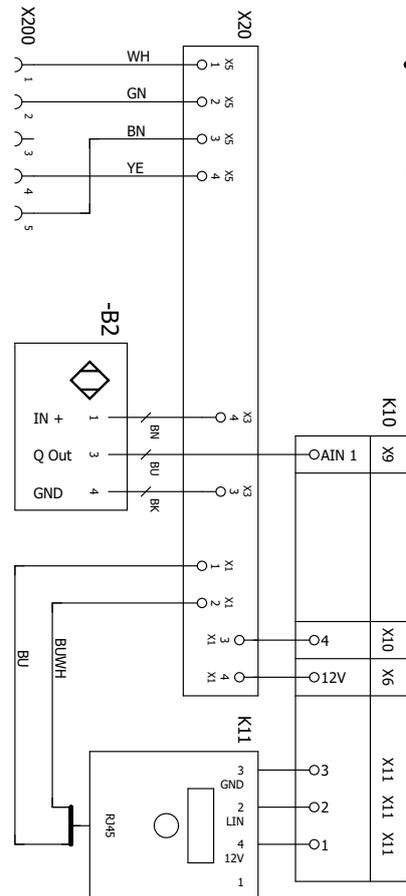
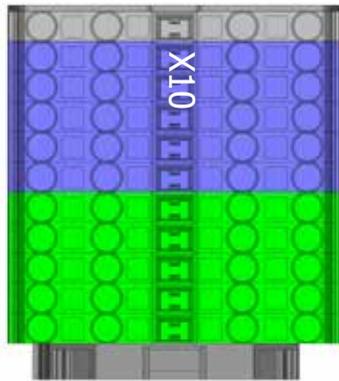
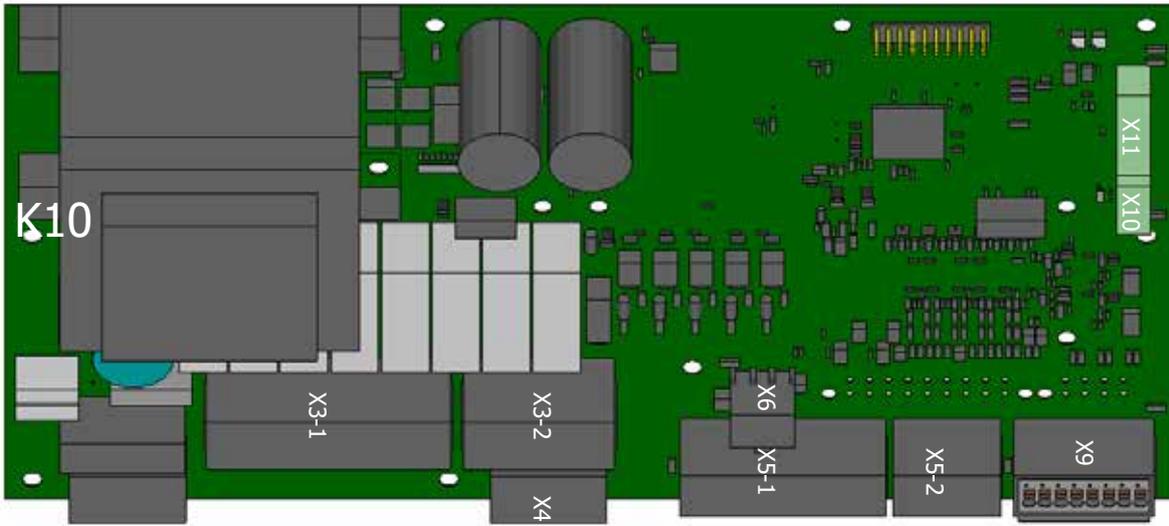
Terminal diagram 2/2

HSV 4 / HSV 180

UK 831249

Equipment	Description	Wired
PEX	Party external	
TA	Outdoor temperature sensor	
TBW	Domestic hot water temperature sensor / domestic hot water thermostat	X
TB1	Temperature sensor, mixing circuit 1	
TRLext:	Temperature sensor, external return	
TVL	Temperature sensor supply	X
TRL	Temperature sensor, return	X
CW	Coding resistor	X
STB / ZWE	Safety temperature limiter / additional heating generator	
EVU / SG 1	Block by power supply company (Jumper if no blocking time) / Smart Grid control 1	
SG 2	Smart Grid control 2	
ZWE1	Additional heating generator 1	
ZIP / KS / BLP	Domestic hot water circulation pump / cooling signal / domestic hot water charge pump	
FP 1 / ZWE 2 / SST	Mixing circuit 1 circulation pump / Additional heating generator 2 / Collective fault	
MIS (MZ1)	Mixing circuit 1 closed (discharge mixer / cooling mixer / charge mixer)	
MIS (MA1)	Mixing circuit 1 open (discharge mixer / cooling mixer / charge mixer)	
ZUP	Additional (feeder) circulation pump	
BUP	Domestic hot water circulation pump / Domestic hot water switching valve	X
HUP	Heating circuit circulation pump	X
VBO	Fan / Brine circulation pump / Well circulation pump	
B2	Volumetric flow meter	X
K10	Controller circuit board; Caution: I max = 6.3A/230VAC	X
K11	Control panel	X
X10	Control voltage feed	X
X20	MODBUS circuit board	X
X200	MODBUS	X

Refer to protection notice ISO 16016.



IMPORTANT

The cable cross-sections shown are only intended as a guideline for the electrician! They must be adapted to the regional regulations and the conditions of use (e.g. cable length, current carrying capacity, ambient temperature, type of installation)!

UK
831251

Refer to protection notice ISO 16016.



Terminal diagram 2/2

UK 831251

Equipment	Description	Wired
PEX	Party external	
TA	Outdoor temperature sensor	
TBW	Domestic hot water temperature sensor / domestic hot water thermostat	X
TB1	Temperature sensor, mixing circuit 1	
TRlex:	Temperature sensor, external return	
TVL	Temperature sensor supply	X
TRL	Temperature sensor, return	X
CW	Coding resistor	
STB / ZWE	Safety temperature limiter / additional heating generator	
EVU / SG 1	Block by power supply company (Jumper if no blocking time) / Smart Grid control 1	
SG 2	Smart Grid control 2	
ZWE1	Additional heating generator 1	
ZIP / KS / BLP	Domestic hot water circulation pump / cooling signal / domestic hot water charge pump	
FP 1 / ZWE 2 / SST	Mixing circuit 1 circulation pump / Additional heating generator 2 / Collective fault	
MIS (MZ1)	Mixing circuit 1 closed (discharge mixer / cooling mixer / charge mixer)	
MIS (MA1)	Mixing circuit 1 open (discharge mixer / cooling mixer / charge mixer)	
ZUP	Additional (feeder) circulation pump	
BUP	Domestic hot water circulation pump / Domestic hot water switching valve	X
HUP	Heating circuit circulation pump	X
VBO	Fan / Brine circulation pump / Well circulation pump	
B2	Volumetric flow meter	X
K10	Controller circuit board; Caution: I max = 6.3A/230VAC	X
K11	Control panel	X
X10	Control voltage feed	X
X20	MODBUS circuit board	X
X200	MODBUS	X

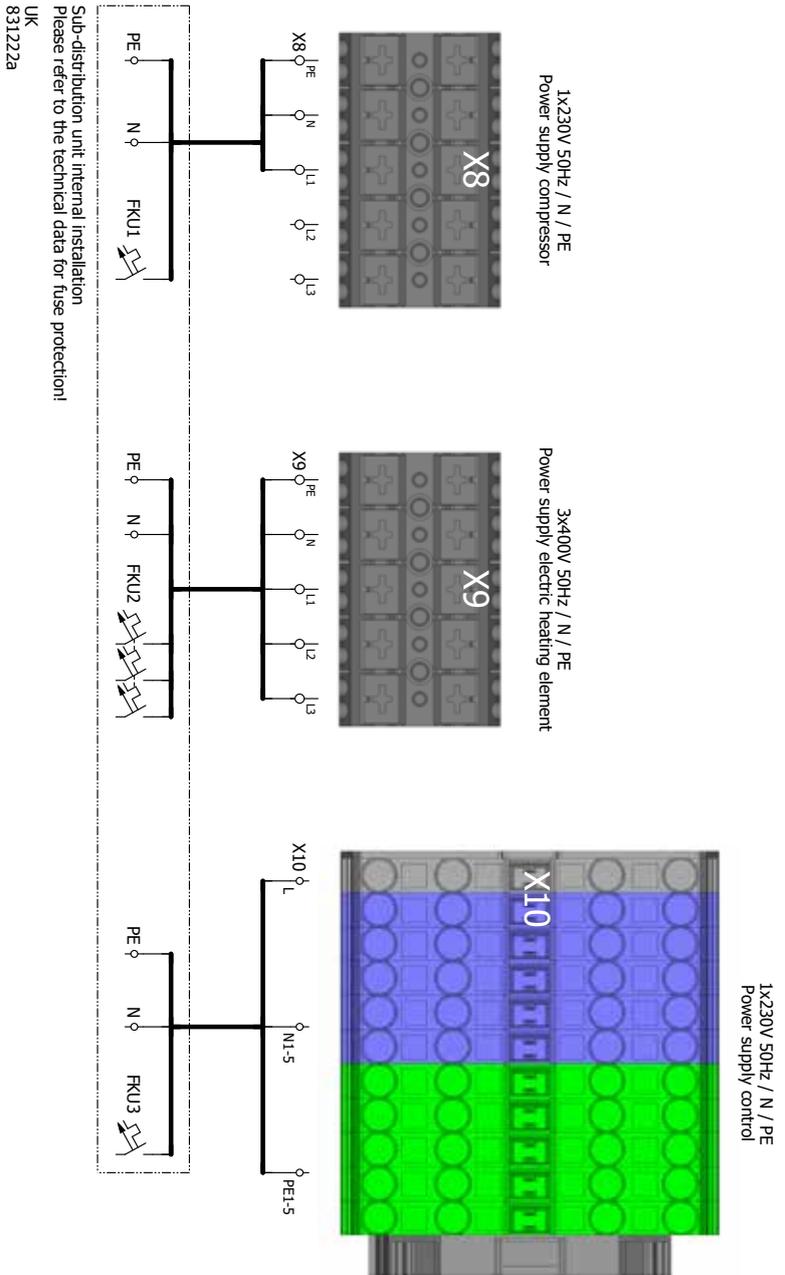
Refer to protection notice ISO 16016.



HSV ...

Terminal diagram, mains connection heat pump 1~230V + electric heating element 3~400V

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

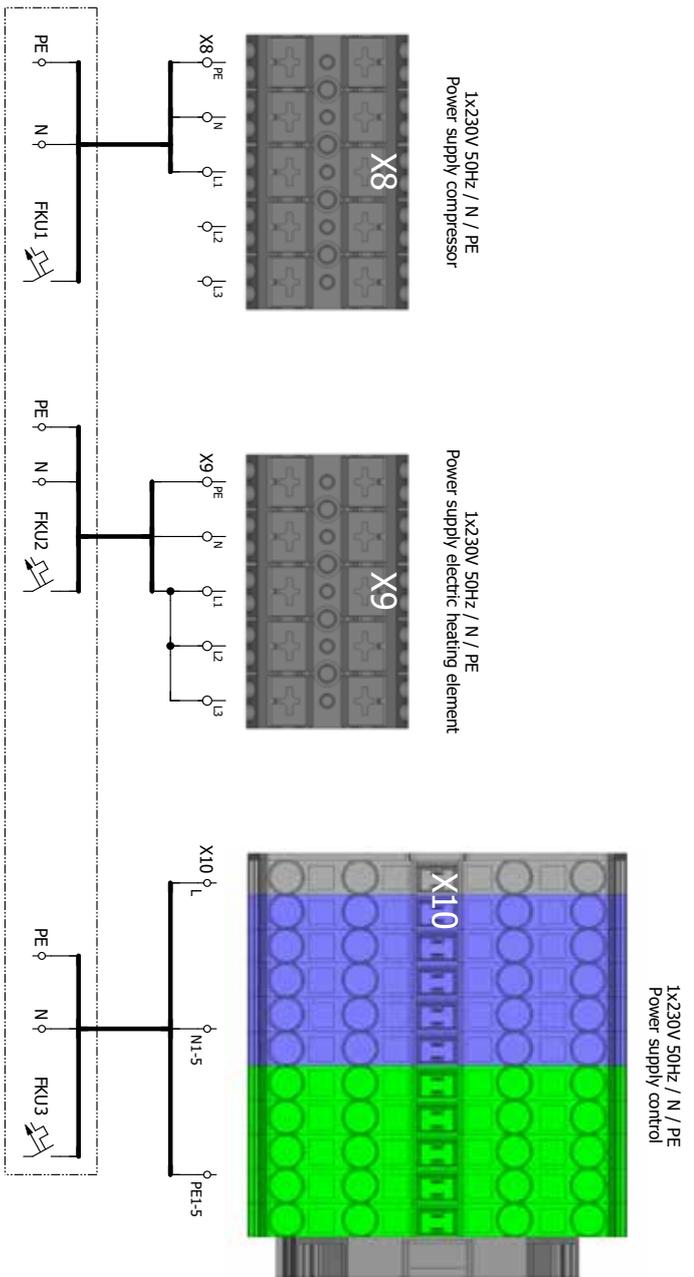


Equipment	Description
FKU1	Circuit breaker compressor
FKU2	Circuit breaker electric heating element
FKU3	Circuit breaker control
X8	Terminal for compressor
X9	Terminal for electric heating element
X10	Terminal for control



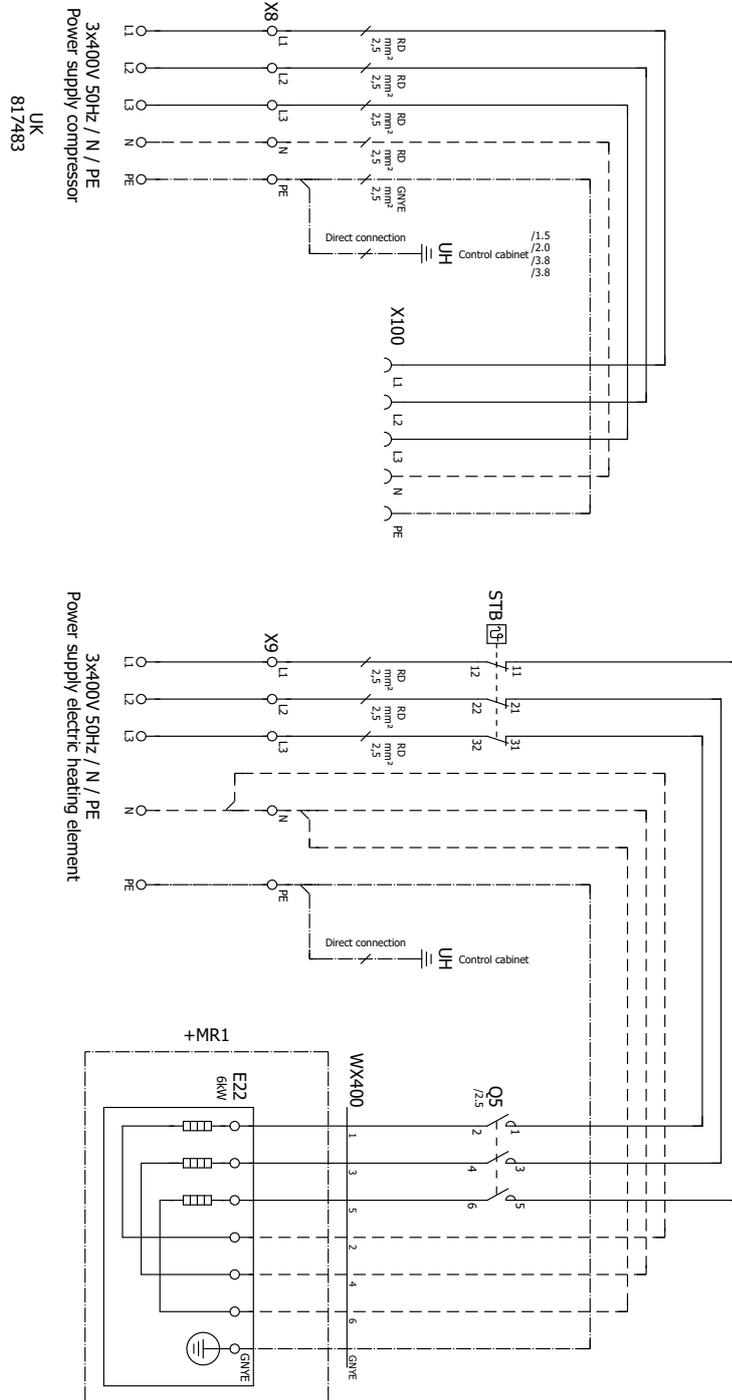
Terminal diagram, mains connection heat pump 1~230V + electric heating element 1~230V

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---



Equipment	Description
FKU1	Circuit breaker compressor
FKU2	Circuit breaker electric heating element
FKU3	Circuit breaker control
X8	Terminal for compressor
X9	Terminal for electric heating element
X10	Terminal for control

Refer to construction drawing TGA 1201C



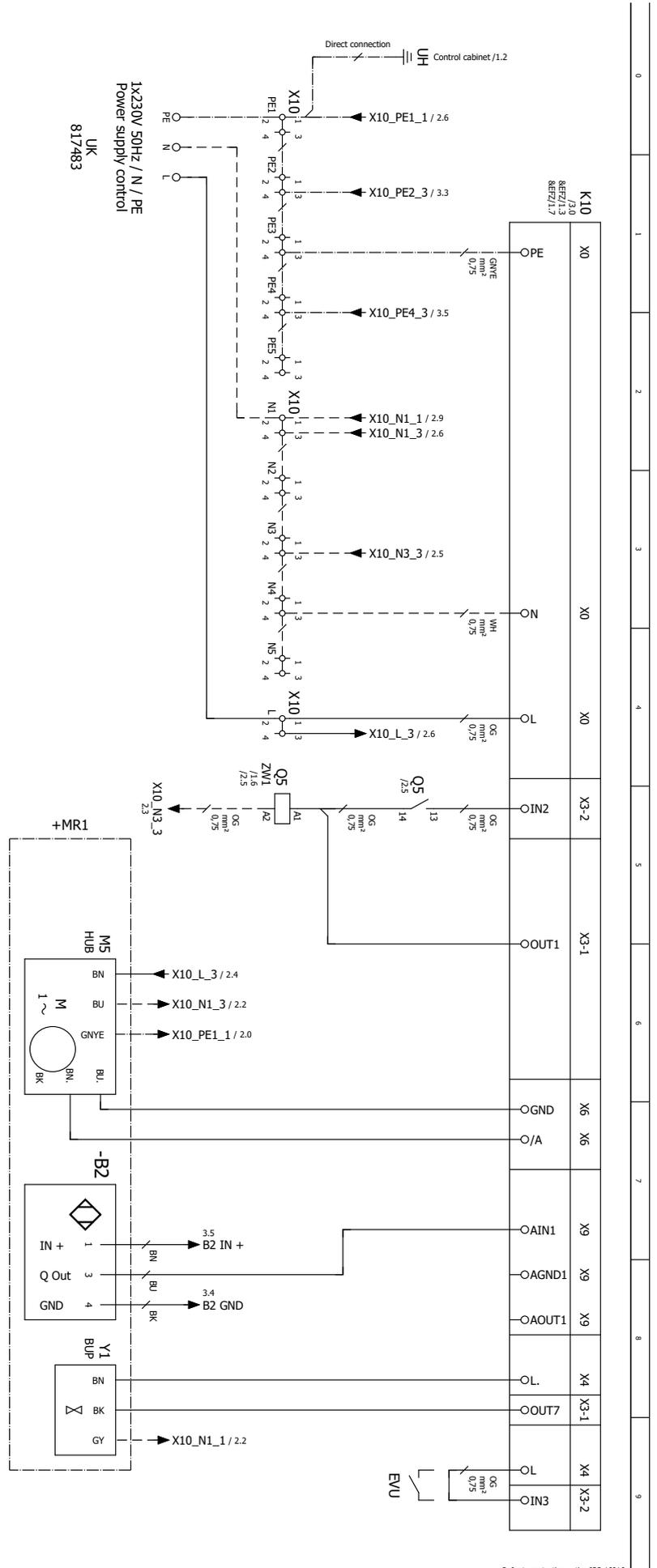
0
1
2
3
4
5
6
7
8
9

Refer to protection notice ISO 16016

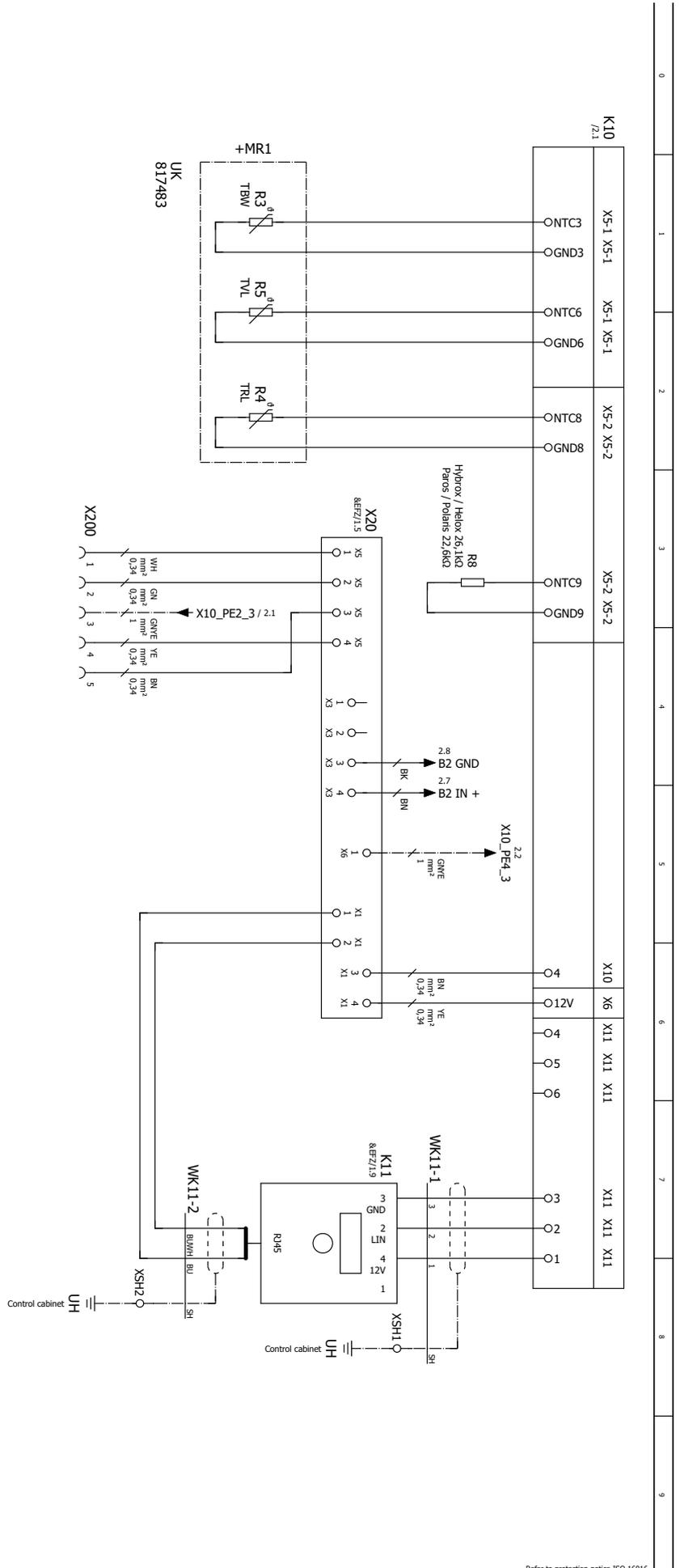


Circuit diagram 2/4

HSV 4 / HSV 180



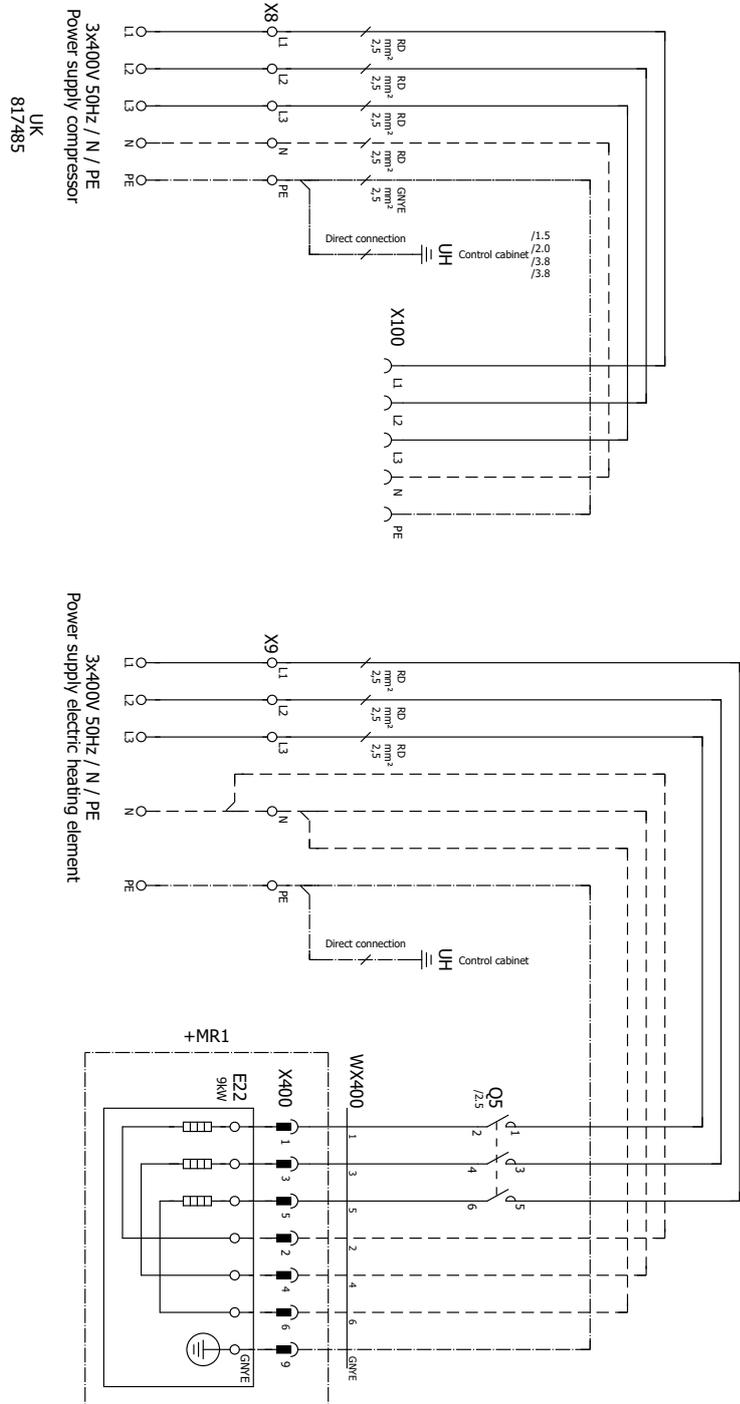
Refer to reduction notice ISO 16016.



Refer to protection notice ISO 16016.



0
1
2
3
4
5
6
7
8
9

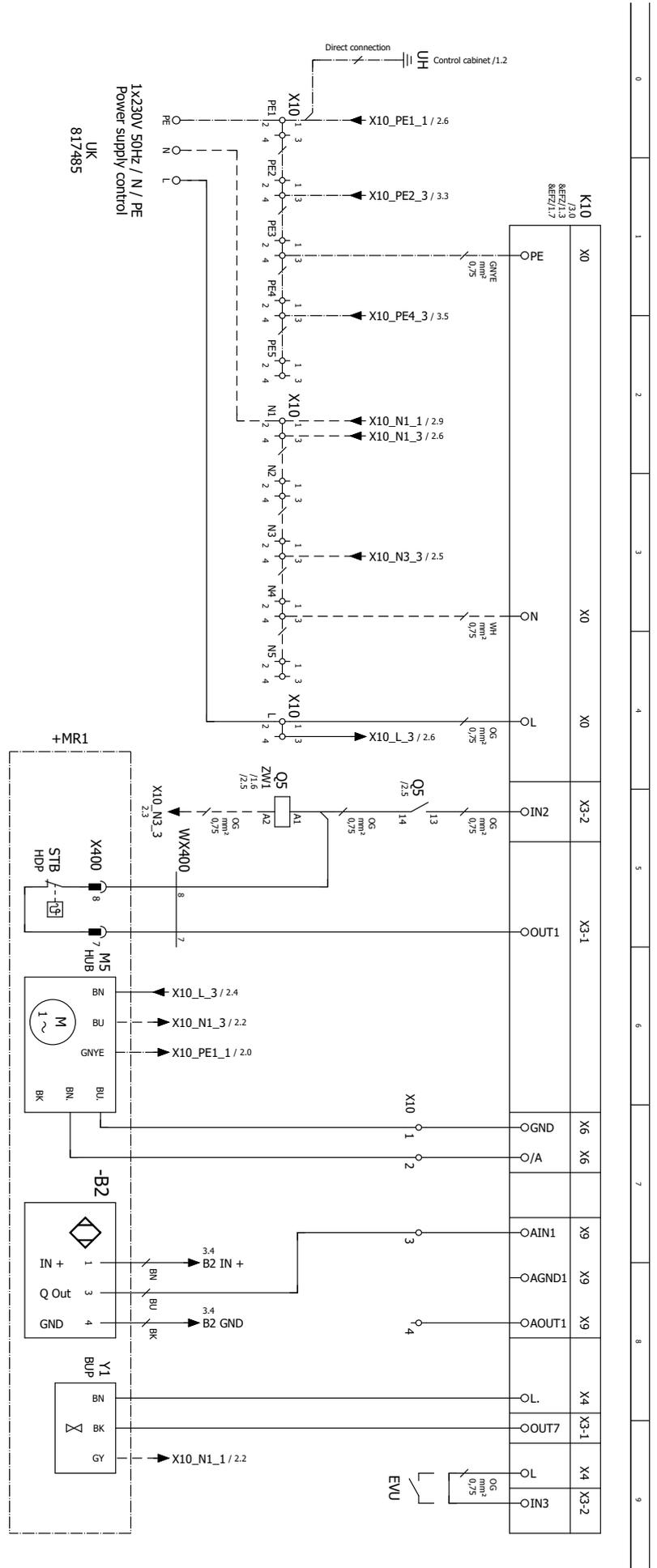


Bevor in production making 1E7/ 1E71E

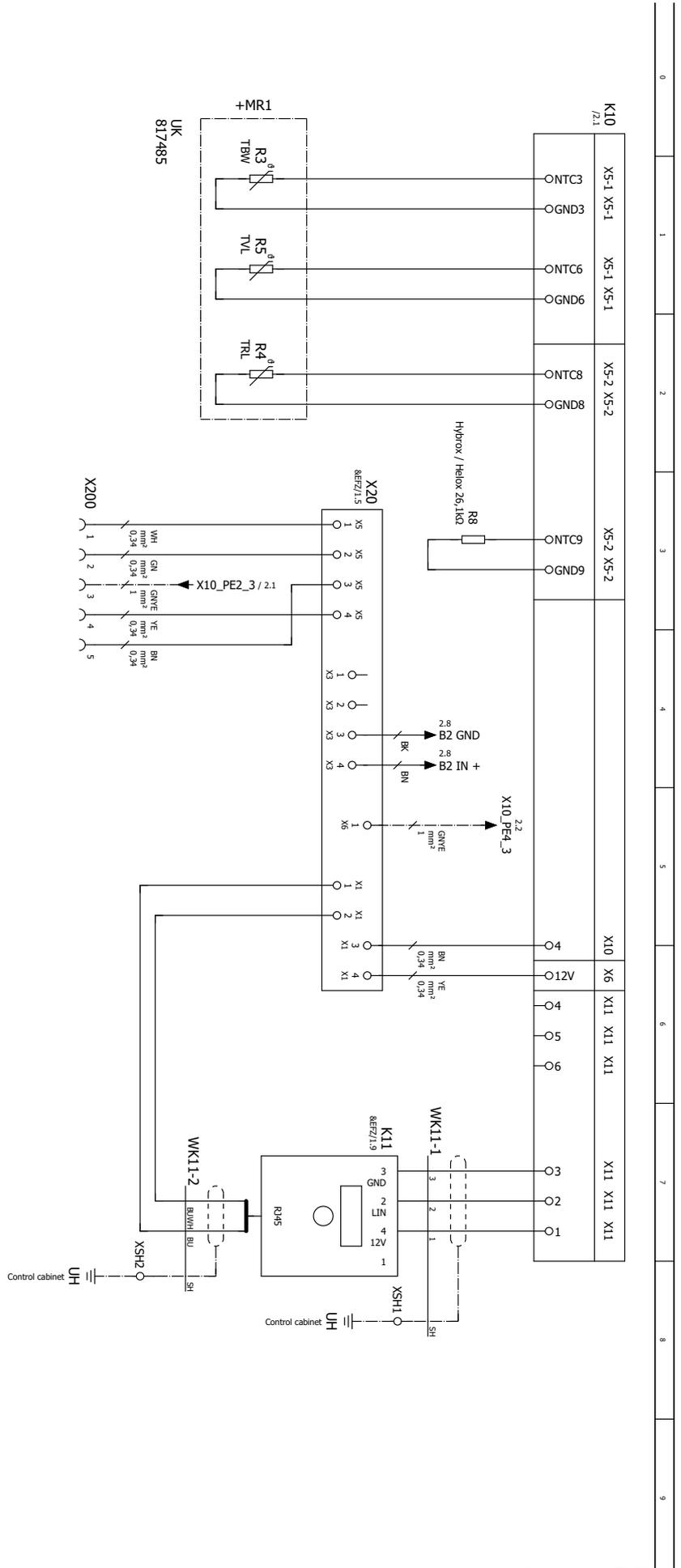


Circuit diagram 2/4

HSV 280



Refer to construction notice 16016



Refer to notation notes 157, 160/16

an ideal tomorrow

The logo for ait Heat Pumps is located in the top right corner. It features the lowercase letters 'ait' in a white, sans-serif font, with a small blue square above the 'i'. Below 'ait', the words 'HEAT PUMPS' are written in a smaller, white, uppercase, sans-serif font. The entire logo is set against a dark blue rectangular background.

ait-deutschland GmbH
Industriestraße 3
95359 Kasendorf
Germany

T +49 9228 / 99 06 0
F +49 9228 / 99 06 149
E info@ait-deutschland.eu

www.aitgroup.com

Member of NIBE Group.