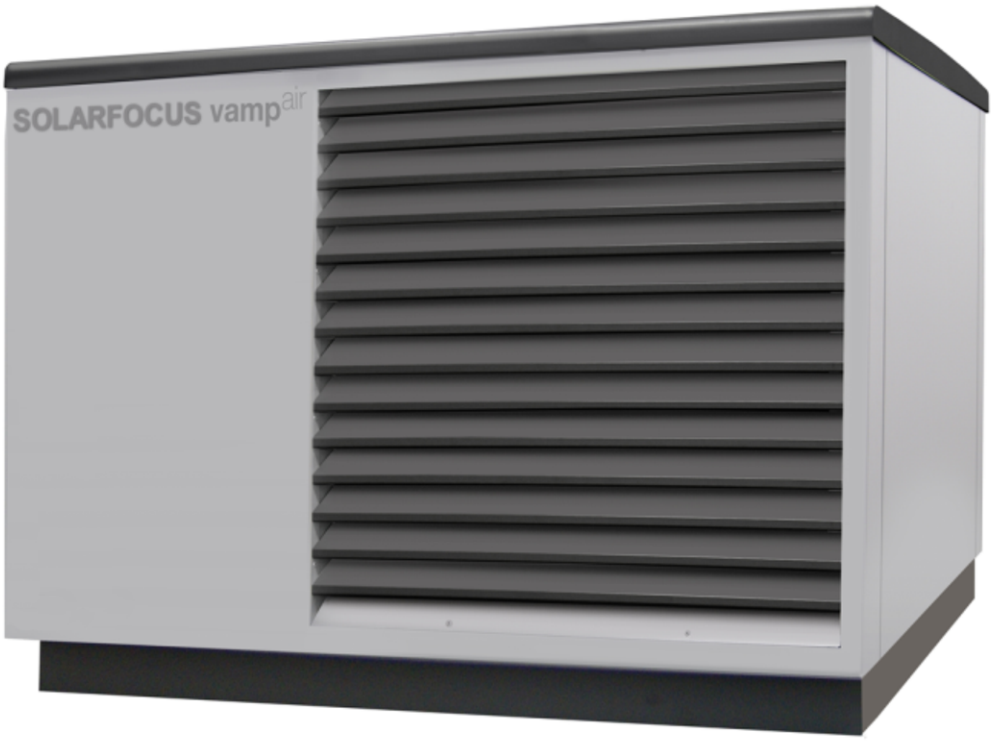
SOLARFOCUS



+ Plug & Heat
+ Low-Noise Technology
+ Inverter Technology

Air source heat pump **vamp**air

Installation manual for qualified personnel

Read carefully before operating.

DR-0072-EN / v41-202205

Content

1 About this manual

Language

The language of the original manual is German. Versions of this manual in all other languages are translations of the original.

Storage

Keep the manual for the entire service life of the product and ready to hand. The manual must be passed on to the new owner when the product is dismantled/reused. If the manual is lost or destroyed, request a new copy from the manufacturer.

Instructions and warnings

The instructions used in this manual are highlighted with symbols and signal words. The signal word indicates the level and nature of the danger.

Indicates information for correct handling of the product.

CAUTION - Material damage is possible if these instructions are not complied with.

DANGER - Failure to comply with this instruction poses a danger to people.

1.1 Limitation of liability

SOLARFOCUS GmbH assumes no liability for injury or material damage resulting from:

- Failure to observe the instructions in this manual.
- Use of the product for any purpose other than for its intended use.
- Deployment of unqualified personnel.
- Use of non-approved spare parts.
- Technical modification of the product by the system operator.

Warranty, guarantee

See General Terms of Business and Delivery Conditions of SOLARFOCUS GmbH.

Manufacturer

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Service Hotline

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2 Safety information

Installation and commissioning

- Heat pump may only be installed and put into operation by certified qualified personnel (SOLARFOCUS service technician or SOLARFOCUS service partner).
- Install heat pump outdoors only.
- Never disconnect the heat pump from the power supply (except electrical work). Otherwise risk of frost damage

Maintenance and repair

- Have repairs done by qualified personnel only Improper repairs can lead to risks for the user and inefficient operating conditions.
- Use original spare parts only

Handling of refrigerant R410A

- The heat pump uses refrigerant R410A. Work on the cooling circuit may be performed only by a qualified refrigerant electrician.
- Wear suitable gloves and goggles when working with refrigerant.

What to do in case of escaping refrigerant

- Escaping refrigerant[1] can cause frostbite if it touches the exit point. If refrigerant escapes do not touch any components of the heat pump.

  [1] Recognizable by oily residue, which is left when exiting.
- Avoid skin or eye contact with the refrigerant. In case of skin or eye contact with the refrigerant, a doctor should be consulted.
- Switch off heat pump, Contact qualified personnel.

3 Technical requirements

3.1 Warranty, guarantee, liability

Guarantee claims are valid as part of a heat pump maintenance agreement.

3.1.1 Technical requirements for warranty and guarantee claims

The following technical requirements must be observed as a precondition for a warranty and guarantee claim.

Regular maintenance

- Have the heat pump serviced annually by qualified personnel

Specifications for the heating system's fill-up/-make-up water

- **Check pH value: this must be in the range of 8.2 to 9.5**
- Avoiding scale buildup > 7(=limescale on heat exchanger surfaces):
  - Take the water hardness into account
  - Soften the fill-up water, or better: desalinate it.
- Avoiding water-side corrosion > 7(is triggered by the oxygen in the water):
  - Correct system planning, correct dimensioning, take material combinations into account.
  - Repair leaks immediately.
  - Expansion tank > 8(prevents air from being drawn in when the system cools down): Correctly set the pressure, check it regularly.
  - Existing underfloor heating: Take care with old, diffusion-open plastic pipes > 9

3.1.2 Conditions for claims

For warranty and guarantee claims observe the following points:

- The warranty begins at the time at the time of handover (delivery note, commissioning log).
- The guarantee period is calculated from the date of initial commissioning (according to the control's operating hour counter).
- The warranty periods are based on the relevant regulations.
- We must be notified promptly and accurately of any damage incurred, so that the cause can be clarified.
- If the system has defects despite correct installation (in compliance with the technical documentation), we grant a warranty provided that the system has been examined by the plant customer service (commissioning log).
- The guarantee applies to technical, construction-related faults and faults in the manufacture of the system that prevent correct and problem-free usage.
- We are not liable for parts that were not produced by SOLARFOCUS. However, we are prepared to transfer our existing claims against the producer (relating to this defect) to the buyer.
- In fulfilling the warranty/guarantee services, we shall cover only the assembly time and the materials used, but not any travel or accommodation costs necessary for the fitters/engineers or any return transport costs.
- SOLARFOCUS GmbH assumes no liability for any consequential costs of damages.
- The repair and/or warranty replacement shall be carried out on site or in the SOLARFOCUS factory at our discretion.
- The company SOLARFOCUS will determine whether such work requires a repair or whether the parts are to be replaced free of charge.

3.1.3 Claims rendered void

The warranty and guarantee claims are rendered void if one of the following points applies:

- Non-compliance with the technical requirements > 3
- Damage during transport.
- Wilful damage.
- Damage due to force majeure (water, fire, etc.).
- Non-observance of information in the planning, installation and operation manual.
- Insufficient energy or water, fault in the hydraulics.
- Incorrect operation, failure to perform maintenance and cleaning as prescribed.
- Commissioning and maintenance carried out by non-certified companies.
- Undocumented commissioning (no commissioning log) and/or maintenance (maintenance log).
- It is almost impossible to produce flawless painted parts; for this reason, slight defects that do not adversely affect proper use shall not be deemed as grounds for complaint.
- No claims can be ß under the warranty if unauthorised intervention (or action that has not been explicitly approved by us the manufacturer) has been carried out. In addition, the goods must be paid for within the specified payment timeframe.

3.1.4 Limitation of liability

SOLARFOCUS GmbH assumes no liability for injury or material damage resulting from:

- Failure to observe the instructions in this manual.
- Use of the product for any purpose other than for its intended use.
- Deployment of unqualified personnel.
- Use of non-approved spare parts.
- Technical modification of the product by the system operator.

3.2 Standards, guidelines, regulations

The following bodies of regulations must be considered and adhered to during planning, installation and operation of the heating system:

Standards for heat pump systems

- ***EN 378-2*** - Refrigerating systems and heat pumps - Safety and environmental requirements
- ***ISO 6529*** - Protective clothing - Protection against chemicals - Determination of resistance of protective clothing materials to permeation by liquids and gases
- ***EN 60335-1*** - Household and similar electrical appliances - Safety - Part 1: General requirements
- ***EN 60335-2-40*** - Household and similar electrical appliances - Safety
- ***EN 61000-3-3*** - Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes ≤16 A per phase
- ***EN 61000-3-11*** - Electromagnetic compatibility (EMC) - Part 3-11: Limits - Limitation of voltage changes ≤75 A per phase
- ***EN 55014*** - Electromagnetic compatibility. Requirements for household appliances, electric tools and similar apparatus.
- ***DIN 8901*** - Refrigerating systems and heat pumps with flammable refrigerants of group L3 (Germany)
- ***DGV (SR 819.121)*** - Pressure equipment safety ordinance (Switzerland)
- ***DBV (SR 819.122)*** - Pressure vessel ordinance (Switzerland)
- ***SN EN 378*** - Refrigerating systems and heat pumps - Safety and environmental requirements (Switzerland)

Standards for heating water

- ***ÖNORM H 5195-1*** - Heat transfer media for building services systems, Part 1: Preventing damage from corrosion and scale formation in closed hot water heating systems (Austria)
- ***VDI 2035*** - Prevention of damage in hot water heating systems (Germany)
- ***SWKI BT 102-01*** - Water quality for building systems (Switzerland)
- ***UNI 8065*** (Italy)

3.3 Specifications for cooling mode

! **CAUTION** - Observe the following points when using the heat pump for room cooling. Failure to comply poses a risk of damage due to moisture in building elements (due to condensation).

- If the temperature falls below the dew point temperature in the cooling system (lines, cooling surface, buffer tank), water precipitates out of the air. Condensation forms on the cooled system parts.
- The system must have insulation suitable for cooling (=diffusion-resistant).
- Take particular care when using carbon steel - risk of external corrosion
- Use room control with humidity sensor, e.g. SOLARFOCUS Art. 26610. This regulates the cooling flow temperature, taking the room temperature and room humidity into account, and prevents the temperature falling below the dew point.
- If room control with humidity sensor is not used: Position the dew-point sensor on the lines.
- For further information, see *Heat pump planning document*, DR-0302
- Standards
  - ISO 12241 - Thermal insulation for building equipment and industrial installations - Calculation rules
  - DIN 4140 - Insulation work on industrial installations and building equipment - Execution of thermal and cold insulations

3.4 Installation location, installation position

- Outdoor installation only
- The ground must be seepable (due to condensate discharge > 6) and local regulations and conditions must be observed.
- The heat pump is weatherproof and requires no additional protective measures (roofing, ...). Exception: In the event of a risk of roof avalanches, mechanical protection for the heat pump must be provided, e.g. protective roof).
- The air flow through the evaporator must not be impaired on the air intake and exhaust side (e.g. by shrubs, walls,...).
- Do not install the heat pump with the air outlet side against the main wind direction. Preferred installation is on a wall, with minimum distance, see foundation plan > 38.
- Take noise development into consideration (do not place in front of the bedroom window, next to the terrace, near neighbours ...).
- Ensure free accessibility (e.g. for service work).
- Installation in a sink is not permitted (lack of air exchange due to sinking, cold air).
- The sucked air must not be contain ammonia. The use of exhaust air from animal stables is therefore not permitted.
- When using heat pumps near the sea, the high salt content of the air can lead to increased corrosion (invalidation of warranty if ignored). The use of heat pumps is harmless from a distance of 12 km to the sea.

3.5 Foundation for the heat pump

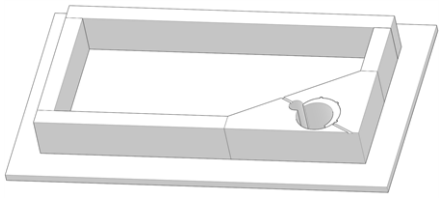
Requirements for the foundation

The foundation for the heat pump must fulfil the following requirements:

- Horizontal orientation
- Weatherproof, frost-proof
- Sufficient load-bearing capacity
- Seals the heat pump at the bottom (prevents sound output; prevents the ingress of rodents)
- Vibration-resistant

Concrete foundation

- In the case of a primary circuit connection from below > 24 provide the required feed-throughs in the concrete foundation.
- Position the heat pump directly on the concrete foundation (affix the supplied sealing tape to the underside of the heat pump base > 18)
- Screwing the heat pump to the concrete foundation is not required
- Insulate the heat pump laterally with moisture-resistant XPS panels (do not use EPS panels)
- Optional: For easy preparation of the concrete foundation see article *Insulating brick for foundation* (Art. No. 25350, Instructions DR-0132). This XPS-shaped block allows fast, convenient formation of the foundation, including the precise placement of the heat pump pipe.



Condensate discharge

When defrosting the evaporator, condensate accumulation of up to 50 litres per 24 h is possible, even over a longer period. This quantity of fluid must be reliably discharged.

2 methods of discharging:

Drain into the ground: If sufficient water-permeable earth layers are present, it is sufficient to lay the drain pipe in gravel fill to a depth of 90 cm (frost-free) > 38 ff

CAUTION - When placing the heat pump close to the building, it must be ensured that the condensation does not damage the building.

CAUTION - Use a perforated version ("drainage pipe") as on-site drain pipe > 22.

Discharge into the sewage system: Outdoors is possible, or to frost-free depth indoors (basement, ...) is possible. In both cases provide sufficient slope and trap (siphon) If a part of the drainage hose can not be laid frost-free, it must be heated by a heating cable.

► Connect the condensate drain line > 22

Permissible installation types

- On continuous concrete foundation
- On concrete flat roof

Impermissible installation types

- On pad or strip foundation
- On structures that can oscillate (e.g. supporting frames made of wood or metal, terraces, lightweight ceilings)
- On wall/facade (e.g. with metal support bracket)

3.6 Line routing, connection

Protect lines against frost

- Lay the heat pump pipe (with heating flow and return line) at frost-free depth.
- Lay the outlet of the condensate drain hose > 6 to frost-free depth.

Observe heat pump pipe connection

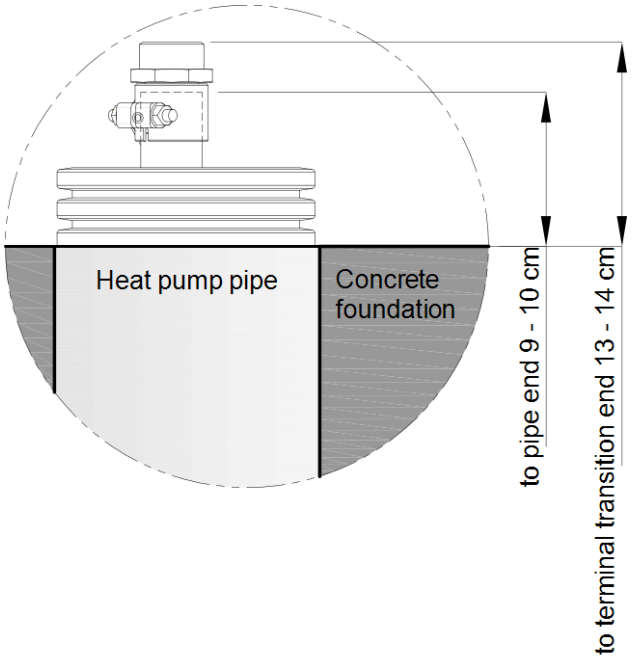


Abb. 2-1

see foundation plan > 38:

3.7 Heating system fill-up water

In regard to the fill-up water quality, two key points must be observed (in accordance with Guideline VDI 2035):

- Avoiding scale buildup (limescale)
- Avoiding water-side corrosion (caused by oxygen in the heating water)

The lowest possible rate of corrosion of the installed metal materials is primarily achieved when the circulation water is in the correct pH range (8.2 to 9.5), while at the same time, the electrical conductivity is as low as possible (50 to 100 µS/cm).

3.7.1 Avoiding scale buildup

What is scale buildup?

Scale buildup is the formation of firmly adhering deposits on water-contacting walls of hot water heating systems. This can subsequently lead to damage (stress cracks in metal, leaks).

Causes of scale buildup

The cause of scaling is the presence of calcium carbonate in the water.

The following calculation/table determines the total permitted hardness of the fill-up water. If the value is exceeded, the fill-up water must be treated, e.g. softened.

Calculation of the total permitted hardness of the fill-up water

To use the table, the *specific system volume* for the system must be determined:

System volume divided by *total heat output* results in the *specific system volume*

1166 litres / 25 kW = **46.64 l/kW specific system volume**

Table: Total permitted hardness of the fill-up water

Total heat output	Specific system volume (VDI 2035)		
	<20 l/kW	≥ 20 <50 l/kW	≥ 50 l/kW
< 50 kW	≤ 16.8°dH	≤ *11.2°dH*	< 0.11°dH
50 - 200 kW	≤ 11.2°dH	≤ 8.4°dH	< 0.11°dH
20 - 600 kW	≤ 8.4°dH	< 0.11°dH	< 0.11°dH
> 600 kW	< 0.11°dH	< 0.11°dH	< 0.11°dH

In our example: if the total hardness of the fill-up water is more than 11.2 dH, then the fill-up water must be treated.

3.7.2 Avoiding water-side corrosion

Corrosion is usually triggered by the available oxygen in the water. This value can be brought into a safe range with proper planning, design, installation and maintenance of the heating system. A constant input of oxygen should be avoided.

Important in this regard:

- Expansion tank > 8: Air must be prevented from being drawn in when the heating system is cooling down. Ensure:
  - Correct planning and implementation of the expansion tank.
  - Regular check of the system pressure, expansion tank pre-pressure.
- Immediate repair of leaks in the heating system.
- In the case of older underfloor heating, ensure pipes are diffusion resistant > 9

Check the pH of the fill-up water

- **The pH value must be between 8.2 and 9.5.**
- If this pH value does not self adjust after a week of operation, it must be raised by adding 10 g/m³ trisodium phosphate (Na3PO4) or 5 g/m³ sodium hydroxide (NaOH). Allow 2 to 4 weeks of operation before further corrections.
- Exception: If aluminium materials are used in the heating system, a pH from 8.2 to 8.5 must be met (pH> 8.5 increased corrosion tendency).

Resistance of materials to water constituents

Irrespective of legal requirements, the following limit values in the heating water used for different materials may not be exceeded or fallen below in order to ensure safe operation of the heat pump. For this, an analysis of the water must be carried out before commissioning.

If the pre-commissioning water analysis for one indicator shows a "-" or an "o" for two indicators, treatment of fill and make-up water is required.

Limits for the quality of the heating water:

Substance in water	Concentration mg/l or ppm	Stainless steel	Copper
Alkalinity (HCO_3^-)	<70	+	o
	70-300	+	+
	>300	+	o/+
Sulphate (SO_4^{2-})	<70	+	+
	70-300	+	o / -
	>300	o	-
HCO_3^- / SO_4^-	>1.0	+	+
	<1.0	+	o / -

Substance in water	Concentration mg/l or ppm	Stainless steel	Copper
Electrical conductivity	<10 µS/cm	+	o
	10-500 µS/cm	+	+
	>500 µS/cm	+	o
pH value]	<6.0	o	o
	6.0-7.5	o/+	o
	7.5-9.0	+	+
	>9.0	+	o
Ammonia (NH_4^+)	<2	+	+
	2-20	+	o
	>20	+	-
Chloride (Cl^-)	<300	+	+
	>300	o	o / +
Free chlorine (Cl_2)	<1	+	+
	1-5	+	o
	>5	o/+	o / -
Hydrogen sulphide (H_2S)	<0.05	+	+
	>0.05	+	o / -
CO_2	<5	+	+
	5-20	+	o
	>20	+	-
Total hardness (°dH)	4.0-8.5	+	+
Nitrate (NO_3)	<100	+	+
	>100	+	o
Iron (Fe)	<0.2	+	+
	>0.2	+	o
Aluminium (Al)	<0.2	+	+
	>0.2	+	o
Manganese (Mn)	<0.1	+	+
	>0.1	+	o

The water quality should be rechecked after 4 to 6 weeks as it may change due to chemical reactions during the first few weeks of operation.

Electrical conductivity

The probability of corrosion usually decreases with decreasing electrical conductivity of the heating water.

Low salt operation - filling with demineralised water, see VDI 2035 sheet 2.

	Low salt
Electrical conductivity at 25°C	< 100 µS/cm

In the case of low-salt operation, feeding with non-demineralised water can have a significant effect on the pH value and push it into a critical range.

► Check the pH value regularly.

3.8 Information about the hydraulic connection

Pressure equalisation through expansion tank

- The expansion tank prevents air from being drawn in when the system cools down (issue: oxygen input, heating system's fill-up water > 7)
- Dimension the expansion tank with a capacity of 12% of the total hydraulic system volume.
- Secure the expansion tank against shut-off. To do this, either use the shut-off options on the way to the expansion tank as cap valves, or unscrew the hand lever (handwheel) and attach it to the expansion tank with the wire in a clearly visible position.
- Installation of an expansion tank or a pressure maintenance system is essential. Use of open expansion tanks is not permitted.
- The pressure in the heating system (can be read off the manometer) and the set pre-pressure in the expansion tank must be checked regularly.

Install the temperature sensor in the immersion sleeves

- Install the flow and return temperature sensor of the heating system in the immersion sleeves.
- Exceptions are only permitted in the case of installation in copper or carbon steel lines. In this case, correct insulation of the sensor must be ensured.

Installing the dirt and sludge separator

- Installation of a filter (<25 µm) is a condition for guarantee and warranty claims, e.g. use SOLARFOCUS dirt and sludge separator. This prevents the ingress of particles into the plate heat exchanger (condenser).

Return hose version (structure borne sound decoupling)

- To prevent structure-borne sound transmission (and thereby resulting noise), a minimum length of 30 cm and arched line routing must be observed for the primary circuit return hose; see information on design > 23

Caution with (older) diffusion-open plastic pipes, e.g. existing underfloor heating

- In the case of older underfloor heating, the diffusion-open plastic pipes can result in increased oxygen input in the heating system. This has a corrosion-inducing effect on the heating system components (see: Avoiding water-side corrosion > 7).
- In this case, the system must be separated (through installation of a heat exchanger).
- Newer plastic pipes (since around the mid 1980s) are diffusion resistant in line with DIN 4726.

4 Product information

4.1 Product description

The air source heat pump **vamp**^{air} is a compact air source heat pump for outdoor installation. As standard, it has a cooling function which extracts heat from the heating surfaces in the living area (underfloor heating, wall heating) and cools it by reversing the circulation.

vamp^{air} works with inverter technology and Enhanced Vaporized Injection > 13. The defrosting of the evaporator is done by circulation reversal.

Rear side (intake grille)

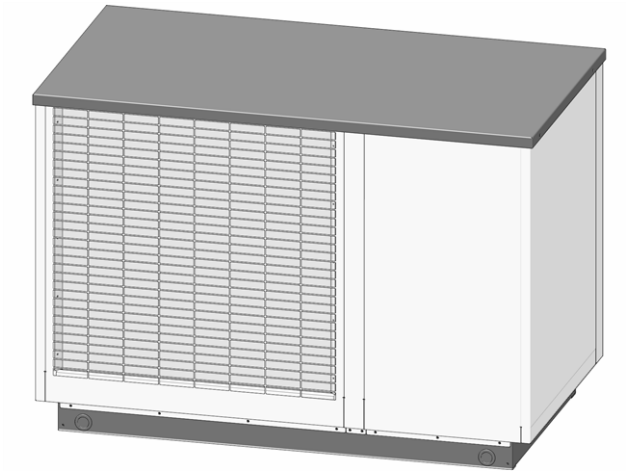


Abb. 2-2

Front side (soundproofing slats)

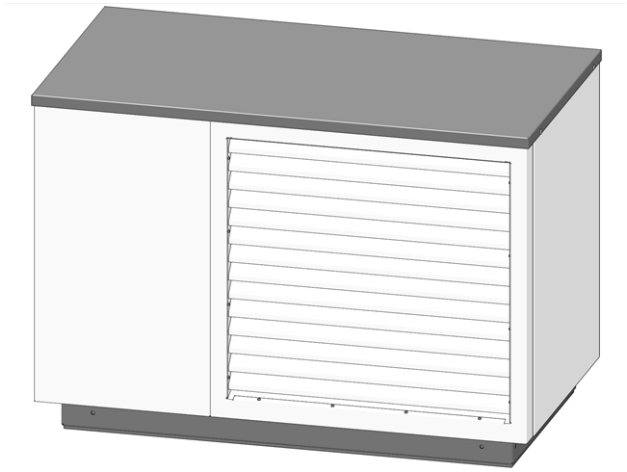


Abb. 2-30: View K 08, K 10

4.2 Functional components

vamp^{air} K 08 and K 10

The fan *2* sucks the ambient air (outside air) through the evaporator *3* and blows it out through the soundproofing slats *1*.

The condensate formed during defrosting of the evaporator is discharged through the outlet *8*.

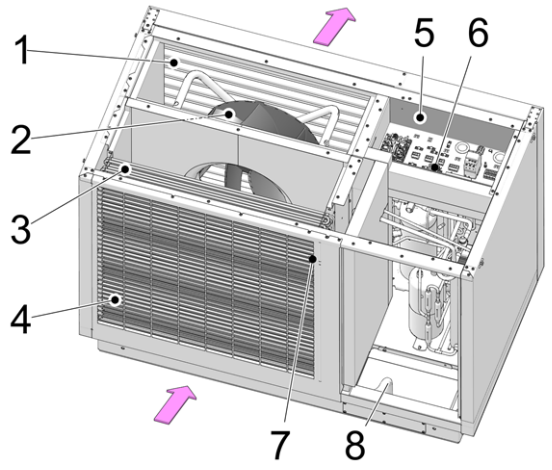


Abb. 2-4

1 Soundproofing slats
2 Fan
3 Evaporators
4 Intake grille
5 Terminal area (electrical connection terminals) > 30
6 Overtemperature reset (OTR)[1] > 19
7 Outside temperature sensor > 36
8 Condensate drain > 6

[1]Only when using electric heating element (optional accessory)

Components cooling circuit (without evaporator)

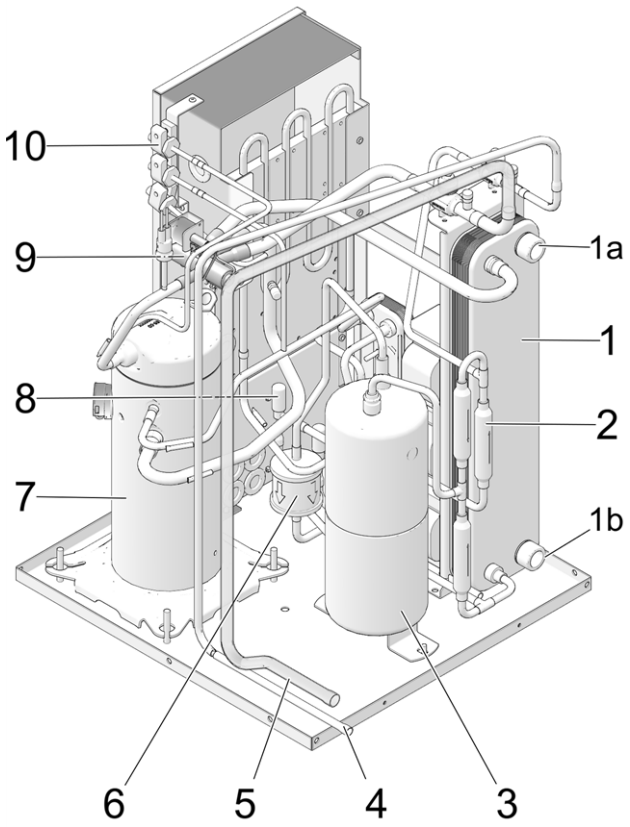


Abb. 2-5: View from behind - left

1 Condenser (plate heat exchanger)
1a Primary circuit flow outlet
1b Primary circuit return inlet
2 Non-return valve
3 Liquid collector
4 Fluid line to evaporator
5 Suction gas line from evaporator
6 Filter dryer
7 Scroll compressor
8 Expansion valve
9 Four-way switchover valve
10 Pressure sensors

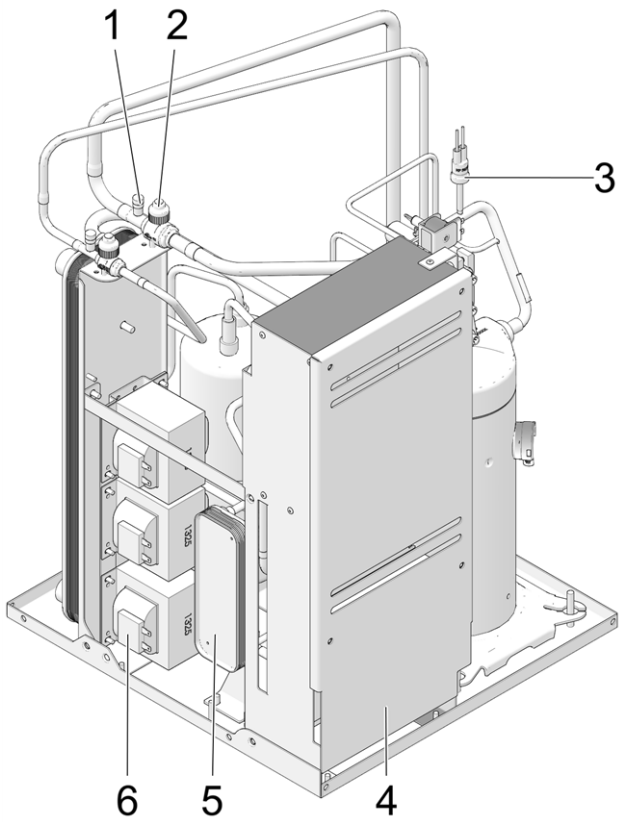


Abb. 2-6: View from the front - left

1 Schrader valve
2 Shut-off valve
3 High pressure switch
4 Connection box
5 Economizer heat exchanger
6 Inverter chokes

DANGER - Do not operate or open Schrader valves *1* and shut-off valves *2*. Risk of injury due to refrigerant leakage.

4.3 Scope of delivery

Accessory for vamp^{air} K 08 and K 10

No	Qty.	Art. no.	Designation
1	1	69803-1002	ecomanager-touch 7" control panel
2	1	69810-1000	Universal module (electronic module)
3	1	61532	Heating pump "HE" Yonos Para RS 25/7.5 iPWM-180
4	1	9390	Connection set "Optibal pump ball valve" KWP10
5	1	54920	Plastic spiral hose 22 x 3.5 mm f. KWP
6	1	61532-ISO	Insulation for 61532 Wilo Yonos Para 25/7.5 iPWM
7	1	69034-1000	Power supply 230V-AC/24V-DC primary
8	1	69035-1000	Housing for display, surface mounted
9	3	69095-1000	Tank sensor PT1000 PVC - 5 m
10	2	69645	Immersion sleeve 1/2" x50 / 7 mm
11	1	69824	Sticker set ecomanager
12	1	7936	Packaging 700x350x300mm
13	1	9906	Immersion sleeve brass length: 140 cm
14	1	9345	Screw set electronic modules II
15	1	69336	Hose clamp 25 - 40 mm galvanised steel
16	1	54947	Compriband-N15x15 mm SKVK
17	8	54949	Cover plug 8.5/12
18	1	DR-0072	Installation manual
19	1	DR-0086	Operation manual

Accessory for vamp^{air} K 12 and K 15

No	Qty.	Art. no.	Designation
1	1	9345	Screw set electronic module II
2	1	9906	Immersion sleeve brass length: 140 cm
3	1	16401	Electronic volume flow sensor 5-85 l/min
4	2	54787	Transition piece for volume flow sensor KWP15
5	1	54920	Plastic spiral hose 22 x 3.5 mm f. KWP, condensate drain hose
6	1	54947	Compriband-N15x15 mm SKVK
7	8	54949	Cover plug 8.5/12
8	1	54976	Pump ball valve with shut-off valve DN32 Rp5/4" x G 2"
9	1	54977	Pump ball valve without shut-off valve DN32 Rp5/4" x G 2"
10	2	54978	Insulation for pump ball valve DN 32
11	2	55035	Seal EPDM SH 70 2" KWP15
12	1	55051	Union nut G 2", set of 2 pcs
13	1	61526	Heating pump "HE" Stratos Para 30/1-8 T2-180
14	1	69034-1000	Power supply 230V-AC/24V-DC primary
15	1	69035-1000	Housing for display, surface mounted
16	2	69095-1000	Tank sensor PT1000 PVC - 5 m
17	1	69803-1002	ecomanager-touch 7" control panel
18	1	69810-1000	Universal module (electronic module)
19	1	69336	Hose clamp 25 - 40 mm galvanised steel
20	1	69645	Immersion sleeve 1/2"x50 / 7 mm
21	1	69824	Sticker set ecomanager
22	1	DR-0072	Installation manual
23	1	DR-0086	Operation manual

The parts in both accessory sets are packed in the heat pump when delivered; for removal dismantle cladding, see *Prepare heat pump* > 17

Not included in the scope of delivery: Heat pump pipe > 26; electric heating element > 13; lifting aid > 13; primary circuit connection set > 23

4.4 Principle of operation

The function of a heat pump is similar to that of a refrigerator from a technical standpoint, but reversed. The refrigerator extracts heat from the food to be cooled and releases it to the room air.

The heat pump **vamp**^{air} withdraws heat from the outside air and delivers it to the heating system.

Four processes are decisive in the cooling circuit of the heat pump:

Evaporation

The evaporator *(2)* takes the circulating refrigerant energy from air and changes its state from liquid to gaseous.

Compression

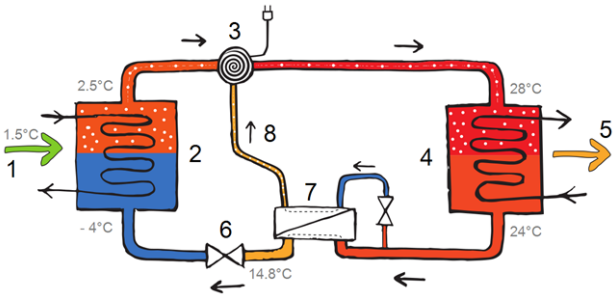
In an electrically driven scroll compressor *3*, the gaseous refrigerant is heated by compression.

Liquefaction (condensation)

The absorbed thermal energy is delivered to the heating system. The gaseous refrigerant is cooled in the condenser (plate heat exchanger) and liquefied again *4*.

Expansion

The pressure of the liquid refrigerant is reduced, resulting in partial evaporation. The result is a mixture of liquid and gaseous refrigerant (= wet steam). The refrigerant cools down.



1 Energy from outside air
2 Evaporators
3 Scroll compressor
4 Condenser
5 Discharge of heating heat
6 Expansion valve
7 Economizer-heat exchanger (for Enhanced Vaporized Injection)
8 Enhanced Vaporized Injection

4.5 Innovative technologies

Inverter technology

The scroll compressor not only works in on/off mode, but is operated with output control (modulating, according to the current power requirement).

Advantage:

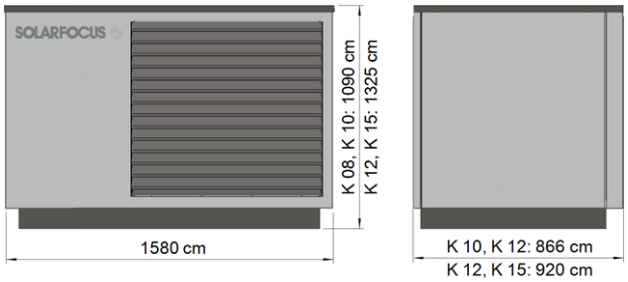
- Precise power adjustment.
- Increased efficiency through reduced pulsing.
- Quieter operation on average due to reduced speed in the partial load range.
- Reduction of the power of secondary drives (fan, primary circuit pump)

Enhanced Vaporized Injection

In the scroll compressor, wet steam is injected from the economizer heat exchanger for cooling.

Enhanced Vaporized Injection increases efficiency, while the power requirement is reduced at the same time. Thus higher flow temperatures and higher heating output (especially at low outside temperatures) are possible. The compression temperature decreases, increasing the life expectancy of the compressor.

4.6 Dimensions



4.7 Accessories

Electric heating element

- Optional accessories, Art. 25200
- Depending on the type of connection, the electric heating element achieves an output of 3, 6 or 9 kW.
- Mounting on the flow (primary circuit).
- An overtemperature reset (OTR) > 19 and contactor are pre-installed in the heat pump as standard.

► Install electric heating element > 19

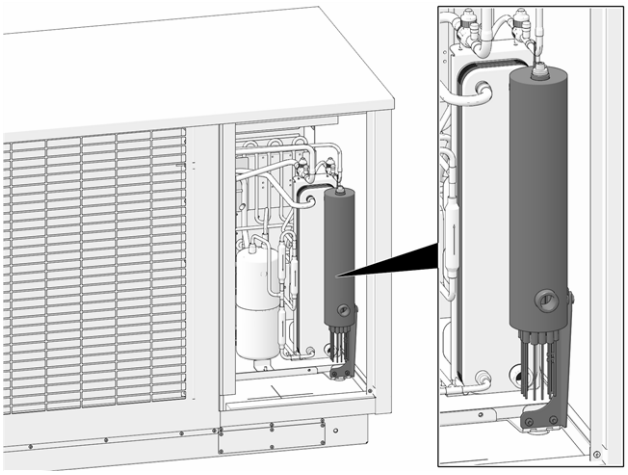


Abb. 2-7: Electric heating element mounted

Lifting aid

- Optional accessories, Art. 25300
- To carry, lift and move the heat pump
- 4-piece

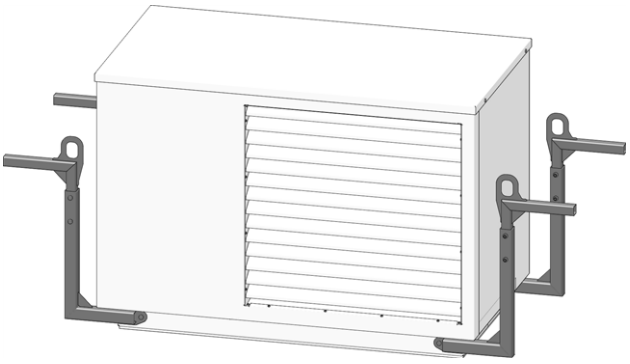


Abb. 2-8

4.8 Technical specifications

vamp^{air}		K 08	K 10	K 12	K 15
Recommended building heat load [1]	[kW]	5.7	7.8	9.4	15
SCOP, moderate climate W35/W55 (EN 14825)		4.2/3.4	4.73/3.8	4.4/3.4	4.95/3.85
ηs seasonal room heating energy efficiency, moderate climate 35 / 55 °C	[%]	165/133	186/149	173/133	195/151
Energy data					
Energy efficiency class, moderate climate W35/W55		A++ / A++	A++ / A++	A++ / A++	A++ / A++
Energy efficiency class incl. control, moderate climate W35/W55		A++ / A++	A+++ / A+++	A++ / A++	A+++ / A+++
Heat output					
Max. heat output at A -7/W35	[kW]	5.7	7.5	10.0	14.7
Max. heat output at A -10/W35	[kW]	5.3	7.0	9.4	13.7
Heat output at A10/W35	[kW]	4.57	6.09	6.46	11.56
Heat output at A7/W35 (EN 14511) @5K	[kW]	4.29	6.19	6.06	11.98
Heat output at A2/W35	[kW]	3.94	5.47	7.31	9.46
Heat output at A -7/W35	[kW]	5.68	5.83	10.08	11.26
Heat output at A7/W55	[kW]	4.41	6.36	6.0	11.58
Cooling capacity					
Max. cooling capacity A35 / W18	[kW]	5	6	10	15
Max. cooling capacity A35/W7 [2]	[kW]	4	5	8	13
Power consumption					
Fan power consumption max.	[W]	35	81	60	170
Power consumption at A10/W35	[kW]	0.86	1.13	1.2	2.1
Power consumption at A7/W35 (EN 14511)	[kW]	0.88	1.24	1.2	2.4
Power consumption at A2/W35	[kW]	0.95	1.25	1.7	2.1
Power consumption at A -7/W35	[kW]	1.8	1.66	3.15	3.29
Power consumption at A7/W55	[kW]	1.4	1.92	1.8	3.41
Coefficients of Performance					
Coefficient of Performance COP at A10/W35		5.3	5.4	5.4	5.5
Coefficient of Performance COP at A7/W35 (EN 14511)		4.83	4.97	5.0	5.0
Coefficient of Performance COP at A2/W35		4.15	4.37	4.2	4.49
Coefficient of Performance COP at A -7/W35		3.16	3.51	3.2	3.42
Coefficient of Performance COP at A7/W55		3.17	3.32	3.3	3.4
Sound data					
Sound power level (EN 12102)	[dB(A)]	45	50	48	55.7
Sound pressure level at 5 m distance, in free field Silent Mode	[dB(A)]	18	21.7	22	22
Sound pressure level at 3 m distance, set up in the open Silent Mode	[dB(A)]	25.5	29.2	29.5	29.5
Sound pressure level at 5 m distance, set up in the open Silent Mode	[dB(A)]	21	24.7	25	25
Sound pressure level at 4 m distance, set up against a wall Silent Mode	[dB(A)]	26	29.7	30	30
Sound power level max. (day/silent)	[dB(A)/ dB(A)]	46 / 43	54 / 47	50 / 47	63 / 47
Cooling circuit					
Refrigerant					
Refrigerant fill level	[kg]	R410A	R410A	R410A	R410A

vamp^{air}		**K 08**	**K 10**	**K 12**	**K 15**
GWP (according to EN 378), kg CO2 equivalent per kg	[kg/kg]	4.78	4.78	6.7	6.7
CO2 equivalent	[t]	9.98	9.98	13.99	13.99
Condenser material		1.4401/Cu			
Operating limits					
Operating limit outside air min.	[°C]	-22			
Operating limit outside air max.	[°C]	35°C			
Operating limit heat-side air min.	[°C]	26°C			
Operating limit heat-side air max.	[°C]	65°C			
Operating limit outside air at W60	[°C]	-22°C			
Operating limit outside air at W65	[°C]	-5			
Water hardness	[°dH]	4 – 8.5			
pH value		7.5 – 9			
Conductivity	[µS/cm]	10 – 500			
Free chlorine	[mg/l]	< 0.5			
Electrical data					
Protection type (IP)		IP X4			
- 1-phase version (K 08.1, K 10.1, K 12.1, K 15.1)					
Number of compressors		1		-	
Compressor connection		~230 V, 50 Hz, 5,5 kW		-	
Control connection	[A]	~230 V 50 Hz		-	
Compressor fuse	[A]	25		-	
Control fuse	[A]	10		-	
Starting current	[A]	15		-	
- 3-phase version (K 08.3, K 10.3, K 12.3, K 15.3)					
Number of compressors		1			
Compressor connection		~400 V, 50 Hz; 5,5 kW		~400 V, 50 Hz; 8 kW	
Control connection		~230 V, 50 Hz			
Auxiliary heating power consumption max.	[kW]	3 / 6 / 9			
Auxiliary heating connection		~400 V, 50 Hz			
Compressor fuse	[A]	13		16	
Control fuse	[A]	10		10	
Auxiliary heating fuse	[A]	13		13	
Starting current	[A]	6.5		8	
Dimensions					
Height	[mm]	1090		1325	
Width	[mm]	1580		1580	
Depth	[mm]	870		920	
Weight Weight (including packaging)	[kg]	348 373		401 426	
Connections					
Connection for heating flow/return	["]	G 5/4" OT			
Flow rates					
Air flow rate	[m³/h]	1300	2900	2000	4400
Heating volume flow rate min.	[l/h]	520	520	800	800
Heating volume flow rate min. for defrosting and commissioning[3]	[l/h]	1560	1560	2500	2500
Heating volume flow rate, at A7/W35 and 5 K	[l/h]	1080	1080	2080	2080

[1] At standard outside temperature -14°C, heating limit temperature 15°C, flow 35°C/return 28°C, taking into account 5% share of peak load heat generator (without domestic hot water)
[2] With extension set *low-temperature cooling*
[3] If this volume flow is not achieved via the heat pump plate heat exchanger (= heating volume flow), commissioning is not possible.

5 Prepare heat pump

5.1 Transport

Option 1: Transport with a lift truck

- Loosen the 4 sheet metal screws (TX25) *1* and remove both covers *2*.
- Carefully insert the lift truck (the pipe bend for the condensate drain is on the left side).

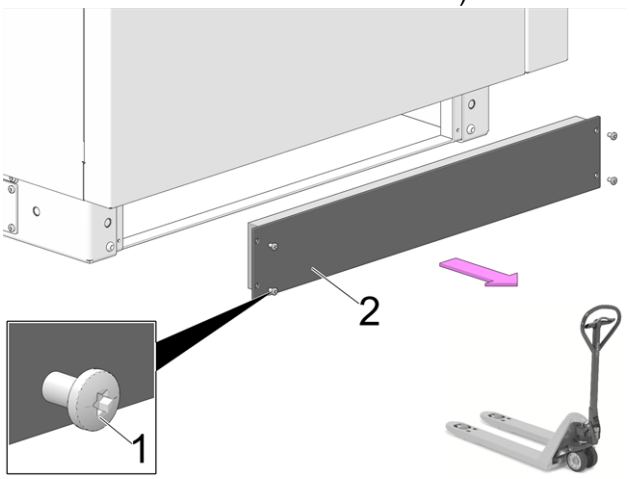


Abb. 2-9

Option 2: Lifting/moving with the lifting aid

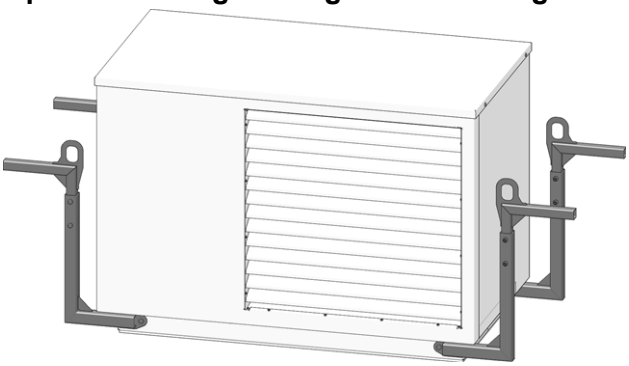


Abb. 2-10: Lifting aid, 4-part

- Mount the bracket *1* with two screws *2* on the base of the heat pump.
  The support angle *3* is adjustable by repositioning the screws *4* to a different height.
  The tab *5* is used for attaching a hoist, e.g. for transport by crane.

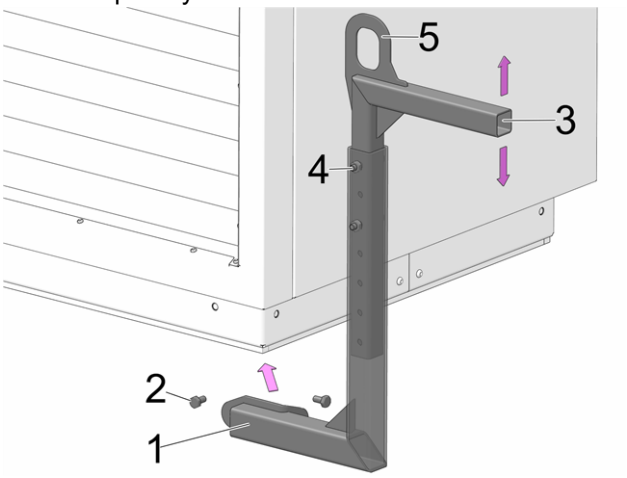


Abb. 2-11: Lifting aid

Option 3: Lifting with a crane

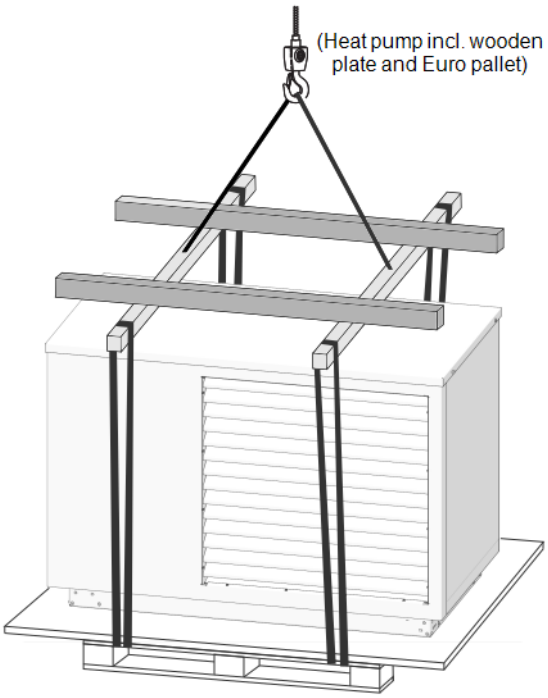


Abb. 2-12: Crane transport with Euro pallet (condition at delivery)

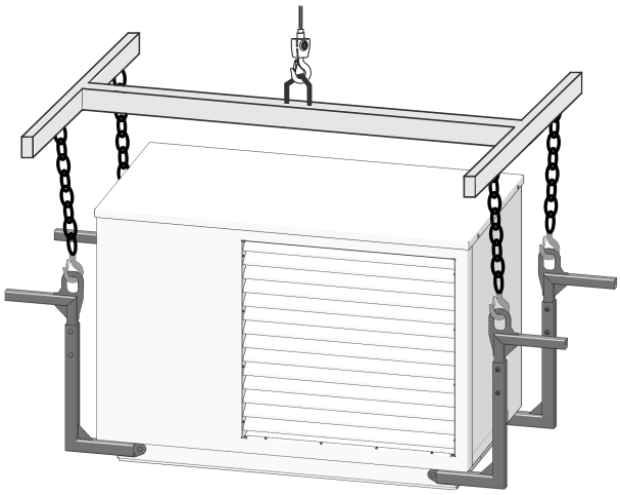


Abb. 2-13: Crane transport with lifting aid

5.2 Attach sealing tape

► For optimum thermal and acoustic sealing, affix the enclosed sealing tape *1* over the underside of the base (over the entire base circumference).

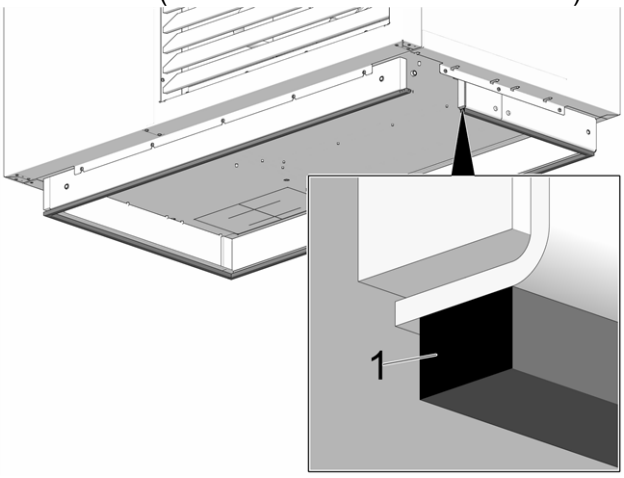


Abb. 2-14

5.3 Dismantling the cover

► Loosen the cylinder head screws TX25 *1* and remove the covers.

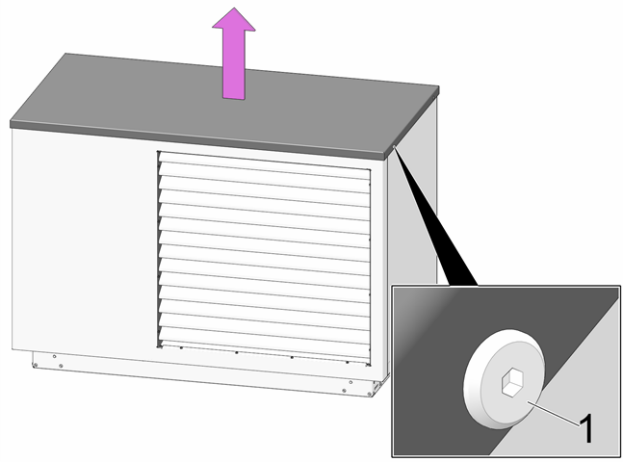


Abb. 2-15

5.4 Remove cladding

► Loosen the 6 bolts (TX25) *1*, remove cladding *2*.

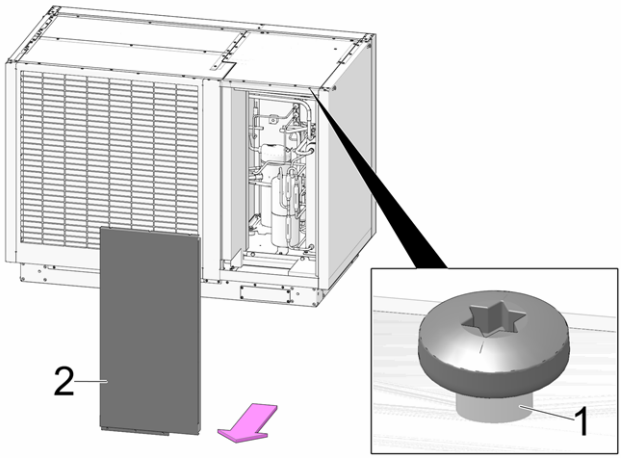


Abb. 2-16

5.5 Remove transport lock

ⓘ Only required for K 12 and K 15

► Loosen 4 pcs. screws *1* and permanently remove transport lock *2*.

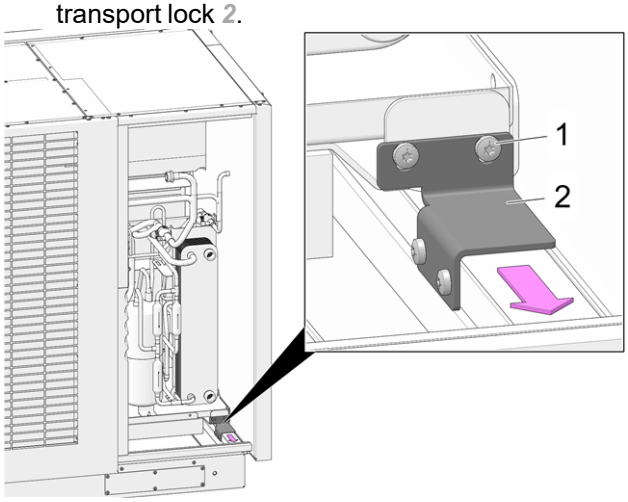


Abb. 2-17

5.6 Connect the heat pump to the power supply before commissioning

ⓘ **Connect the heat pump to the power supply at least 12 hours before commissioning.**

The oil sump heating then starts the heating process, this pre-heating ensures smooth commissioning of the heat pump.

6 Install electric heating element

6.1 Important information

CAUTION

- **Follow the following installation steps exactly.**
- **If errors are made during installation, the electric heating element's safety devices will be ineffective.**
- **The risk of subsequent damage is very high.**

- The electric heating element, which is available as an optional accessory[1], is connected to the primary circuit flow of the condenser (heat exchanger).
- A contactor and overtemperature reset (OTR) are already preinstalled in the heat pump. CAUTION: The capillary tube sensor of the overtemperature reset must be positioned in the heating element on site > 21
- The overtemperature reset protects the heating element from overheating (by interrupting the power supply, e.g. during dry running).
- A mounting bracket is enclosed with the heating element.

[1] The heating element is only available for the three-phase version of the **vamp**^{air}, i.e. K 08.3, K 10.3, ...

CAUTION - Protect the electrical terminal area ofthe heat pump against moisture (e.g. precipitation) during installation work.

6.2 Heating element and components

Overview: Heating element and components

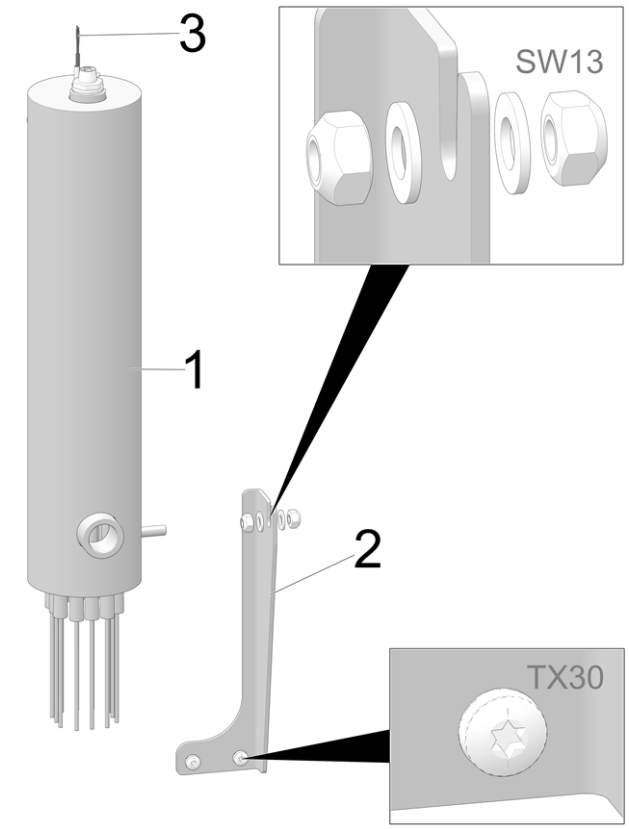
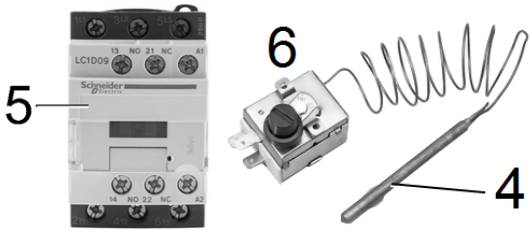


Abb. 2-18



1 Electric heating element
2 Bracket
3 Temperature sensor T1 for condenser
4 Capillary tube sensor of the OTR
5 Contactor
6 Overtemperature reset (OTR)

Overview: Heating element installed

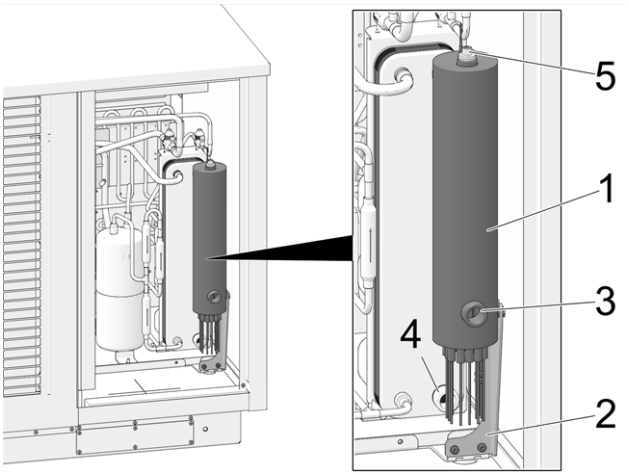


Abb. 2-19

1 Electric heating element
2 Bracket
3 Primary circuit flow outlet
4 Primary circuit return inlet
5 Vent valve

6.3 Mount heating element

► Mount the bracket and the heating element to the heat pump as shown.

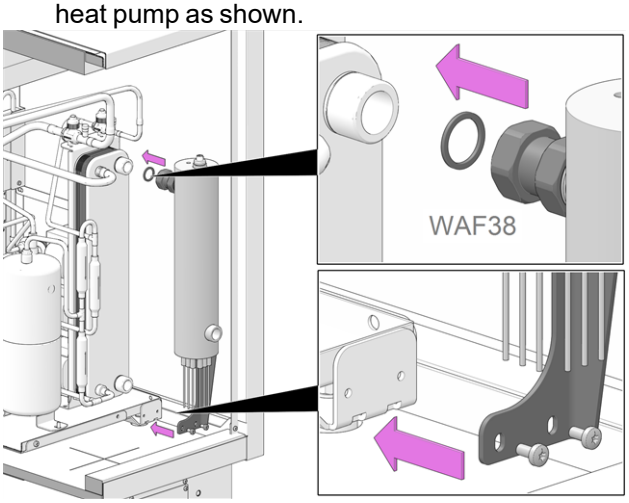
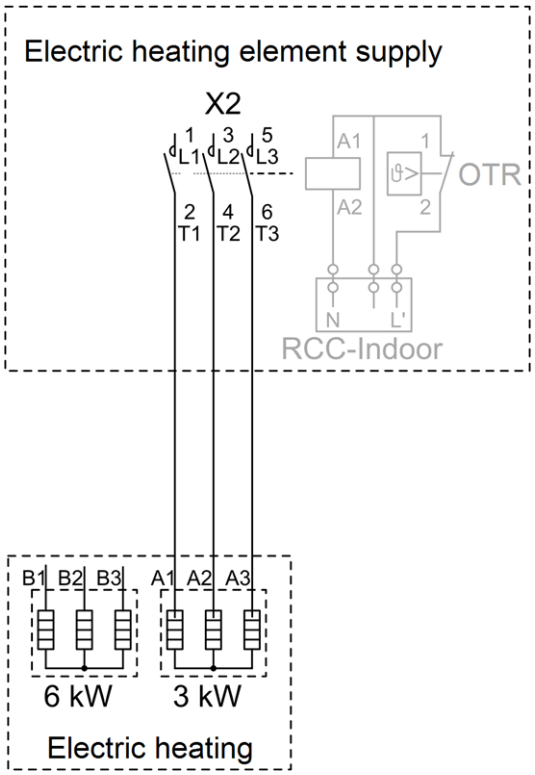


Abb. 2-20

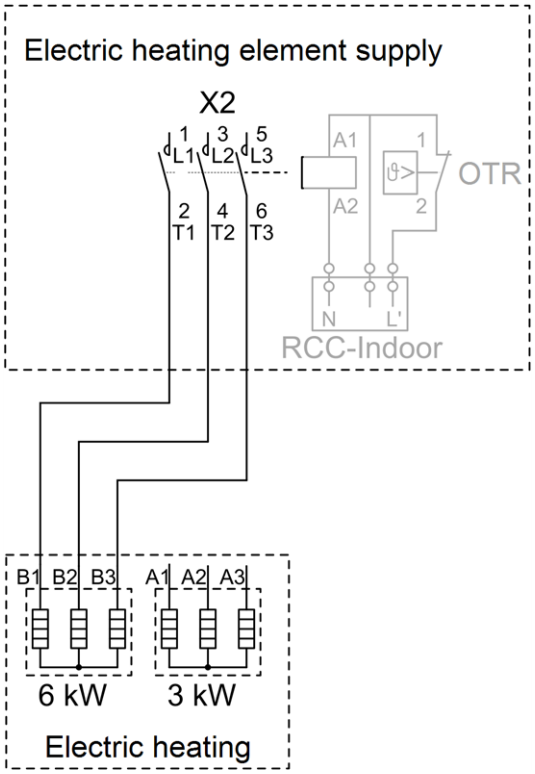
6.4 Connect the heating element

► Connect the wires of the heating element to the contactor *(X2)* according to the desired power:

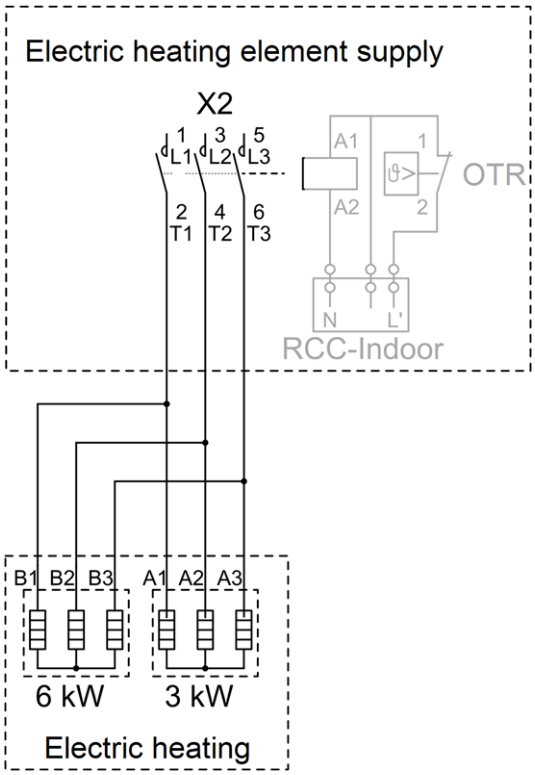
Power 3 kW: Connect wires A1, A2 and A3 to L1, L2 and L3.



Power 6 kW: Connect wires B1, B2 and B3 to L1, L2 and L3.



Power 9 kW: Connect wires A1 and B1 parallel to L1, A2 and B2 to L2, A3 and B3 to L3.



6.5 Fit the sensors (2x) in the heating element

Position the capillary tube sensor in the heating element

- ► Insert the capillary tube sensor *1* of the overtemperature reset on the bottom of the heating element into the tube (about 20 cm).
- ► Secure the capillary tube to one of the cables with cable ties.

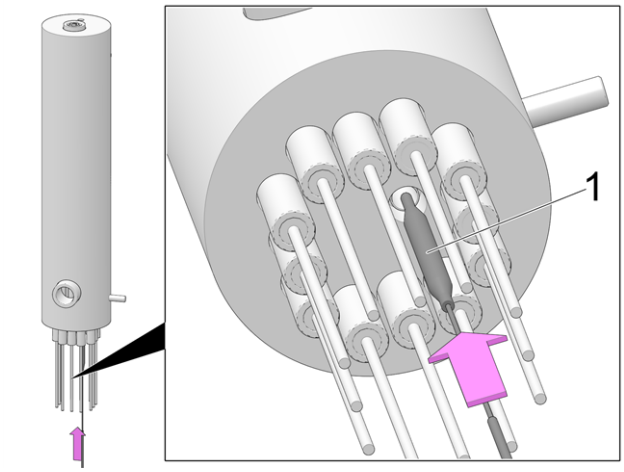


Abb. 2-21

Position temperature sensor T1 in the heating element

- ► Insert the temperature sensor *1* for the condenser on the top of the heating element in the intended opening.

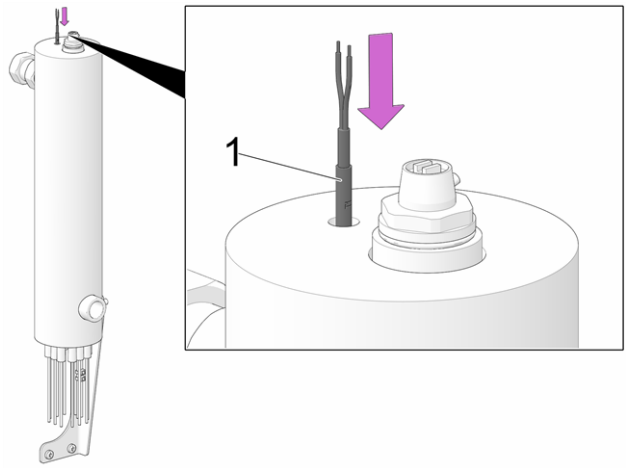


Abb. 2-22

Positioned sensor

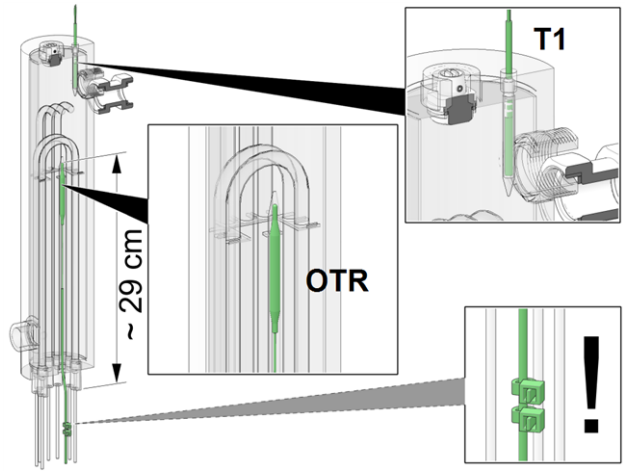


Abb. 2-23

Line routing

- ► Run the capillary tube on the left side of the condenser, not the primary circuit flow.
- ► Provide sufficient mobility of the cables and lines (due to oscillating positioning of the heat pump unit).

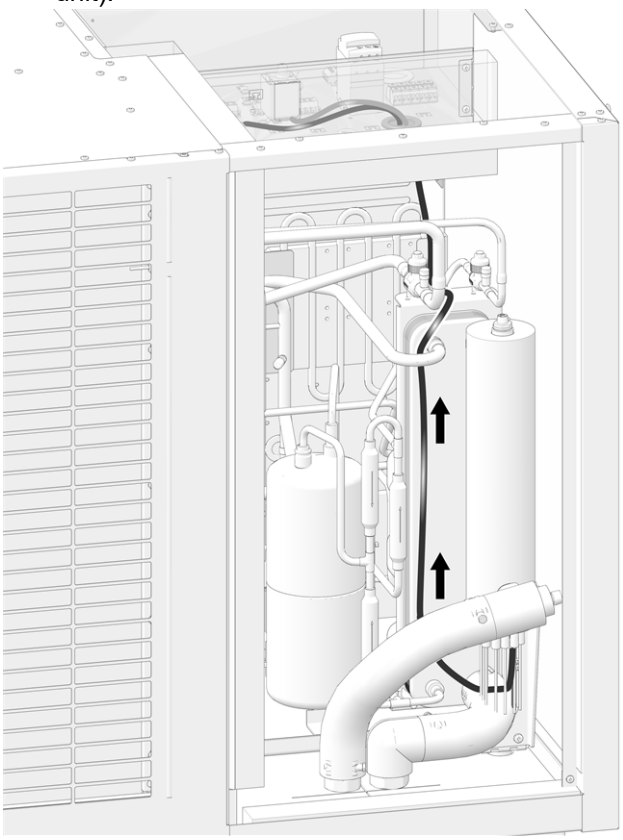


Abb. 2-24: Line routing

7 Hydraulic connection

7.1 Make condensate drain, seal

- ► Insert the drain hose *1* that is premounted on the condensate drain pan into the drain pipe that is to be laid on site *2*.
- ► Seal the empty space between drain hose and drain pipe, e.g. with adhesive tape (used to prevent rising damp).

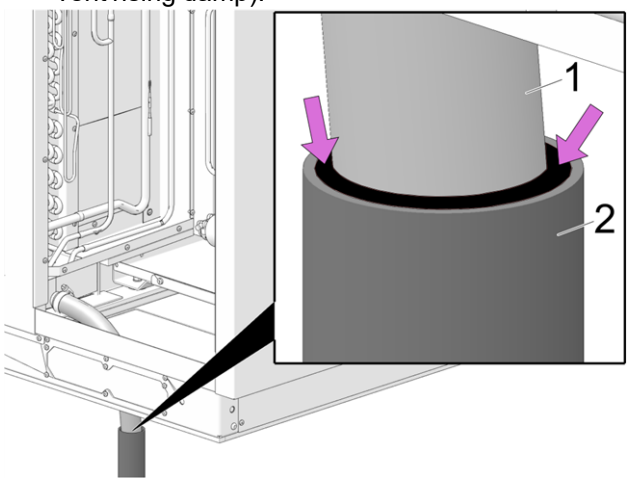


Abb. 2-25

7.2 Rinse the lines

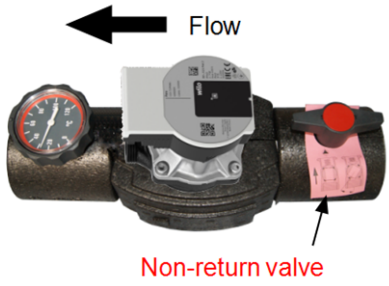
- ► Thoroughly rinse the primary circuit to remove impurities (e.g. chips, deposits).

! **CAUTION** - The heat pump must not yet be connected at this point. Impurities must not enter the heat pump.

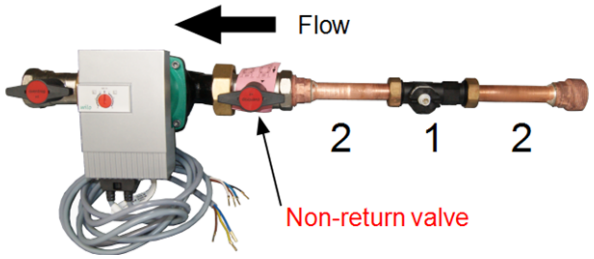
7.3 Install the primary circuit circulation pump

ⓘ Note the installation position of the non-return valve: Fit on the suction side of the circulation pump.

Wilo-Para (K 08, K 10)



Wilo-Stratos PARA (K 12, K 15)



- The flow sensor *1* must be installed upstream of the circulation pump when viewed in the direction of flow.
- The calming section *2* before and after the flow sensor must not be removed.

► Connect the primary circuit circulation pump electrically > 34

► Connect the flow sensor electrically > 35

7.4 Connect the primary circuit

There are two fundamental options for connecting the primary circuit to the heat pump:

- Inlet from the heat pump **bottom**, (from the concrete foundation) with the *connection set bottom* > 24
- Inlet from the heat pump **rear**, with the *connection set rear* > 25

Both solutions are described in detail below.

Important installation information for connecting the primary circuit

- **The connecting cable from the connection on the heat pump to the building must be a flexible connection. This is ensured by using the SOLARFOCUS connection set.**
- **The line routing must always provide a bend. Avoid direct and straight line routing. Avoid line routing under tension or pressure.**
- **Avoid hose lengths smaller than 30 cm.**
- **If these specifications are not adhered to, there is a risk that vibrations and thus, noise will be transmitted in the living space.**

! **CAUTION** - Due to the oscillating bearing of the heat pump unit, the hydraulic connection to the heating system must not be carried out as a rigid connection.

! **CAUTION** - The connection to the heating system must not be carried out with stainless steel corrugated pipes (material not suitable).

7.4.1 Connection on the condenser

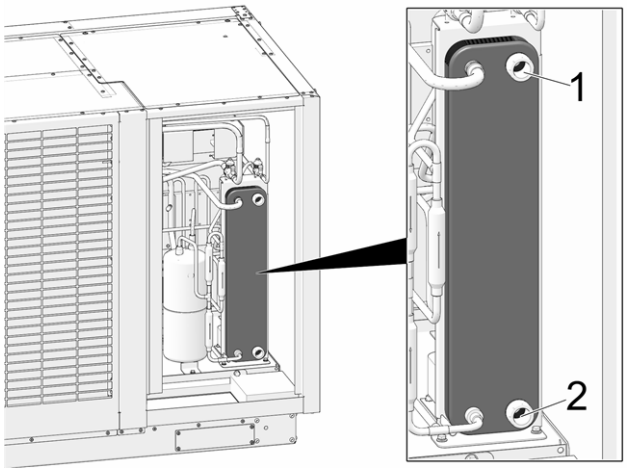


Abb. 2-26

1 Primary circuit flow outlet
2 Primary circuit return inlet

7.4.2 Cut insulating mat (only required for K 08 and K 10)

► To introduce the primary circuit lines, cut the soundproofing insulation (mat). After installation of the pipes, pay attention to the best possible sealing.

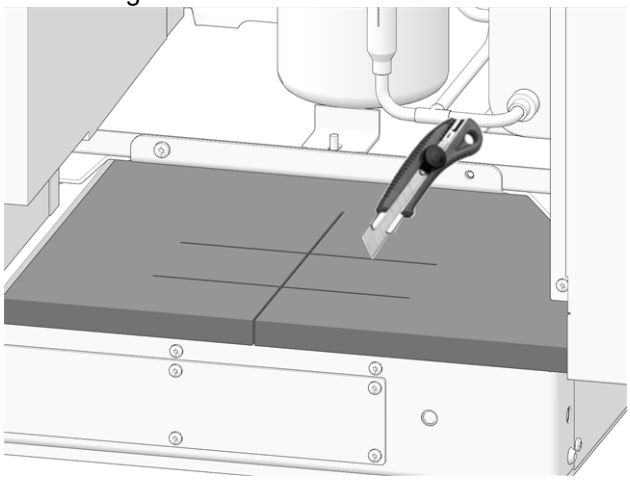


Abb. 2-27: Cut insulation mat

7.4.3 Primary circuit connection set

The SOLARFOCUS connection sets are supplied from the factory suitable for direct connection to the condenser (plate heat exchanger).

ⓘ When using the optional electric heating element, the flow line on the connection sets must be shortened on site (the flow connection is located lower in the case of the electric heating element than in the plate heat exchanger).

7.4.3.1 Bottom connection set

- Connection with the heat pump pipe inserted from the bottom
- Art.No. 25104: for heat pump pipe external diameter 32, connection with 1 inch union nut
- Art.No. 25105: for heat pump pipe external diameter 40, connection with 5/4 inch union nut

Vent valve *1*

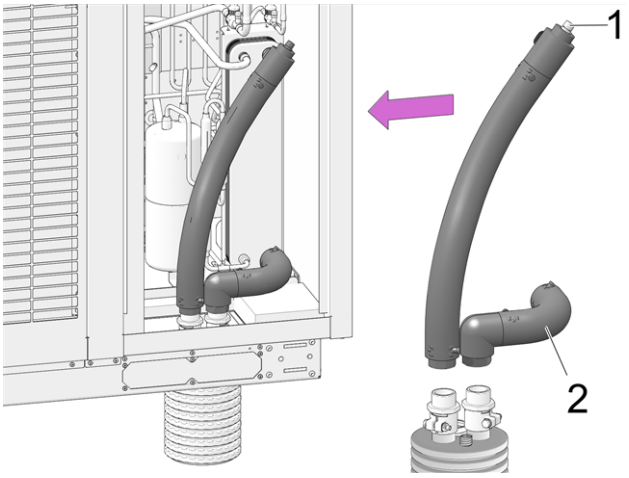


Abb. 2-28

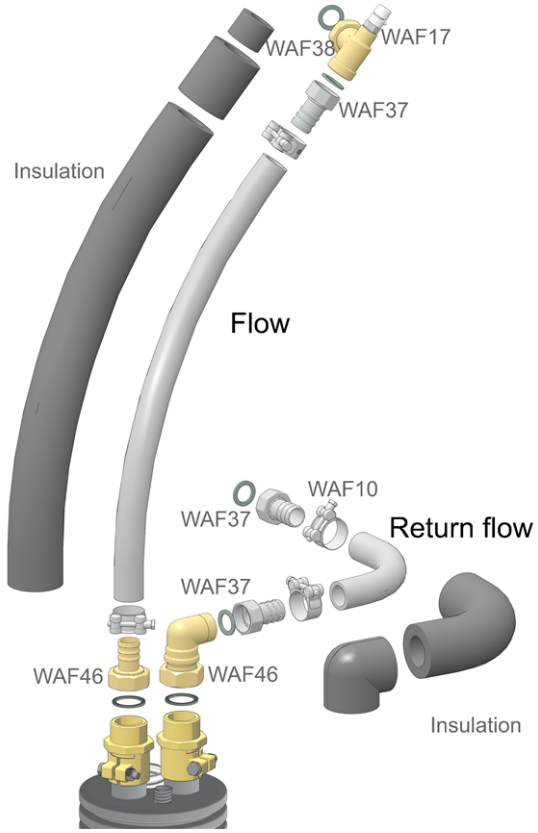


Abb. 2-29: Components of bottom connection set

Installation example: **vamp**^{air} with electric heating element and bottom connection set

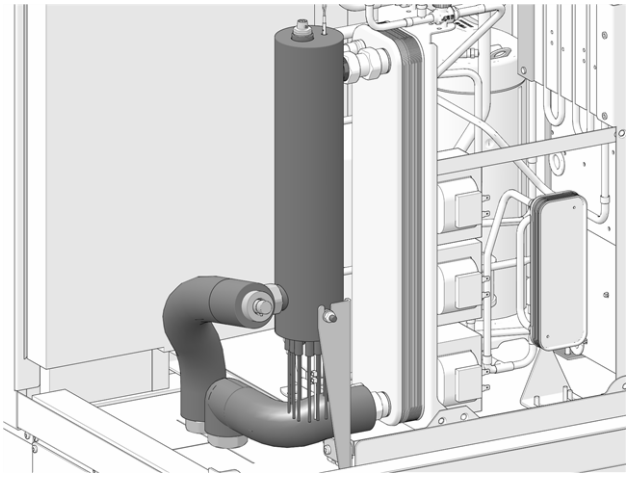
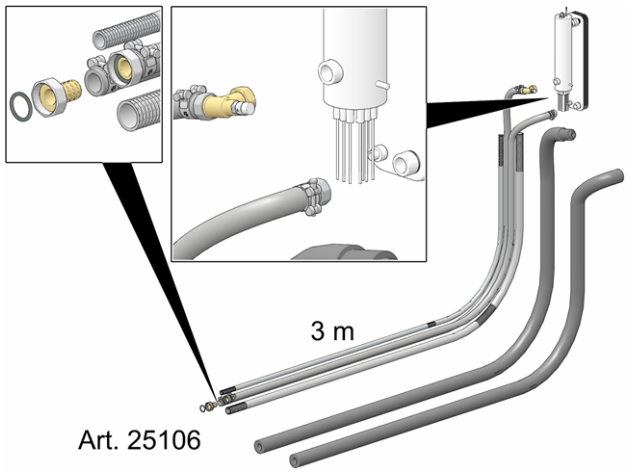


Abb. 2-30

7.4.3.2 Bottom connection set, direct connection, 3 m long

- Art. 25106
- Flexible connection set for connecting the heat pump to the flow and return of the building installation.
- The cable is laid in the underground waste pipe (KG), not included in the scope of delivery.

Connecting cable and cable conduit must be sealed so they are diffusion-resistant and thermally-insulating > 291



Seal the underground waste pipe

► Seal the annular space *1* of the underground waste pipe at both pipe ends such that it is diffusion-resistant (e.g. use PU-foam (water-resistant)), note: Mineral wool or granulate/filling material are not diffusion-resistant).

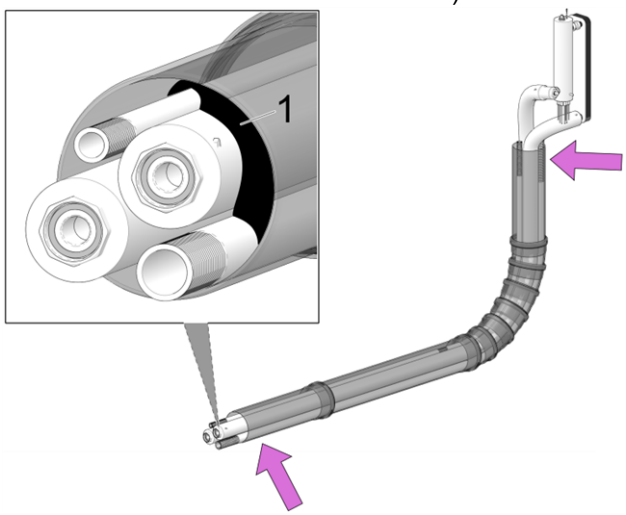


Abb. 2-31

7.4.3.3 Rear connection set

- For connection of the primary circuit lines introduced from the rear.
- Art. no. 25107

Vent valve *1*

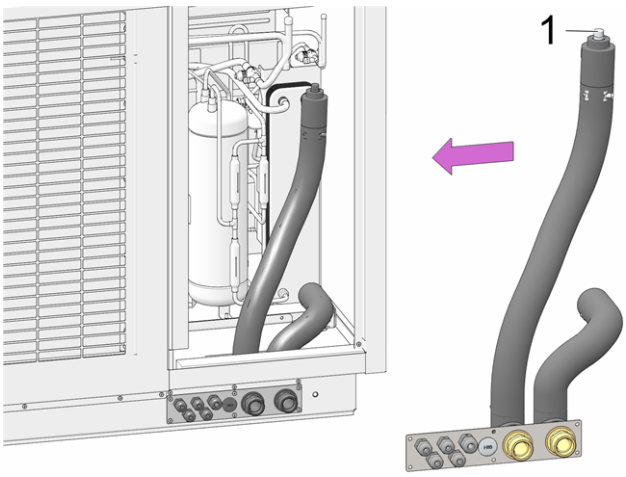


Abb. 2-32

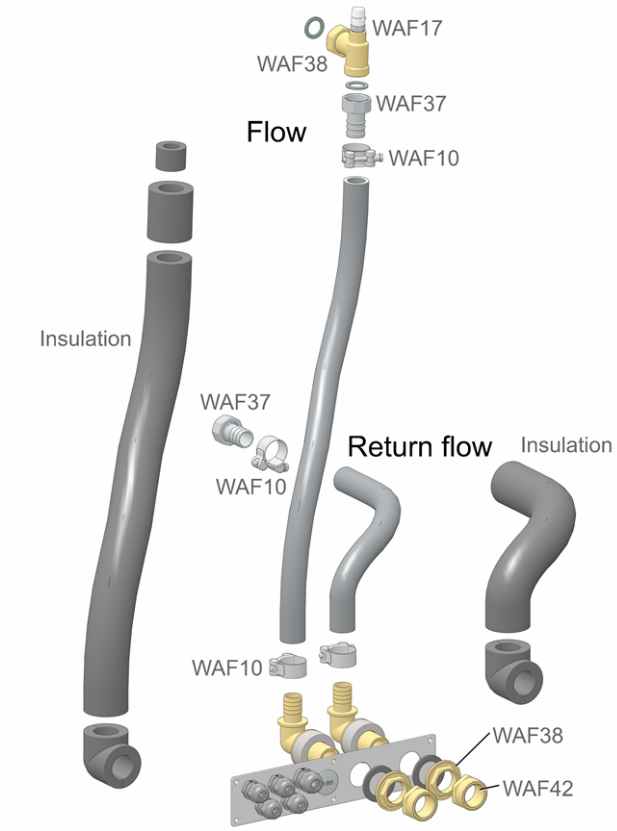


Abb. 2-33: Components of rear connection set

Seal insulation

► Stick fabric tape on insulation parts at the collision point

7.4.3.4 Rear connection set - 3 m long extension

- Art. 25108
- Used to extend the rear connection set (Art. 25107). For connecting the rear connection set with the flow and return of the building installation.

- Protect the cables on site against weathering and damage.
- Connecting cable and cable conduit must be sealed so they are diffusion-resistant and thermally-insulating > 29

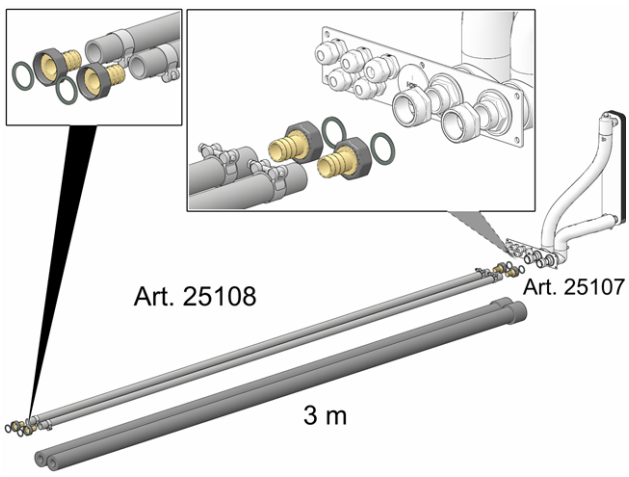


Abb. 2-34

7.4.4 Fit temperature sensor T1 for condenser

Fit temperature sensor *T1* to the primary circuit connection set (if using the optional electric heating element, see > 21)

- ▶ Secure the sensor *1* to the brass connection angle *2* with fabric tape.
- ▶ Install insulation and connect with fabric tape at connection point.

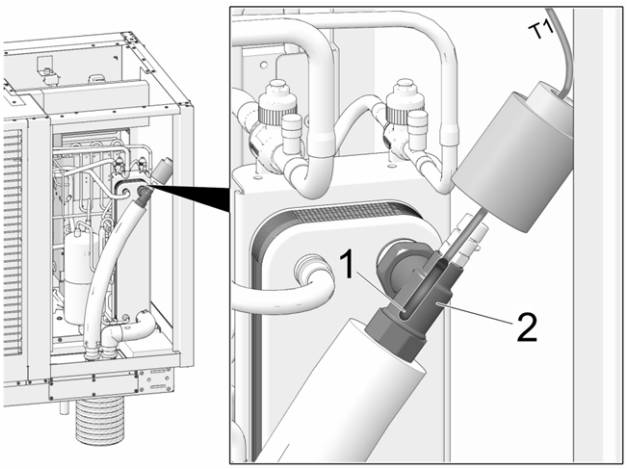
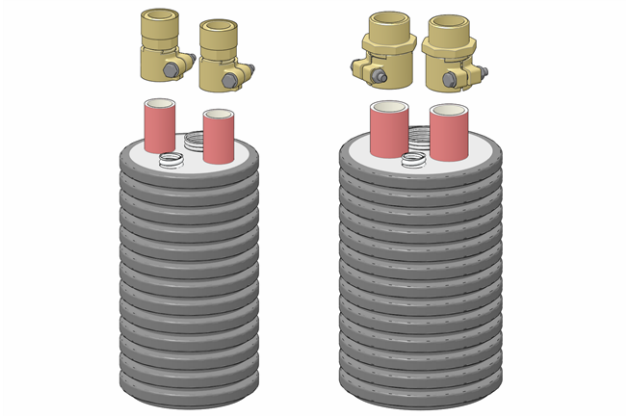


Abb. 2-35: Temperature sensor T1

7.4.5 Heat pump pipe

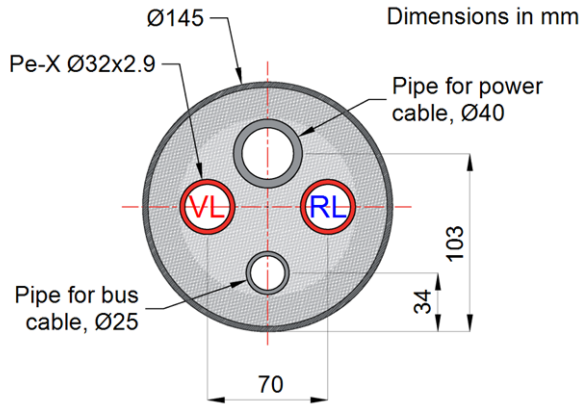
- – For primary circuit connection from the underside of the heat pump, we recommend laying in the ground with the SOLARFOCUS heat pump pipe.
- – 2 dimensions available:



DA 32 (Art. 141804) DA 40 (Art. 141805)

Dimensions and design external diameter 32

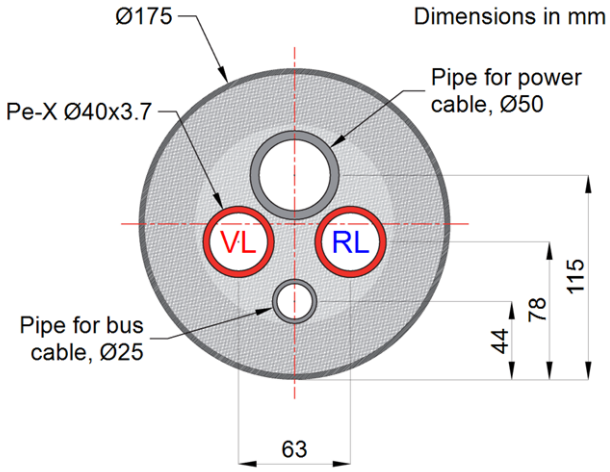
The dimensions are important for placement in the concrete foundation > Abb. 2-50, > 40



Connect both pipes (for bus cable and power cable) once the electrical installation is complete > 29

Dimensions and design external diameter 40

The dimensions are important for placement in the concrete foundation > Abb. 2-50, > 40



Connect both pipes (for bus cable and power cable) once the electrical installation is complete > 29

7.5 Pipe dimensions: Residual delivery height information

The following information is for sizing the primary circuit heating pipes.

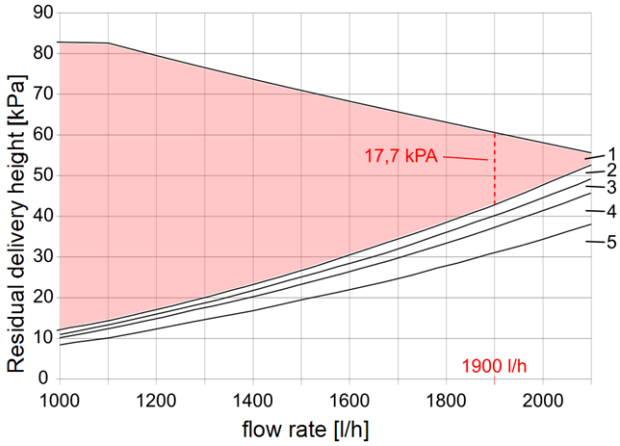
7.5.1 vamp^{air} K 08, K 10

The following components were taken into account when calculating the residual delivery height and for the total KVS value:

- **vamp**^{air} K10
- Pump ball valves
- 2x switchover valves with a KVS value of 11.3 m³/h at Δp=1 bar
- Electric heating element
- Connection set (e.g. Art. 25104, 25105, 25106, 25107)

Residual delivery height

At flow rate [l/h]:	1600	1800	**1900**	2000
[kPA]	38.0	24.7	**17.7**	10.4
[mWS]	3.87	2.52	**1.80**	1.06



1	Residual delivery height with Wilo Para 25/8
2	Art.16517 - 3-way zone valve with half screw connection
3	Art.16517 - 3-way zone valve with half screw connection
4	Pump ball valves
5	Heat pump K10 plus connection set with electric heating element

Total KVS value

2.89 m³/h at Δp=1 bar

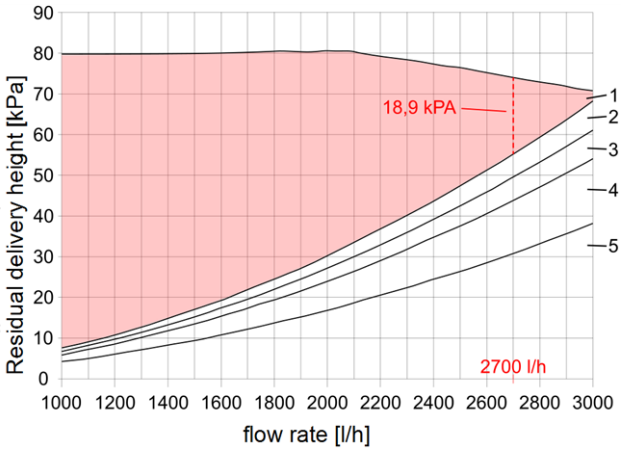
7.5.2 vamp^{air} K 12, K 15

The following components were taken into account when calculating the residual delivery height:

- **vamp**^{air} K15
- Pump group with volume flow sensor
- 2x switchover valves with a KVS value of 11.3 m³/h at Δp=1 bar
- Electric heating element
- Connection set (e.g. Art. 25104, 25105, 25106, 25107)

Residual delivery height

At flow rate [l/h]:	2500	2600	**2700**	2800
[kPA]	29.0	24.0	**18.9**	13.6
[mWS]	2.96	2.45	**1.92**	1.38



1	Residual delivery height with Wilo-Stratos PARA 30/1-8
2	Art.16517 - 3-way zone valve with half screw connection
3	Art.16517 - 3-way zone valve with half screw connection
4	Pump group K15 with volume flow sensor
5	Heat pump K15 plus connection set with electric heating element

Total KVS value

3.63 m³/h at Δp=1 bar

8 Electrical connection

DANGER - There is a risk of fatal electric shocks when working on electrical components of the system

- Work may be performed only by a qualified electrician.
- Applicable standards and regulations must be observed.

8.1 Access to terminal area

vamp^{air} K 08, K 10

► Loosen 10 pcs. sheet metal screws *1*, remove cover *2*.

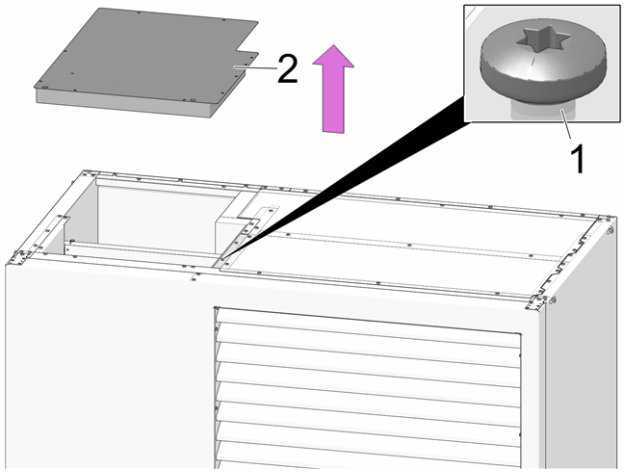


Abb. 2-36: Access to terminal area K 08, K 10

vamp^{air} K 12, K 15

► Loosen 5 pcs. sheet metal screws *1* on underside.
► Loosen 2 pcs. sheet metal screws *2* on both suspensions.
► Lift cover *3* and remove.

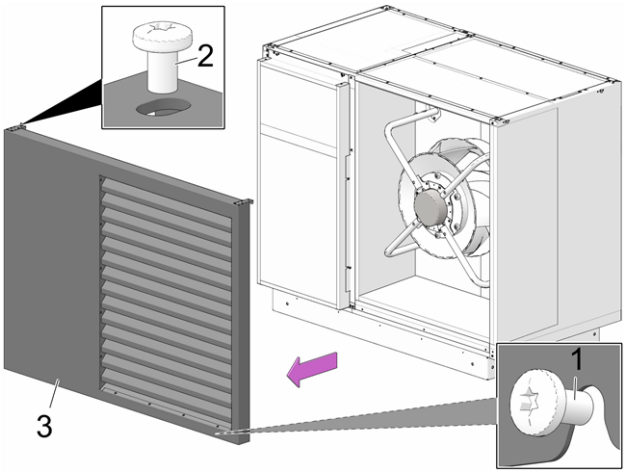


Abb. 2-37

► Loosen 2 pcs. screws *1* on top side.
► Loosen 2 pcs. screws *2* each on left and right side of cover *3*.
► Remove cover *3*.

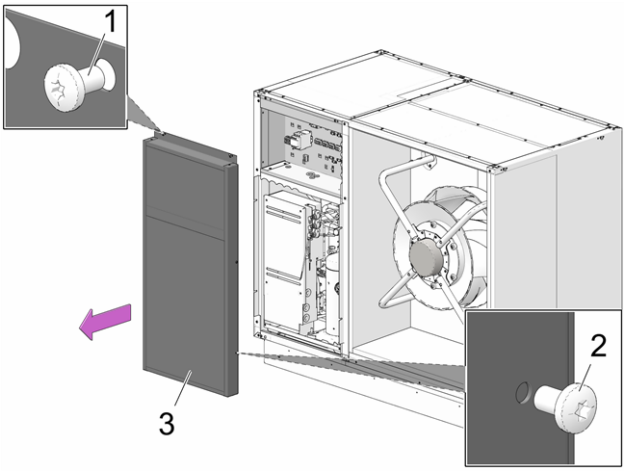


Abb. 2-38: Access to terminal area K 12, K 15

8.2 Terminal assignment

X1 - Heat pump power supply

K 08.3, K 10.3: Three-phase version (= standard)

- 400 V, 5.5 kW, rated current 8 A, terminals 3/N/PE
- Recommended fuse B13 A
- Install all-current sensitive type B RCCB.
- The rotating field does not need to be considered.
- ≥2.5 mm² up to 20 m cable length, 4 mm² with cable length over 20 m (use flexible cable).

K 08.1, K 10.1: Single-phase design

- 230 V, 5.5 kW, maximum operating current 20 A
- Recommended fuse B25 A
- ≥4 mm² up to 20 m cable length, 6 mm² with cable length over 20 m (use flexible cable).

K 12.3, K 15.3: Three-phase version (= standard)

- 400 V, 8 kW, rated current 12 A, terminals 3/N/PE
- Recommended fuse B16 A
- Install all-current sensitive type B RCCB.
- The rotating field does not need to be considered.
- ≥2.5 mm² up to 20 m cable length, 4 mm² with cable length over 20 m (use flexible cable).

K 12.1, K 15.1: Single-phase design

- 230 V, 8 kW, maximum operating current 20 A
- Recommended fuse B35 A
- ≥4 mm² up to 20 m cable length, 6 mm² with cable length over 20 m (use flexible cable).

X2 - Power supply for electric heating element

- Electric heating element with 3, 6 or max. 9 kW power can be connected, 400 V AC, terminals 3/N/PE
- Recommended fuse B16 A
- Wiring diagram for electric heating element > 20
- ≥2.5 mm² up to 20 m cable length, 4 mm² with cable length over 20 m (use flexible cable).

X3 - Control power supply for heat pump, control and primary circuit circulation pump

- 230 V, 10 A, terminals 1/N/PE
- Recommended fuse B10 A
- Cable cross-section ≥1.5 mm²

X5 - Bus cable (RS485)

- Cable length up to 100 m: 2x2x0.22 mm²
  Cable length 100 m to 200 m: 2X2x0.34 mm² (e.g. Lapp Unitronic Bus Can, No. 2170263)
- AWG22, STP (=Shielded Twisted Pair)
- Nominal resistance: 120 Ohm
- Line capacitance per metre: <60 pF/m
- Loop resistance: <160 Ohm/km

X6 - Analogue input

- 0 to 10 V input, for heat pump output specification

8.3 Seal the connection cable piping

► Seal the gap between the cables and the electro-piping **for both hoses and on both sides of the piping** (pipe start and end), e.g. use acrylic sealing compound, no PU foam, this measure serves to prevent condensation forming.

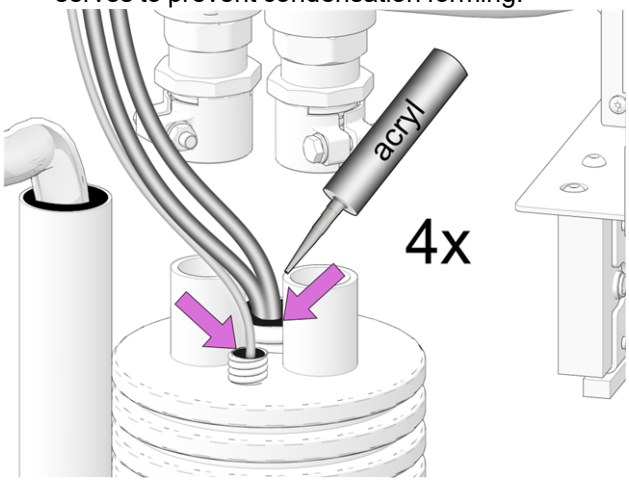


Abb. 2-39: Seal pipes

8.4 Terminal area, electrical supply

CAUTION - Protect the terminal area against moisture (e.g. precipitation) during connection work.

Terminal area K 08, K 10

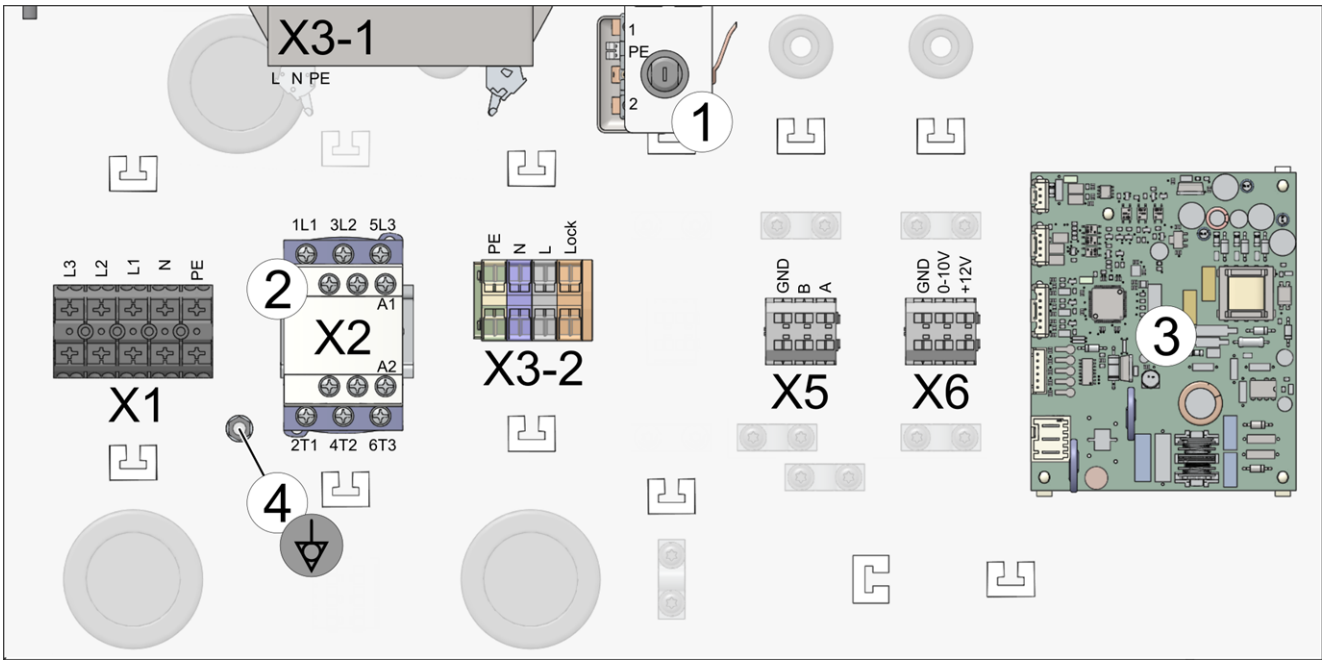


Abb. 2-40: Terminal area K 08, K 10

Terminal area K 12, K 15

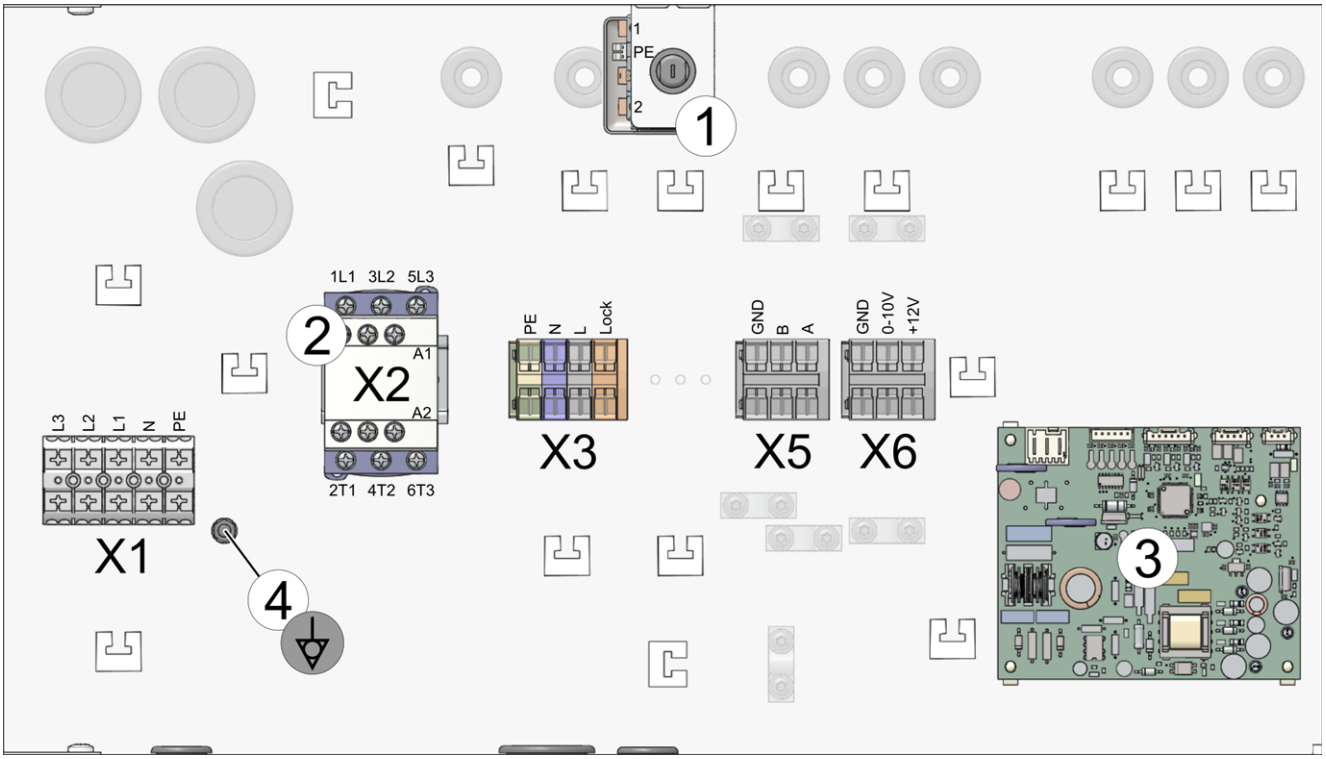
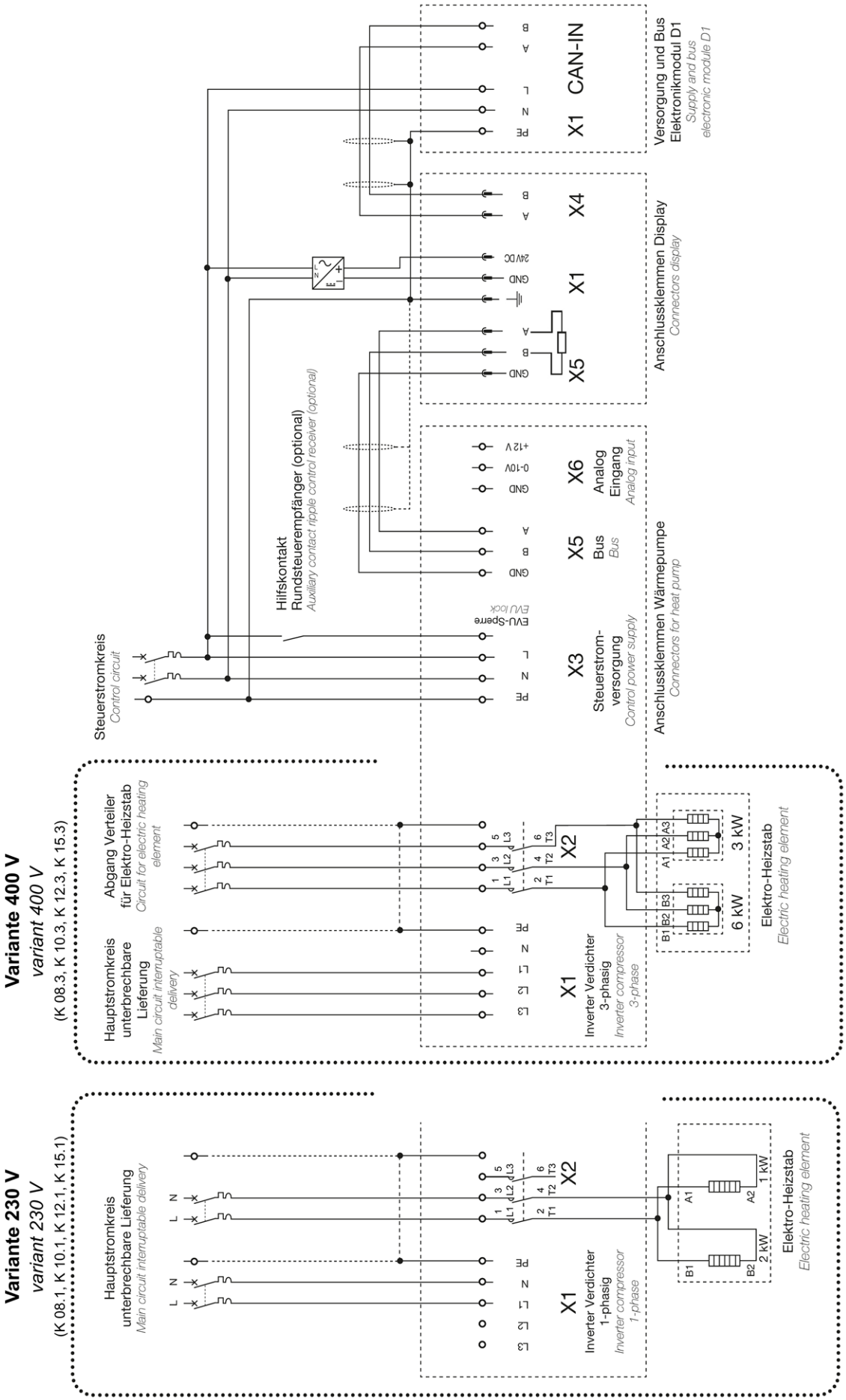


Abb. 2-41: Terminal area K 12, K 15

1 Overtemperature reset - OTR (only used in combination with electric heating element)
2 Contactor (only used in combination with electric heating element)
3 *RCC outdoor* board
4 Connection for potential equalisation

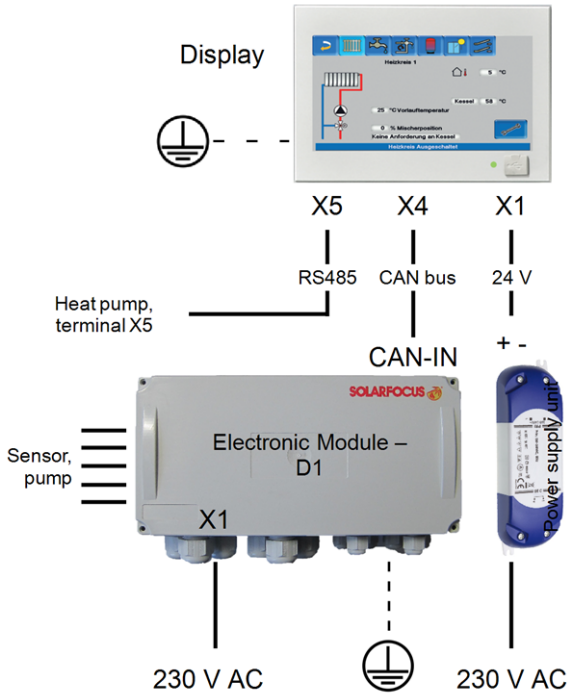
8.5 Electrical connection plan



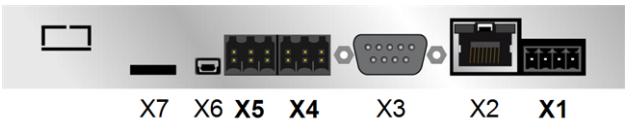
8.6 Connect eco*manager-touch* control

Mount the control (display with metal surface-mounted housing) and the electronic module on the wall inside the building (e.g. in the equipment room).

8.6.1 Overview



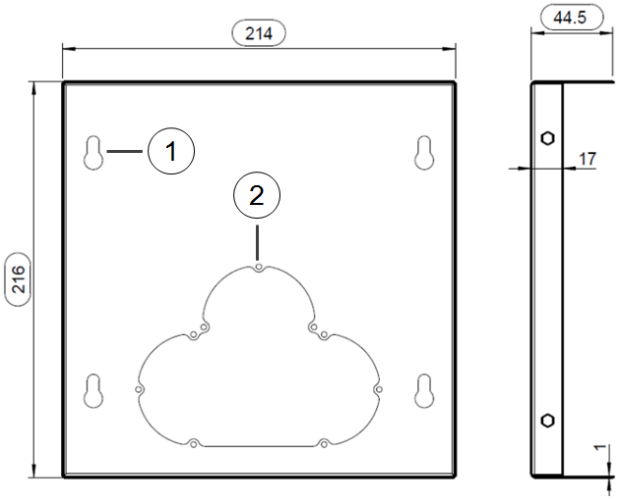
Interfaces on the display



8.6.2 Surface-mounted installation

- ► It is possible to install the metal housing with 4 boreholes *1*.
- ► Installation on electrical flush-mounted socket is possible with boreholes *2*.

(screw materials for installation of housing not included in scope of delivery).

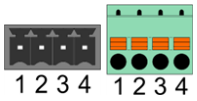


- ► Install the power supply in the housing.

8.6.3 Display power supply

- ► Run the power supply for the display from the power supply unit (supplied).

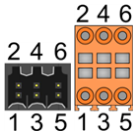
Display **X1**		Power supply unit
+ 24 V DC	Pin 1 or 2	+
GND	Pin 3 or 4	-



8.6.4 Connect CAN bus

- ► Make bus cable connection from the display to the electronic module D1.

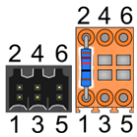
Display **X4**		Electronic module **CAN-IN**
CAN A	Pin 1 or 3	A
CAN B	Pin 2 or 4	B
GND	Pin 5	GND ⊥

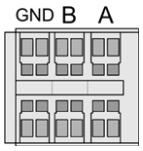


8.6.5 Connect RS485 bus

- ► Establish the bus cable connection from the display to the electrical terminal area of the heat pump.
- ► 220 Ω resistor in connector X5 (on display).

Display **X5**		Terminal area **X5**
RS485 A	Pin 1 or 3	A
RS485 B	Pin 2 or 4	B
GND	Pin 5	GND ⊥

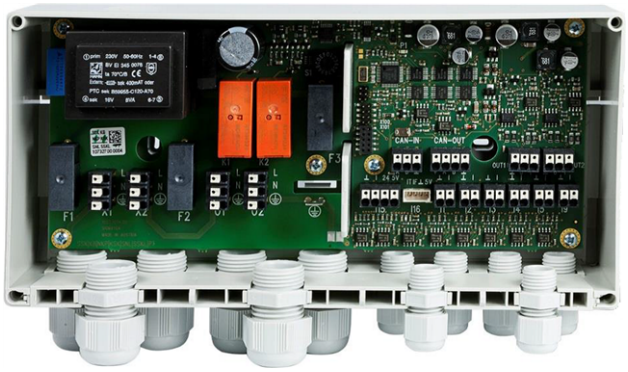




8.7 Connect electronic module D1

Note on terminal designations in the electronic module: **O** or ***o*** stands for *output* , **I** or **i** stands for *input*.

- ► Loosen 4 screws and remove the module cover.



8.7.1 Terminal assignment - overview

You can find detailed information about the connection of the individual components on the following pages.

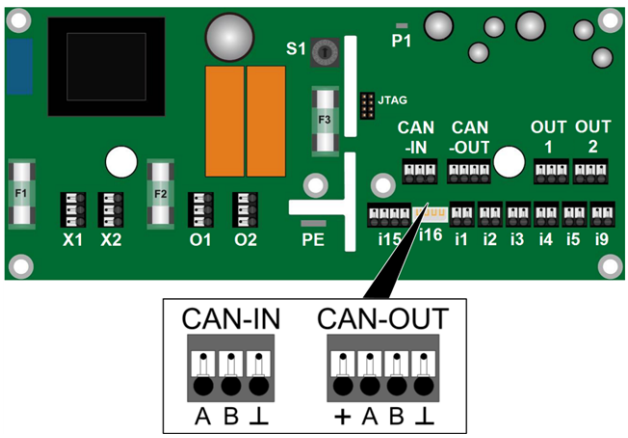


Abb. 2-42: Electronic module (type *universal module*)

Connection	Function
CAN-IN	Bus cable
CAN-OUT	Bus cable
X1	Power supply for the electronic module - 230 V AC
X2	230 V AC output (e.g. for further electronic modules)
i1	Switching contact (input) for heating circuit[1] > 35
i2	Temperature sensor tank (buffer tank, domestic hot water tank)
i3	Flow sensor
i4	Return sensor For **vamp**air K 08, K 10
i4	"Return sensor", measurement of the return temperature by means of flow sensor (Huba Control) For **vamp**air K 12, K 15
i5	Digital input for Smart Grid[1]
i9	Digital input for Smart Grid[1]
i15	Flow sensor (made by Huba Control) - measurement of the flow rate For **vamp**air K 12, K 15
o1	Primary circuit circulation pump - power supply
OUT1	Primary circuit circulation pump - control signal
o2	Three-way ball valve

[1] Only connect potential-free contact.

8.7.2 Connection of the bus cable

CAUTION

- Risk of destruction of the electronic module or control components if terminals are incorrectly assigned.
- Lay the bus cable/sensor cable (low voltage) and power cable (230 V) separately.
- Where a bus cable (with separate earthing systems) extends over more than one building install a CAN bus repeater to galvanically isolate the bus (e.g. SOLARFOCUS Art. 61610).

CAUTION - Note different versions of the CAN-IN terminal depending on the type of electronic module.

- Type *universal module:*
  3-pole, A B ⊥
- Type *heating circuit basic module* and *heating circuit extension module:*
  4-pole, + A B ⊥

- Use a bus cable with this specification:
  - Cable length up to 100 m: 2x2x0.22 mm²
    Cable length 100 m to 200 m: 2X2x0.34 mm²
    (e.g. Lapp Unitronic Bus Can, No. 2170263)
  - AWG22, STP (=Shielded Twisted Pair)
  - Nominal resistance: 120 Ohm
  - Line capacitance per metre: < 60 pF/m
  - Loop resistance: < 160 Ohm/km
- Connect the shield of the bus cable to the ground (GND ⊥) of each electronic module (see the images in the following chapter *Bus terminating resistor*).
- If there are several bus participants, the following applies: The bus wiring must run from one bus-participant to the next. The order of the participants does not matter.

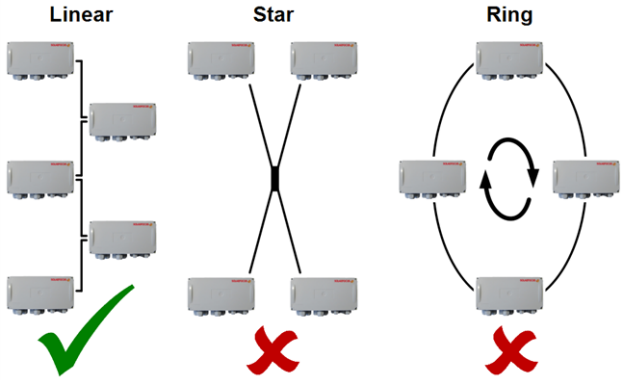
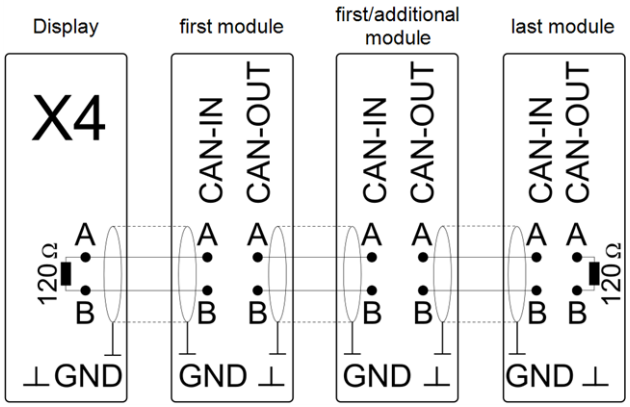


Abb. 2-43: Bus topology

8.7.3 Bus terminating resistor

- CAN (Controller Area Network) is a 2-wire bus system. The bus must be equipped at each end with a 120Ω terminating resistor (to avoid reflections).
- Two connections for the CAN bus - *CAN-IN* and *CAN-OUT* - are located on the electronic module. The terminating resistor is pre-installed to *CAN-OUT* at the factory.
- If only one electronic module is connected to the heat pump, the terminating resistor for this must be left on the *CAN-OUT* plug. **If several modules are connected, then the terminating resistor may only be installed on the last module in the chain** (the terminating resistor must be removed from the remaining modules). See the following image(s).

Heat pump vamp^{air}



A 120 Ohm resistor is permanently installed in the display.

8.7.4 Connect the primary circuit circulation pump

► Connect pump to the electronic module D1

Wilo-Para (K 08, K 10)

	Wire	Electronic module
Power cable	L	**o1** – L
	N	**o1**- neutral conductor N
	PE	**o1** – protective earth conductor PE
Control cable	blue	**OUT1**- ground ⊥
	brown	**OUT1** - O
	black	**OUT1** - I

Wilo-Stratos PARA (K 12, K 15)

	Wire	Electronic module
Power cable	L	**o1** – L
	N	**o1**- neutral conductor N
	PE	**o1**- protective earth conductor PE
Control cable	brown	**OUT1**- ground ⊥
	white	**OUT1** - O

8.7.5 Connect the flow sensor

Only required for **vamp**^{air} K 12 and K 15.

Flow sensor

► Connect sensor to the electronic module D1

Sensor	Electronic module
Return temperature sensor (PT1000)	**i4**, white and grey wire, polarity can be swapped
Flow sensor (flow volume)	brown: **i15** - 24V **black: i15** - earthing **blue: i15** - I

8.7.6 Heating circuit - switch externally (optional)

Function Description

This function of the control **eco**manager-*touch* enables the switching on/off of the heating circuit by a switching contact.

Usage example

As soon as all room thermostats (of a single room control) have reached the required temperature, the control receives **eco**manager-*touch* a signal, and the heating circuit is switched off. When the temperature drops, the heating circuit is switched on again.

Prerequisite for functionality

- The parameter *Room effect*[1] must be set to the option *On*.
- Software version 19.020 for control

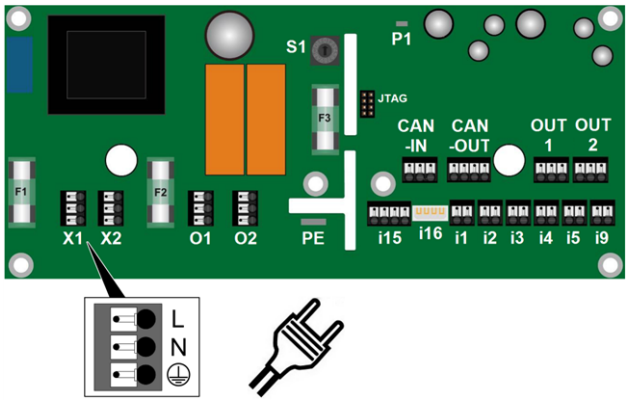
[1] You can find the parameter *Room effect* in the heating circuit settings of the control: Screen *Heating circuit* | Screen *System parameters*. To ensure visibility of the parameter, registration with qualified personnel code is required.

Electrical connection

- Input *i1* on electronic module *D1* (=D1i1)
- Contact closed = heating circuit *On*
  Contact open = heating circuit *Off*
- Switching contact must be potential-free

When using the optional item 26100 (*extension of buffer operation with a mixed heating circuit*) the room thermostats on are connected to X40 and X41 of the heating circuit basic module. The connection *D1i1* has no function in this case.

8.7.7 Connecting the mains power supply to the electronic module



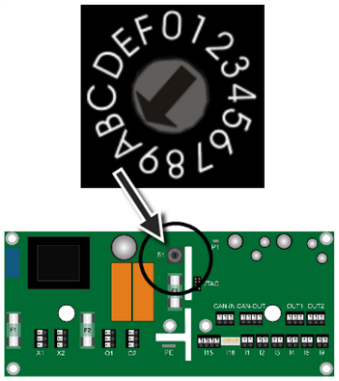
Mains power supply	Electronic module
L	**X1** – L
N	**X1**- neutral conductor N
PE	**X1** – protective earth conductor PE

- Establish the connection to a standard protective contact plug so that the electronic module can be disconnected from the power supply as necessary.
- For the 230 V AC supply use a 3 x 1.5 mm² cable (protection with 10 A fuse B).
- Comply with regulations of the regional electrical utility firm.

CAUTION - Connect the *PE* blade terminal (6.3 x 0.8 mm) of the electronic module to the potential equalisation in the building installation (cable cross-section ≥2.5 mm²).

8.7.8 Device address of the electronic module

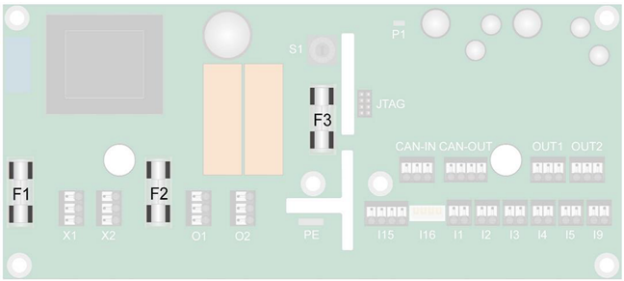
The device address of the module can be adjusted using the rotary switch S1.



Using the module as a ...	Device address
Electronic module D1 **vamp**^{air}	A

8.7.9 Elec. fuses in the electronic module

DANGER - A fuse replacement may only be carried out on a disconnected 230 V AC power supply by qualified personnel.



Fuse	Rating	Size	Assignment
F1	0.4 AT	5x20 mm	Primary-side Supply transformer
F2	4 AT	5x20 mm	Relay outputs
F3	0.4 AT	5x20 mm	Secondary-side Supply transformer

If fuse F1 or F3 is defective, a message will be shown on the display of the **eco**manager-*touch* control: *Electronic module communication error*

8.8 Outside temperature sensor - position

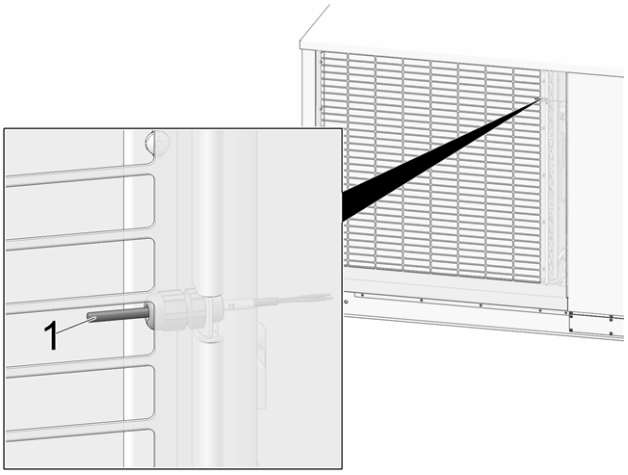


Abb. 2-44

8.9 Connecting the control to the internet

To enable the Internet connection of the **eco**manager-*touch* control, connect the Ethernet port **X2** *1* (type RJ45) on the bottom of the display by cable to a network router.

The connection is required in order to use the following functions:

- mySOLARFOCUS app
- Weatherman function
- IP-VNC (remote access to the control)
- Sending e-mails

Additional information on these functions can be found in the operation manual.

Display - Connections

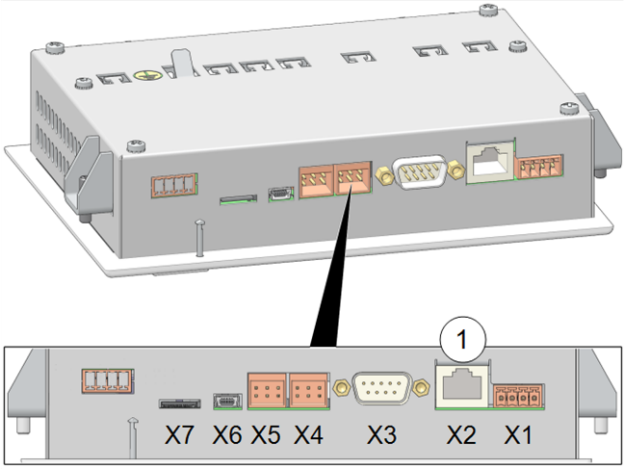


Abb. 2-45: Connections on the underside of the display

8.10 Smart Grid Ready

The SG-Ready label is a label for heat pumps, the controller of which meet the conditions for inclusion in a future, intelligent power grid *(smart grid* = SG).

Digital inputs

Depending on the switching state of the two electronic module inputs[1] i5 and i9 > *8.7.1 Terminal assignment - overview* > 33, four possible operating states may result:

[1] Only connect potential-free contacts.

i5	i9	
1	0	Operating state 1: The compressor is blocked (electrical power block, maximum 2 hours) The i5 input can therefore also be used as electrical power lock info.
0	0	Operating state 2: Normal operation
0	1	Operating state 3: Recommendation to turn on
1	1	Operating state 4: Turning on

Switching state: Input bridged = logical 1, interruption = logical 0

Additional information on the topic of this *Smart Grid* can be found in the operation manual.

9 Initial commissioning

Initial commissioning of the heat pump may only be performed by certified, qualified personnel (SOLARFOCUS service technician, or SOLARFOCUS service partner) (= condition for guarantee, warranty).

Request commissioning at least 10 days before the desired commissioning date at SOLARFOCUS (see form DR-0104 for commissioning request at the end of this manual).

Requirements for commissioning

- ☑ The hydraulic installation of the heating system is complete.
- ☑ The primary circuit was thoroughly rinsed, filled and vented.
- ☑ The electrical installation of the heating system is complete.

Conditions for commissioning

- Volume flow of the heat pump (for the defrosting)
  - The required volume flow for defrosting the heat pump must be reached. This is 1560 l/h for the **vamp**^{air} K 08 and K 10, and 2500 l/h for the **vamp**^{air} K 12 and K 15.
  - If the volume flow for the defrosting is not reached, then commissioning cannot be completed. Please check the hydraulic system for dimensioning, blockages/correct position of the switchover valves.
- The return temperature from the primary circuit must exceed a specific value (depending on the outside temperature, see following diagram).

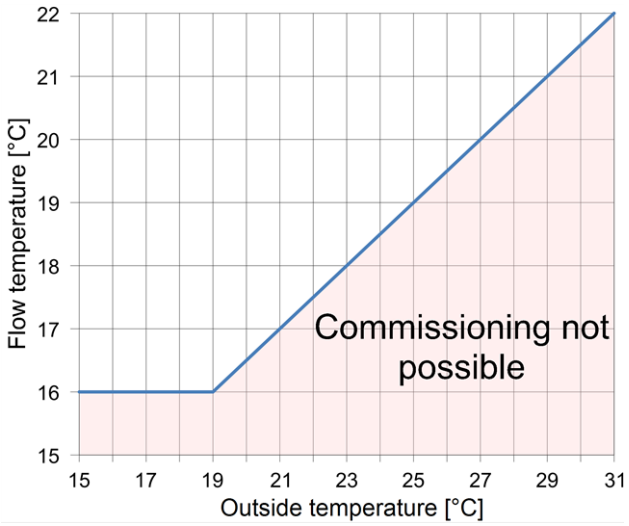
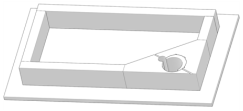


Abb. 2-46

After having completed initial commissioning, the completed commissioning form should be returned to SOLARFOCUS. If this does not happen, then for guarantee and warranty claims of any kind the date of shipment from the manufacturer to the dealer (according to the delivery note and invoice) will be used.

10 Foundation plan

The following illustrations show the foundation, partly with standard insulation boards (thickness 7 cm). Alternatively: *Insulating brick for foundation* , Item No. 25350, for quick and easy foundation creation.



10.1 Downward line connection

Top view

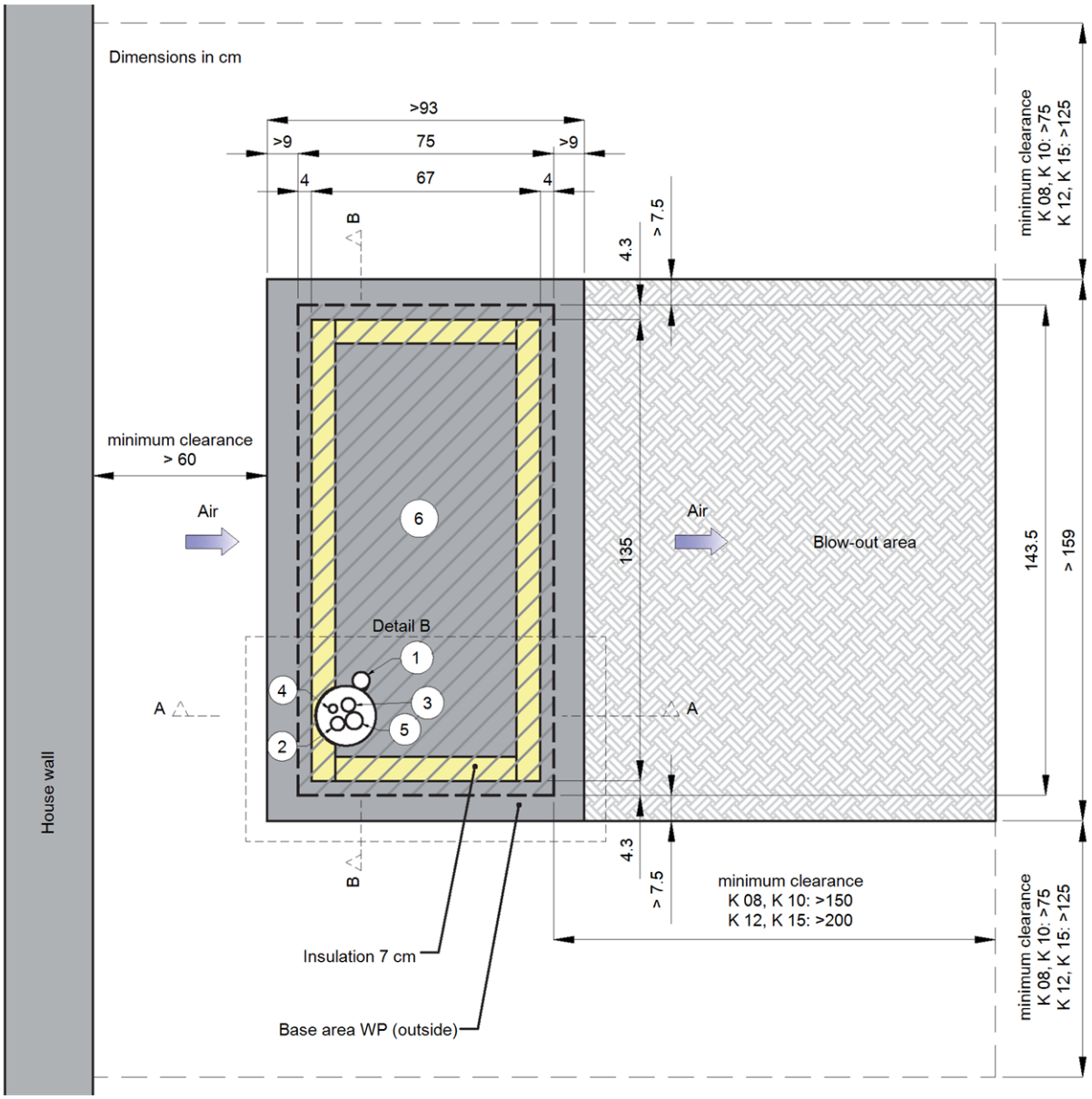


Abb. 2-47

1 Condensate drain, Ø > 50 mm
2 Pipe for heating return (connection HP 5/4” OT flat sealing)
3 Pipe for heating flow (connection HP 5/4” OT flat sealing)
4 Conduit for bus cable, Ø 25 mm
5 Conduit for electric cables, Ø > 50 mm
6 Installation surface (concrete base + insulation); **pay attention to horizontal and planar execution!**

Side view of foundation: Section A - A

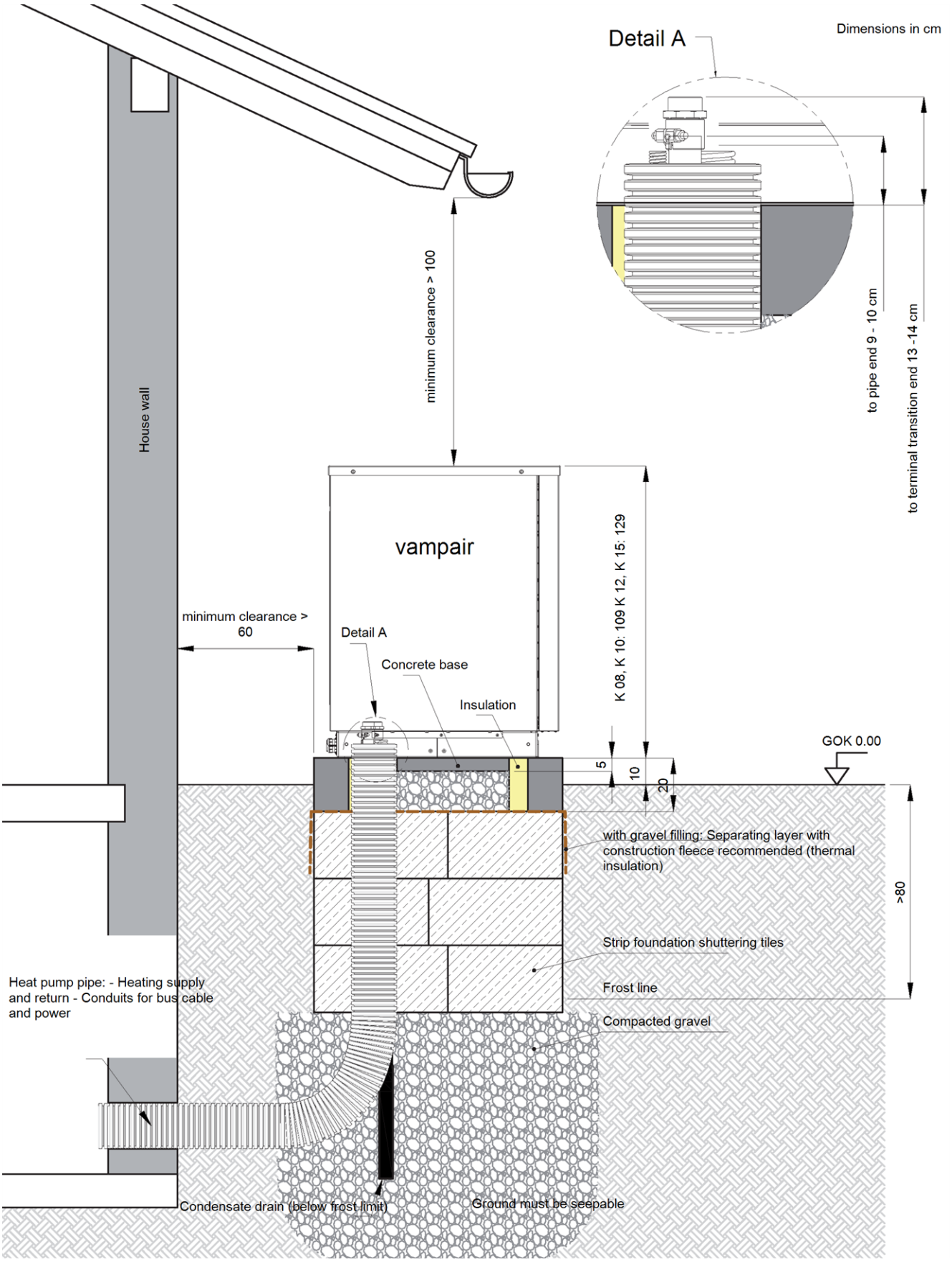


Abb. 2-48

Side view of foundation: Section B - B

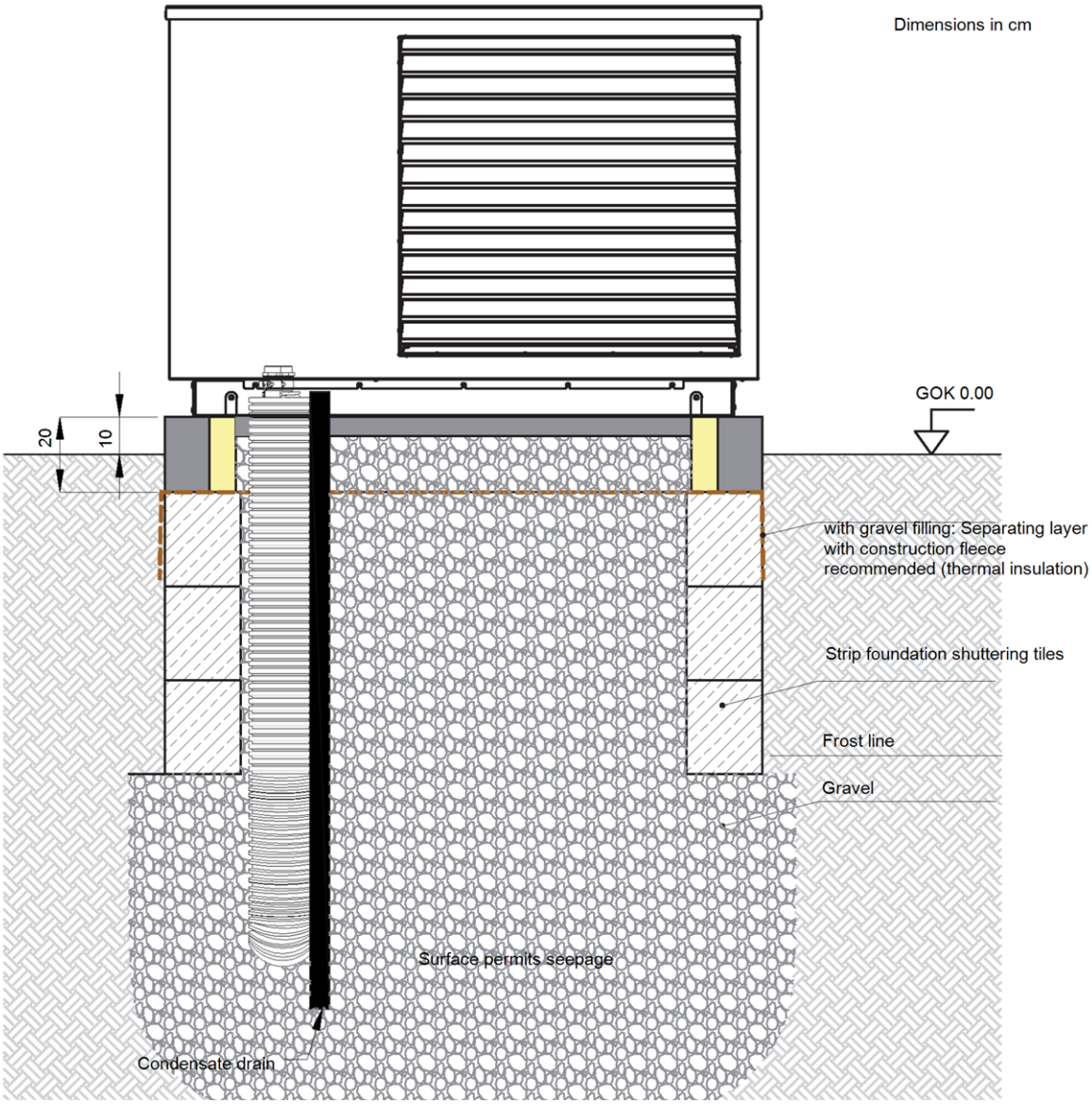


Abb. 2-49

Detail B (illustration shows the heat pump pipe external diameter 40)

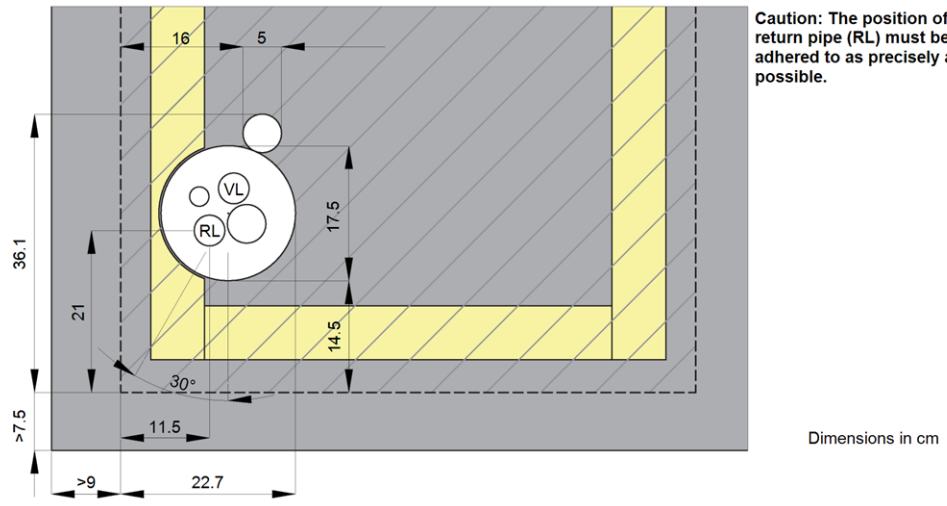


Abb. 2-50

10.2 Line connection to the rear

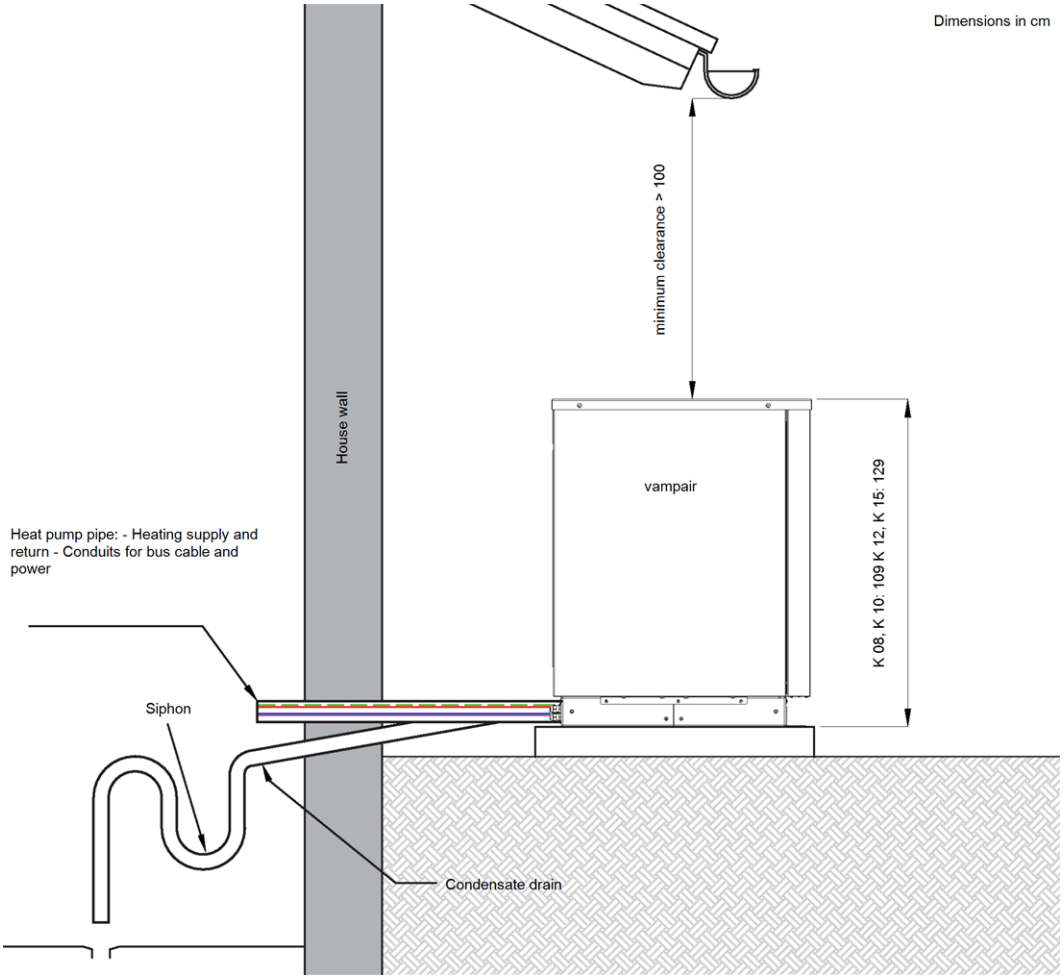


Abb. 2-51

10.3 Condensate drain

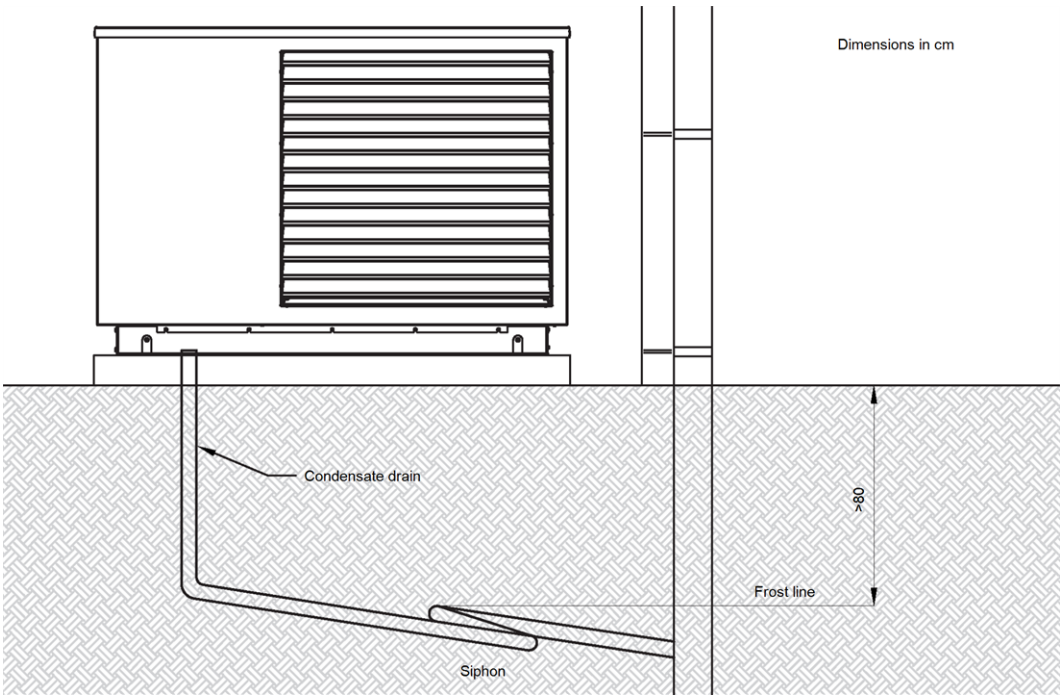


Abb. 2-52

11 Flat roof set-up

Top view

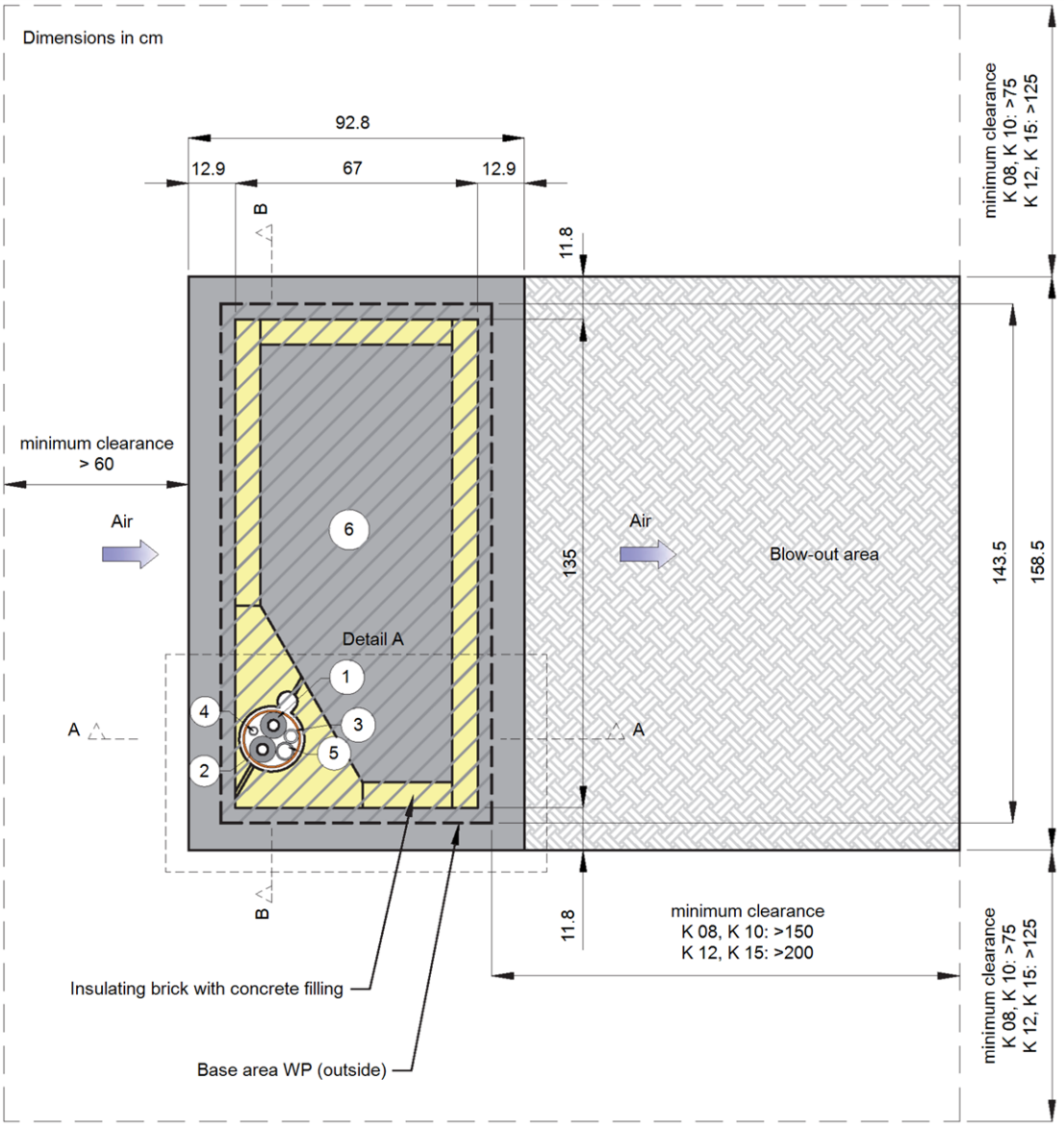
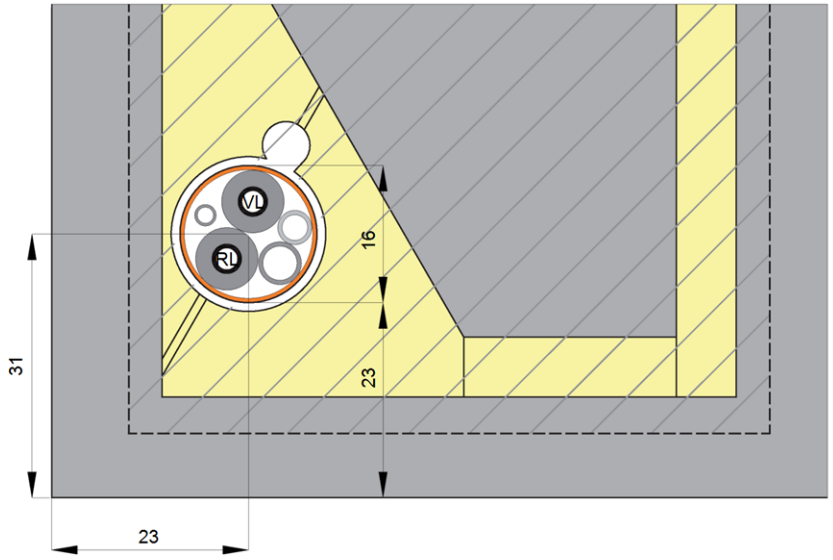


Abb. 2-53

1 Connection hose heating flow Ø 35 mm plus 19 mm insulation
2 Connection hose heating return Ø 35 mm plus 19 mm insulation
3 Condensate drain, Ø > 50 mm
4 Conduit for bus cable, Ø 25 mm
5 Conduit for electric cables, Ø > 50 mm
6 Installation surface (for insulating brick with concrete filling)
Note: The concrete surface must be horizontal and have a flat finish.

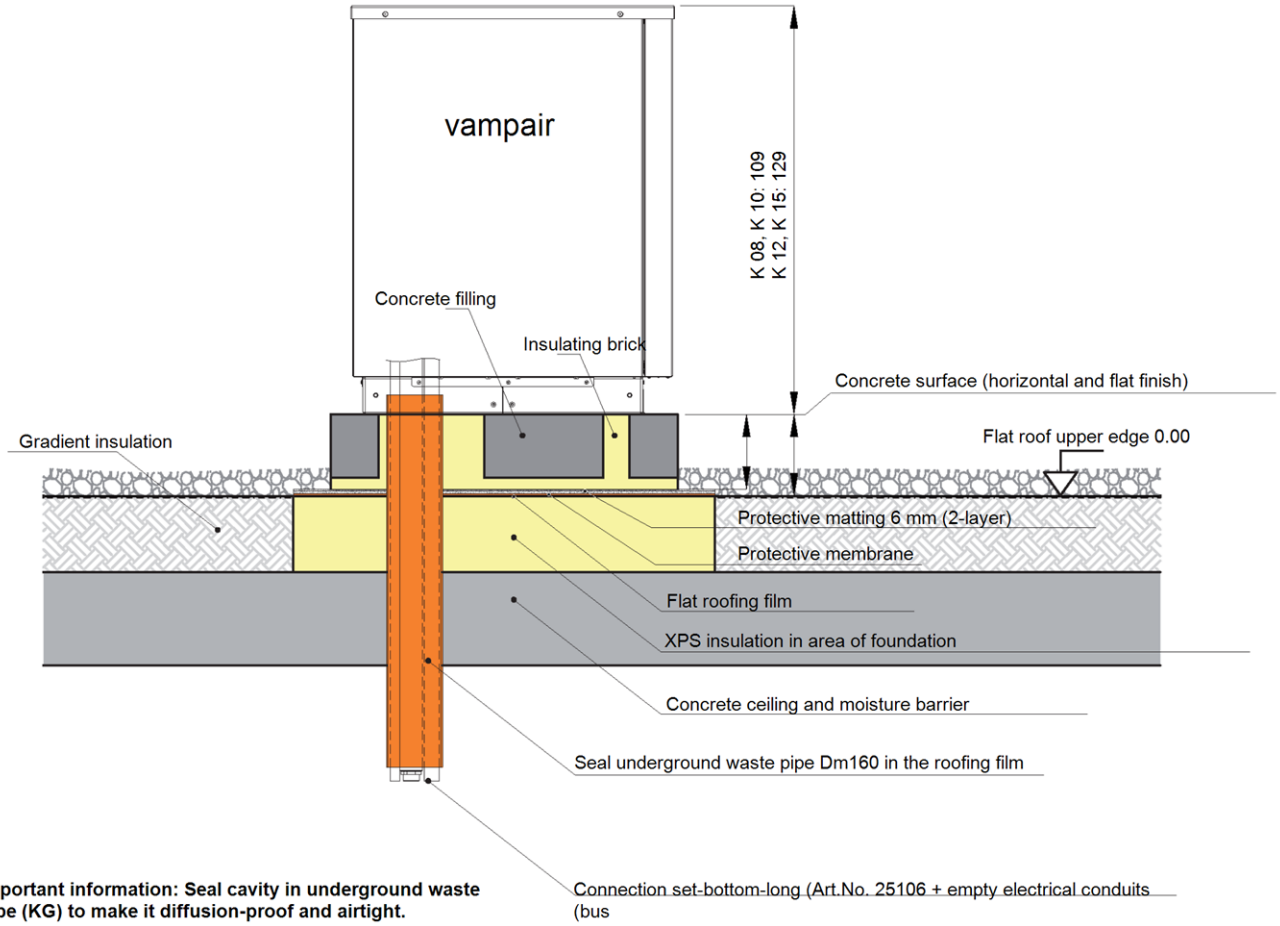
Detail A (illustration shows the heat pump pipe external diameter 40)



Caution: The position of the return pipe (RL) must be adhered to as precisely as possible.

Dimensions in cm

Side view of foundation: Section A - A



Important information: Seal cavity in underground waste pipe (KG) to make it diffusion-proof and airtight.

Abb. 2-54

Front view of foundation: Section B - B

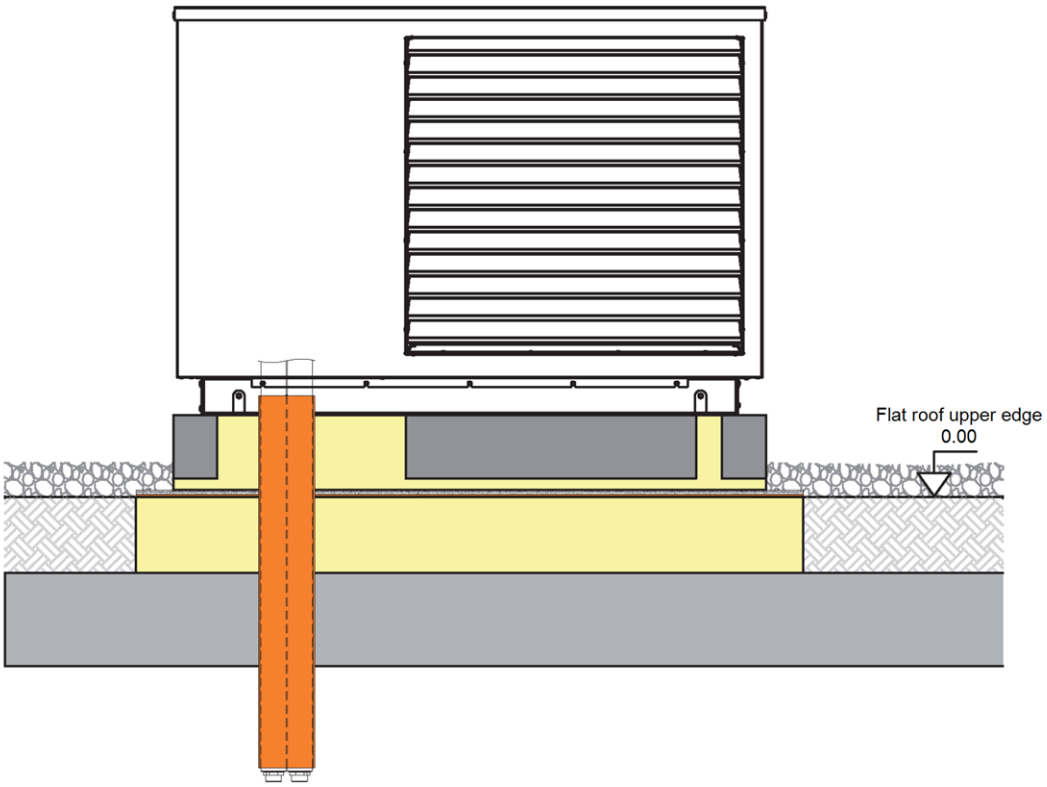
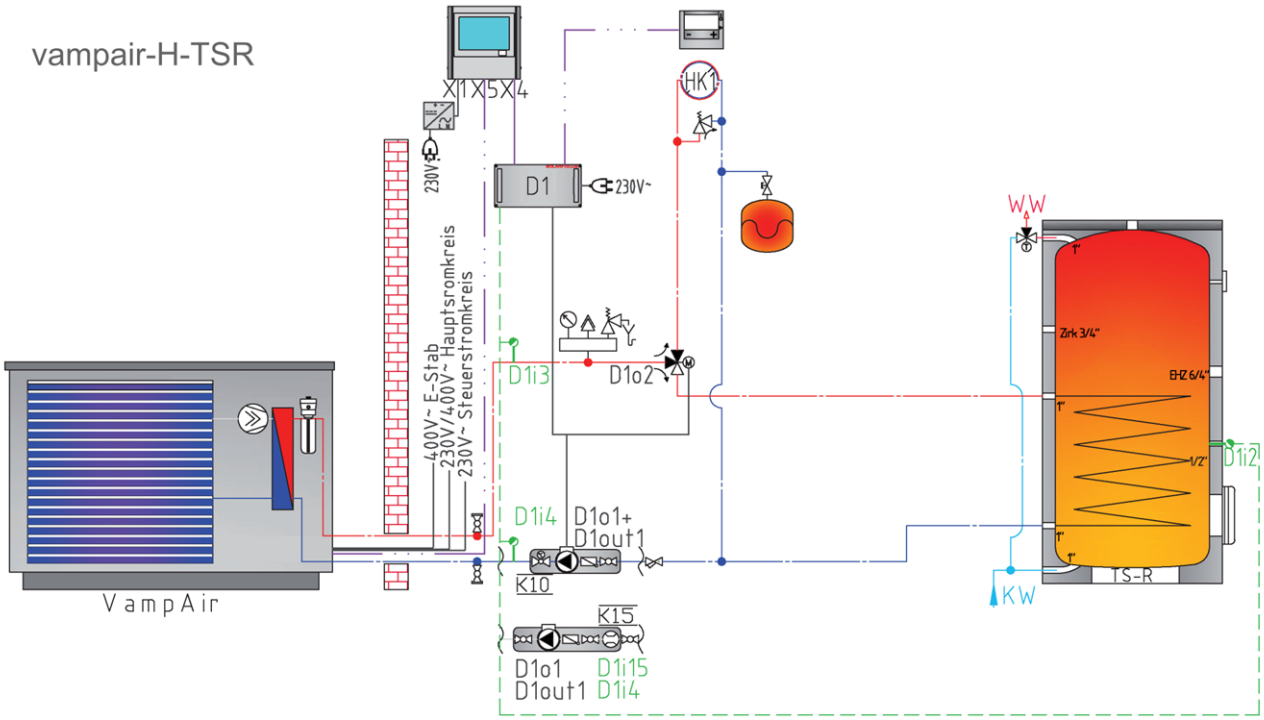


Abb. 2-55

12 Plant schematic

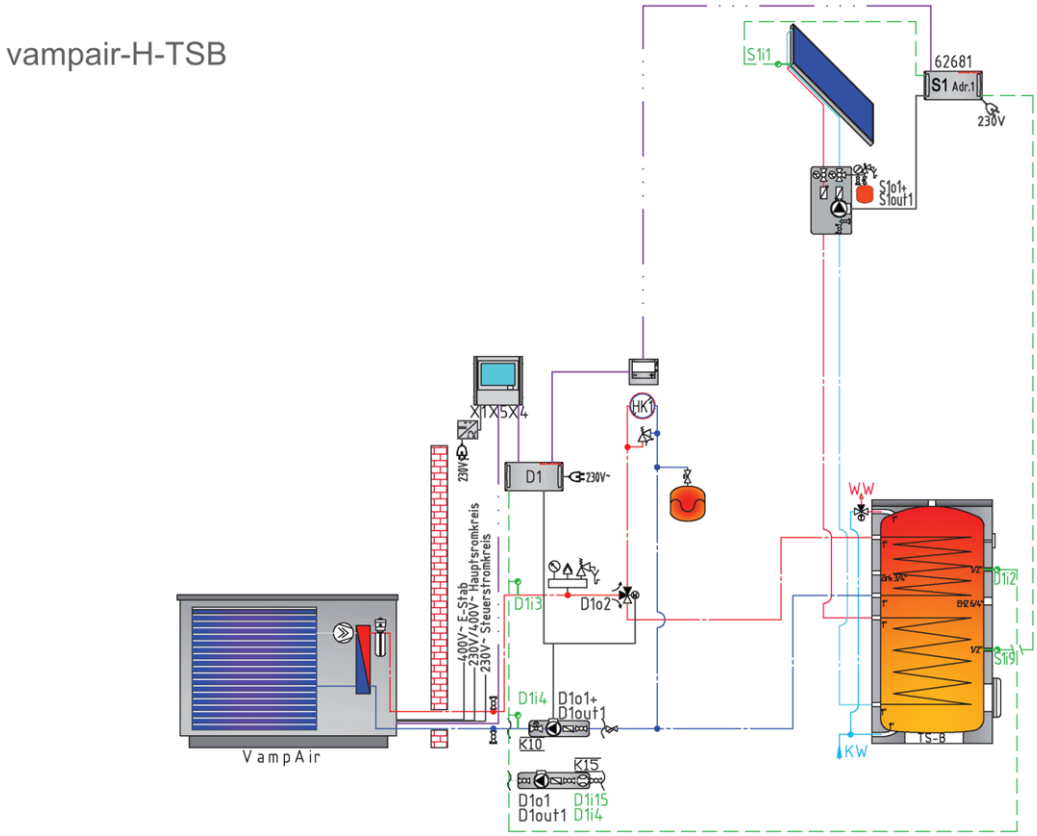
vamp^{air}: for an unmixed heating circuit, with DHW tank

- Suitable for new builds, max. 1 unmixed heating circuit
- Observe min. 22 m² heatable floor area without single room control, and minimum volume flow of 1560 l/h (for K08 and K10) and 2500 l/h (for K12 and K15) in case of defrosting via heating circuit
- Observe residual delivery height of primary circuit circulation pump
- Note the overflow valve setting
- Suitable for room cooling



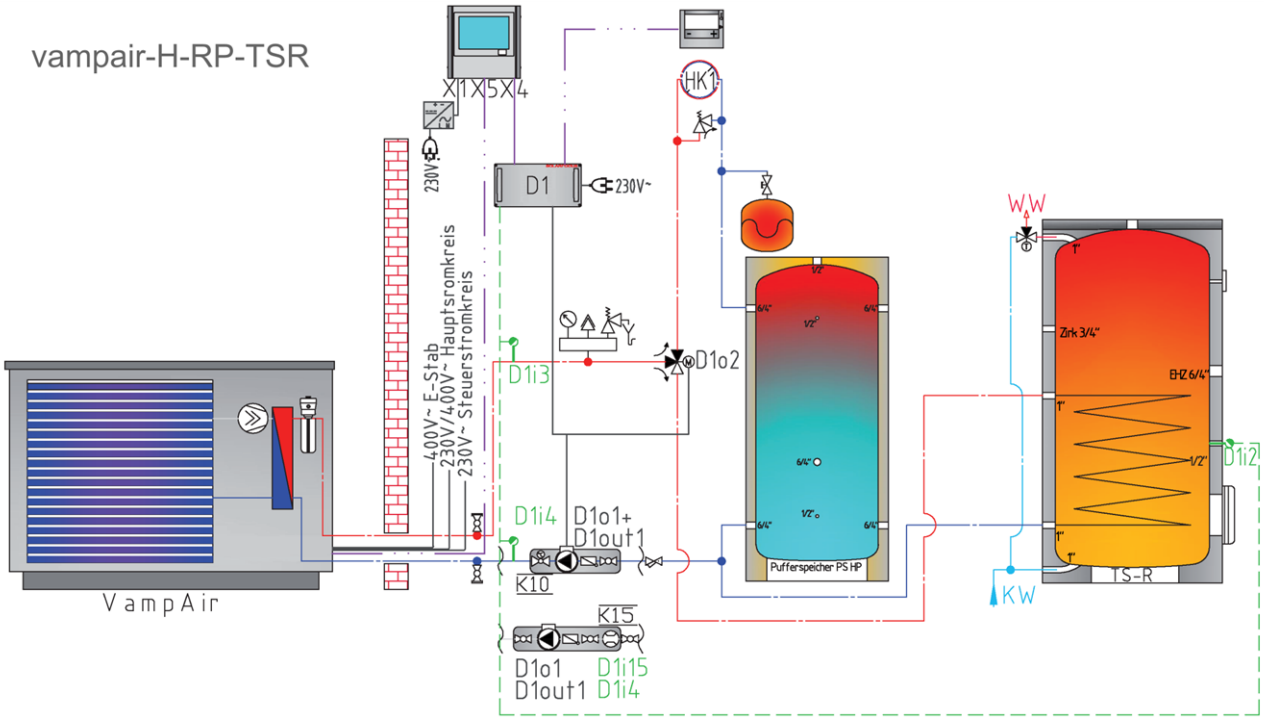
vamp^{air}: for an unmixed heating circuit, with DHW tank (incl. solar coil)

- Suitable for new builds, **max. 1 unmixed heating circuit**
- Observe min. 22 m² heatable floor area without single room control, and minimum volume flow of 1560 l/h (for K08 and K10) and 2500 l/h (for K12 and K15) in case of defrosting via heating circuit
- Observe residual delivery height of primary circuit circulation pump
- Note the overflow valve setting
- Suitable for room cooling



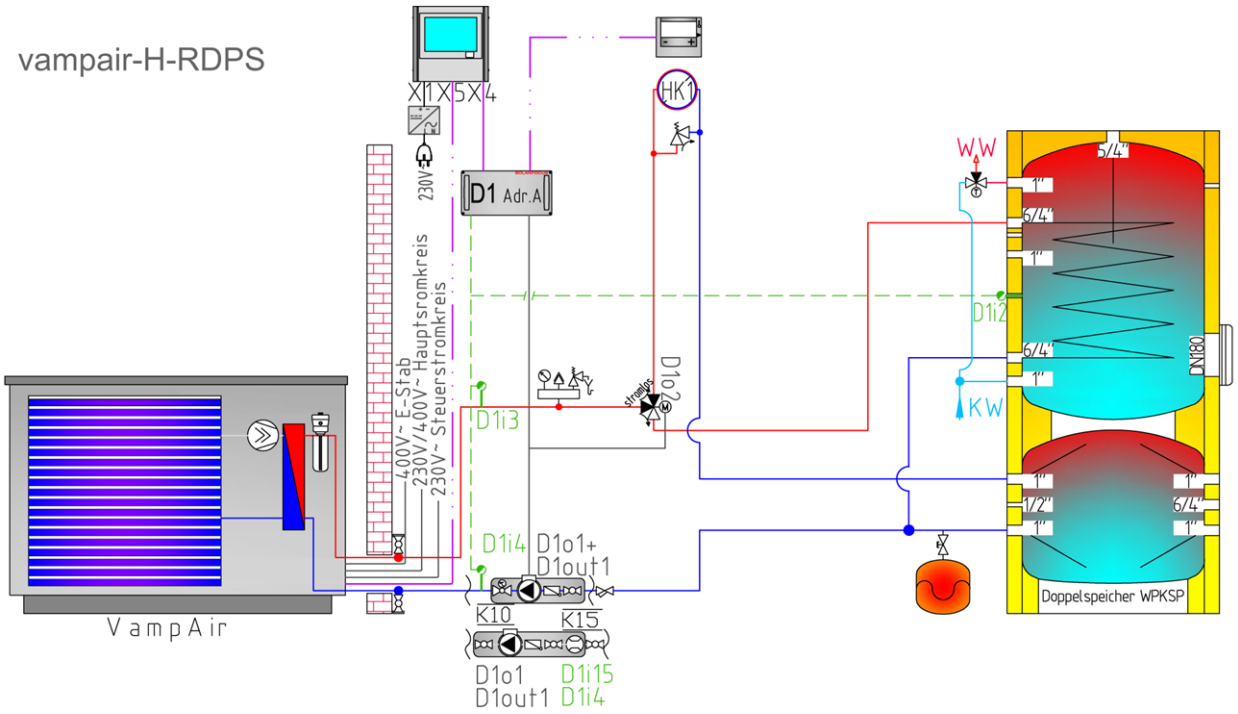
vamp^{air}: for an unmixed heating circuit, DHW tank and buffer tank

- Suitable for new builds, **max. 1 unmixed heating circuit**
- Observe minimum volume flow of 1560 l/h (for K08 and K10) and 2500 l/h (for K12 and K15) in case of defrosting via heating circuit
- Note the overflow valve setting
- Suitable for room cooling



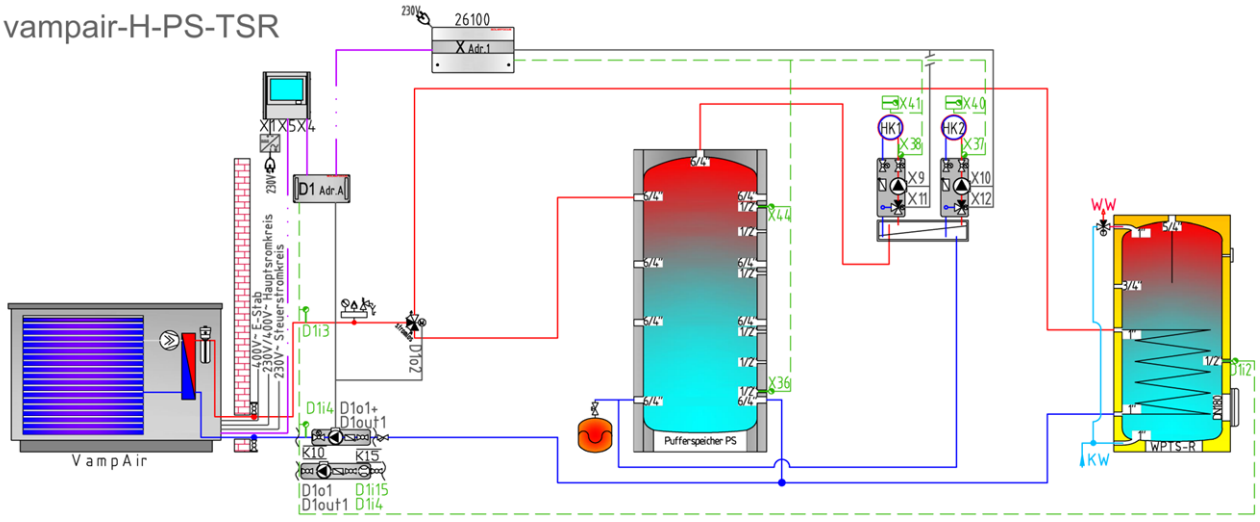
vamp^{air}: for an unmixed heating circuit, with dual storage

- Suitable for new builds, **max. 1 unmixed heating circuit**
- Observe minimum volume flow of 1560 l/h (for K08 and K10) and 2500 l/h (for K12 and K15) in case of defrosting via heating circuit
- Note the overflow valve setting



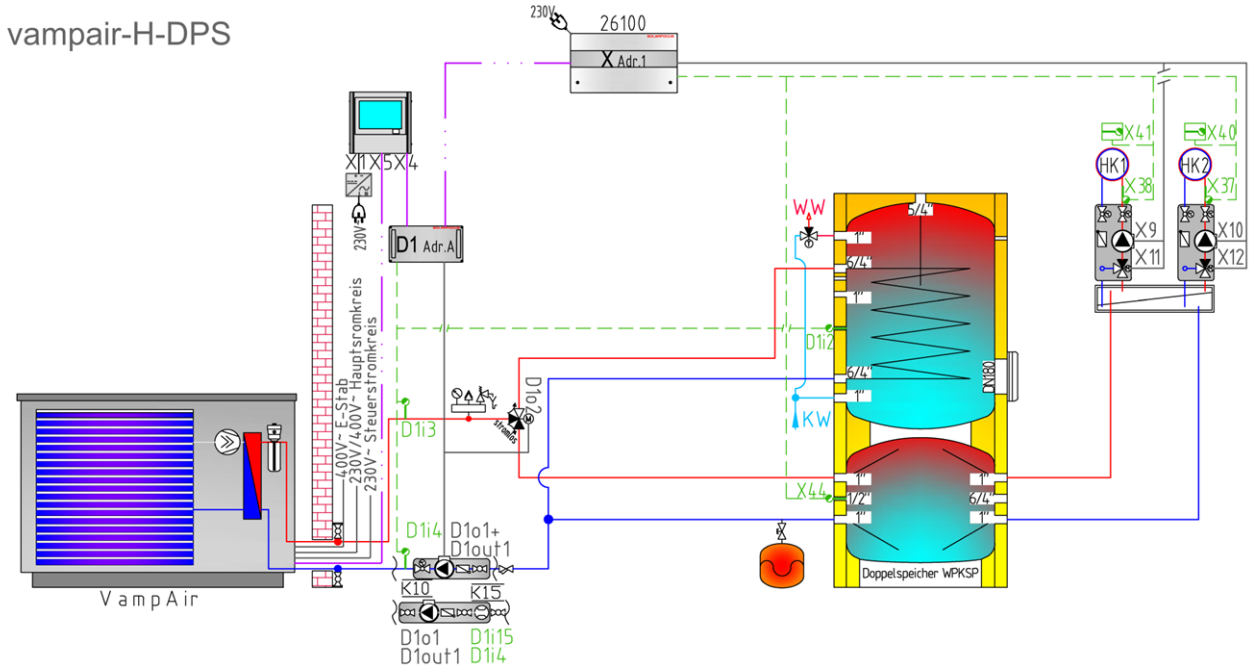
vamp^{air}: for a mixed / unmixed heating circuit, with DHW tank and buffer tank

- **Suitable for new builds and renovated buildings**, up to 8 mixed heating circuits possible
- Decoupling of primary circuit and heating circuit
- Easy to integrate additional heat generators



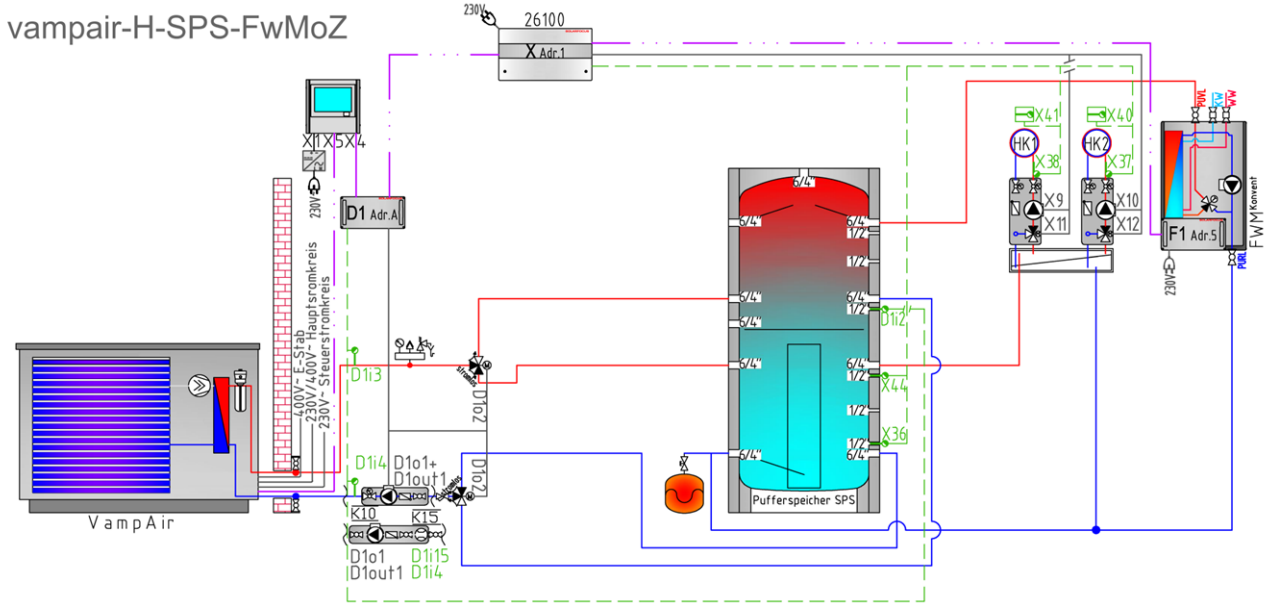
vamp^{air}: for a mixed / unmixed heating circuit, with dual storage

- Suitable for new builds and renovated buildings, up to 8 mixed heating circuits possible
- Decoupling of primary circuit and heating circuit



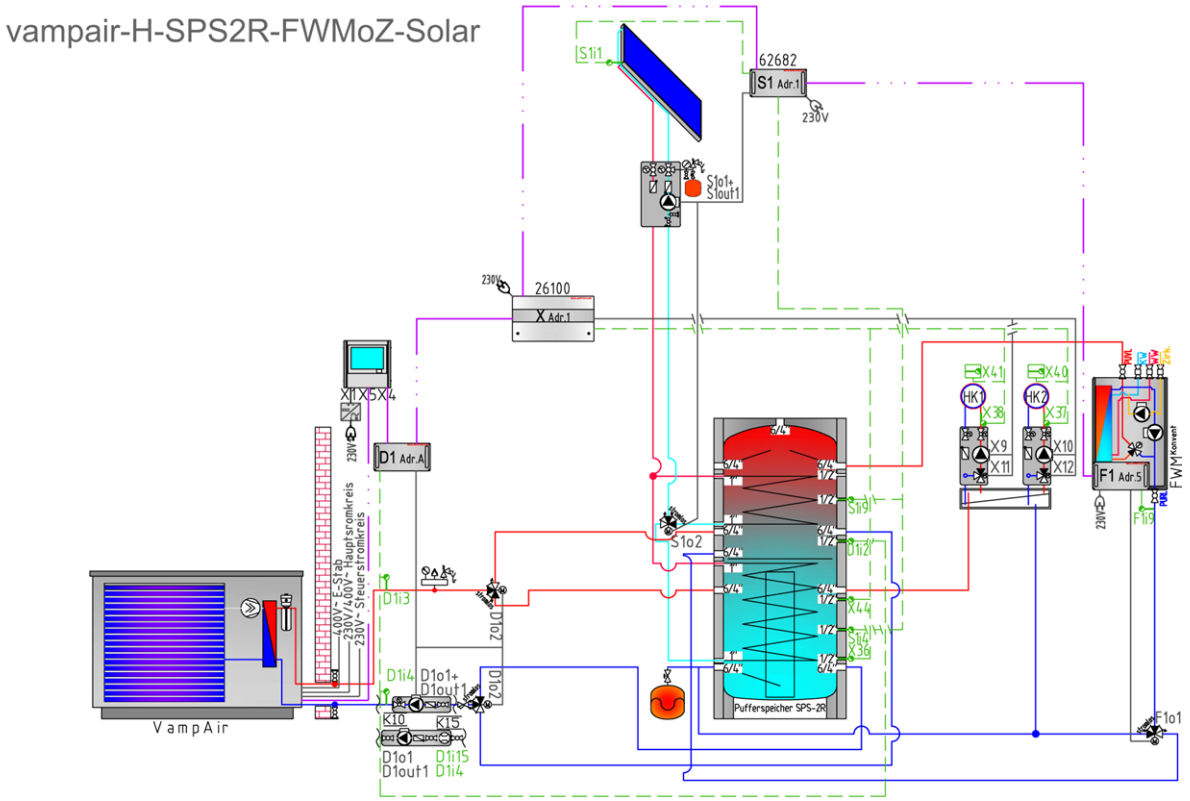
vamp^{air}: for a mixed / unmixed heating circuit, with stratified buffer tank and fresh water module

- Suitable for new builds and renovated buildings, up to 8 mixed heating circuits possible
- Hygienic hot water preparation with FWM
- Decoupling of primary circuit and heating circuit
- Easy to integrate additional heat generators



vamp^{air}: for a mixed heating circuit, with stratified buffer tank incl. 2 solar coils and fresh water module

- Suitable for new builds and renovated buildings, up to 8 mixed heating circuits possible
- Hygienic domestic hot water preparation with fresh water module plus circulation
- Decoupling of primary circuit and heating circuit
- Easy to integrate additional heat generators



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Log wood


Wood chips


Solar energy


Fresh water


Heat pump

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