Installer reference guide

Daikin Altherma 3 H HT ECH_2O

ETSH(B)16P30D	ETSX(B)16P30D
ETSH(B)16P50D	ETSX(B)16P50D

Installer reference guide
Heat pump (indoor unit) with integrated heat accumulator

English

06/2019

List of contents

1 General safety precautions

1.1 Particular safety instructions

⚠ WARNING

Devices that have not been set up and installed correctly can impair the function of the device and/or cause serious or fatal injury to the user.

- Work on the indoor unit (e.g. set-up, inspection, connection and initial commissioning) may only be carried out by persons who are authorised and have successfully completed **qualifying technical or vocational training** and who have taken part in advanced training sessions recognised by the relevant responsible authorities for the specific activity. These include, in particular, **certified heating engineers, qualified electricians and HVAC specialists** who, because of their **professional training** and **expert knowledge**, have experience in the professional installation and maintenance of heating, cooling and air conditioning systems as well as hot water storage tanks.

⚠ WARNING

Disregarding the following safety instructions may result in serious physical injury or death.

- This device may only be used by **children** aged 8 and above and by persons with restricted physical, sensory or mental capabilities or with a lack of experience and knowledge if they are under supervision or if they have been instructed in the safe use of the equipment and understand the dangers arising from it. **Children** must not play with the device. Cleaning and **user maintenance** must not be carried out by **children** without supervision.
- Establish the power supply in accordance with IEC 60335-1, via a separate isolator which separates all poles with a contact opening distance that provides full disconnection in accordance with overvoltage category III.
- All electrical work must only be carried out by electrically qualified experts and with consideration of the local and national regulations and the instructions in this manual. Ensure that a suitable electrical circuit is used. Insufficient load capacity of the electrical circuit or improperly executed connections can result in electric shock or fire.
- The customer must install a pressure relief device with a rated over-pressure of less than 0.6 MPa (6 bar). The connected drain line must have a continuous gradient and a free outlet in a frost-free environment (see Chap. 3.3).
- Water may drip out of the drain line of the pressure relief device. The drain opening must be left open to atmosphere.
- The pressure relief device must be operated regularly in order to remove scale deposits and to make sure it is not blocked.
- The storage tank and hot water circuit can be drained. The instructions in Chap. 8.1 must be observed.

1.1.1 Observing the instructions

- The original documentation is written in German. All other languages are translations.
- Please read this manual carefully and thoroughly before proceeding with the installation or modification of the heating system.
- The precautionary measures described in this document cover very important topics. Follow them meticulously.
- The installation of the system and all activities described in this manual and the applicable documents for the installer must be carried out by an approved installer.

1 General safety precautions

Documentation set

This document is part of a documentation set of other applicable documents.The complete set comprises:

- Installation manual for the indoor unit (format: paper – included in the indoor unit scope of delivery)
- Operating instructions for the indoor unit (format: paper – included in the indoor unit scope of delivery)
- Operating manual for the heat pump (format: paper – included in the indoor unit scope of delivery)
- Installation manual for the outdoor unit (format: paper – included in the outdoor unit scope of delivery)
- Installation instructions for optional components (format: paper – included in the scope of delivery of the respective component)
- Installer reference guide of the indoor unit (format: digital)
- Installer reference guide of the outdoor unit (format: digital)

The reference guides contain the complete set of technical data, a detailed description of best practices and information on maintenance, troubleshooting and decommissioning.

The digital documents and the latest editions of the supplied documentation are available on the regional Daikin website or, on request, from your dealer. The Daikin website is easy to access using the QR code on your device.

1.1.2 Meaning of warnings and symbols

Warnings in this manual are classified according to their severity and probability of occurrence.

DANGER

Indicates an immediate danger.

Disregarding this warning can lead to serious injury or death

WARNING

Indicates a potentially dangerous situation

Disregarding this warning may result in serious physical injury or death.

CAUTION

Indicates a situation which may cause possible damage

Disregarding this warning can cause damage to property and the environment and result in minor injuries.

This symbol identifies user tips and particularly useful information, but not warnings or hazards

Special warning signs

Some types of danger are represented by special symbols.

Electric current

Danger of explosion

Risk of burns or scalds

Risk of poisoning

Validity

Some information in this manual has limited validity. The validity is highlighted by a symbol.

Heat pump outdoor unit

Heat pump indoor unit

FWXV-ATV3

Observe the specified tightening torque

Only applies to devices with unpressurised solar system connection (DrainBack).

Only applies to devices with a bivalent solar system connection (Biv).

Only applies to indoor units with cooling function

Handling instructions

1 Handling instructions are shown as a list. Actions where the sequential order must be adhered to are numbered.

➔ Results of actions are identified with an arrow.

1.2 Safety instructions for installation and operation

1.2.1 General

WARNING

Devices that have not been set up and installed correctly can impair the function of the device and/or cause serious or fatal injury to the user.

- Work on the indoor unit (e.g. set-up, inspection, connection and initial commissioning) may only be carried out by persons who are authorised and have successfully completed **qualifying technical or vocational training** and who have taken part in advanced training sessions recognised by the relevant responsible authorities for the specific activity. These include, in particular, **certified heating engineers, qualified electricians and HVAC specialists** who, because of their **professional training** and **expert knowledge**, have experience in the professional installation and maintenance of heating, cooling and air conditioning systems as well as hot water storage tanks.
- Before starting any work on the indoor unit, switch off the external main switch and secure it against unintentional switch-on.
- Do not leave any tools or other objects below the hood of the device after finishing installation or maintenance work.

Avoiding danger

The indoor unit conforms to the state of the art and meets all recognised technical requirements. However, improper use may result in serious physical injuries or death, as well as property damage. To prevent such risks, only install and operate the devices:

- as stipulated and in perfect condition,
- with an awareness of safety and the hazards involved.

This assumes knowledge and use of the contents of this manual, of the relevant accident prevention regulations as well as the recognised safety-related and occupational health rules.

Before working on the hydraulic system

- Work on the system (such as installation, connection and initial commissioning, for example) must only be carried out by persons who are authorised, who have successfully completed qualifying technical or vocational training for the respective activity and who have taken part in advanced training sessions recognised by the relevant responsible authority.
- When carrying out any work on the system, switch off the main switch and secure against being switched on inadvertently.
- Seals must not be damaged or removed.

- Make sure that the safety valves comply with the requirements of EN 12828 when connecting on the heating side, and with the requirements of EN 12897 when connecting on the domestic water side.

1.2.2 Intended use

The indoor unit may only be used for domestic hot water preparation, as a room heating system and, depending on its design, as a room cooling system.

The indoor unit must only be installed, connected and operated according to the indications in these instructions.

Only the use of a suitable outdoor unit approved by the manufacturer is permitted.

		
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	EPRA14DAV3	P
	EPRA16DAV3	P
	EPRA18DAV3	P
	EPRA14DAW1	P
	EPRA16DAW1	P
	EPRA18DAW1	P

Tab. 1-1 Permissible combinations

Any other use outside the intended use is considered as improper. The operator alone shall bear responsibility for any resulting damage.

Intended use also includes compliance with the maintenance and inspection conditions. Replacement parts must at least satisfy the technical requirements defined by the manufacturer. This is the case, for example, with original spare parts.

1.2.3 Device installation room

WARNING

The plastic wall of the storage tank on the indoor unit can melt under the effects of external heat (>80 °C) and, in the extreme case, can catch fire.

- Only install the indoor unit at a minimum clearance of 1 m from other heat sources (>80 °C) (e.g. electrical heater, oil heater, chimney) and combustible materials.

CAUTION

- Only install the indoor unit if sufficient load-carrying capacity of the ground of 1050 kg/m² plus safety margin is ensured. The ground must be flat, horizontal and level.
- **Outdoor installation is not permissible**.
- Installation in an explosion-risk environment is not permissible.
- The electronic control system must not be exposed to whether effects like rain and snow under any circumstances.
- The storage tank may not be exposed to continuous direct sunlight, as the UV radiation and the effects of the weather will damage the plastic.
- The indoor unit must be installed protected from frost.
- Make sure that the supply company does not provide corrosive domestic water. Suitable water treatment may be required.

- Always ensure the minimum distances from walls and other objects (Chap. 3.3).

CAUTION

- p=0 If a DrainBack solar heating system is connected: Install the indoor unit far enough under the solar panels to allow complete emptying of the solar heating system. (Follow instructions in the DrainBack solar heating system manual). An insufficient height difference may lead to destruction of the DrainBack solar heating system.
- The indoor unit must not be operated in rooms with ambient temperatures of more than 40 °C.

CAUTION

- The required concentration may vary depending on the type of glycol. ALWAYS compare the requirements from the table above with the specifications provided by the glycol manufacturer. If necessary, meet the requirements set by the glycol manufacturer.
- The added concentration of glycol must NEVER exceed 35%.
- If the fluid in the system is frozen, the pump CANNOT start. Mind that if you only prevent the system from bursting, the liquid inside might still freeze.
- If NO glycol has been added to the system and a power failure or a pump failure occurs, drain the water from the system.
- When the water inside the system is stationary, it can easily freeze and thus damage the system.

CAUTION

Glycol absorbs water from its environment. Therefore do NOT add glycol that has been exposed to air. Leaving the cap off the glycol container causes the concentration of water to increase. The glycol concentration is then lower than assumed. As a result, the hydraulic components might freeze up after all. Take preventive actions to ensure a minimal exposure of the glycol to air.

CAUTION

Use only propylene glycol including the required inhibitors, classified as category III as per EN 1717.

CAUTION

- If overpressure occurs, the system releases some of the fluid through the pressure relief valve. If glycol was added to the system, take adequate measures so as to safely recover it.
- Under all circumstances, make sure that the hose of the pressure relief valve is ALWAYS free to release the pressure. Prevent water from staying and/or freezing up inside the hose.

1.2.4 Electrical installation

- Electrical installations may only be carried out by electrical technicians and in compliance with valid electrical guidelines as well as the specifications of the responsible energy supply company.
- Compare the mains voltage indicated on the nameplate with the supply voltage before connecting to the mains.
- Before beginning work on live parts, disconnect them from the power supply (switch off main switch, remove fuse) and secure against unintentional restart.
- Device covers and service panels must be replaced as soon as the work is completed.

1.2.5 Requirements for heating and storage water

Damage due to deposits and corrosion: observe the relevant technical rules to avoid corrosion products and deposits.

Minimum requirements regarding the quality of filling and top-up water:

- Water hardness (calcium and magnesium, calculated as calcium carbonate): ≤ 3 mmol/l
- Conductivity: ≤ 1500 (ideal: ≤ 100) µS/cm
- Chloride: ≤ 250 mg/l
- Sulphate: ≤ 250 mg/l
- pH value: 6.5 – 8.5

INFORMATION

To guarantee frost protection in the event of a power failure, glycol can be added to the heating water circuit. Please observe the notes in Chap. 3.8.4.

Measures for desalination, softening or hardness stabilisation are necessary if the filling and top-up water have a high total hardness (>3 mmol/l – total of the calcium and magnesium concentrations, calculated as calcium carbonate). We recommend the use of Fernox KSK limescale and corrosion protector. For other properties deviating from the minimum requirements, suitable conditioning measures are necessary to maintain the required water quality.

Using filling water and top-up water which does not meet the stated quality requirements can cause a considerably reduced service life of the device. The responsibility for this lies solely with the operator.

1.2.6 Heating system and sanitary connection

- Create a heating system according to the safety requirements of EN 12828.
- The plumbing connection must comply with the requirements of EN 12897. The requirements of the following must also be observed:
  - EN 1717 – Protection against pollution of potable water installations and general requirements of devices to prevent pollution by backflow
  - EN 61770 – Electric appliances connected to the water mains – Avoidance of backsiphonage and failure of hose-sets
  - EN 806 – Specifications for installations inside buildings conveying water for human consumption
  - and, in addition, the country-specific legislation.

When operating the indoor unit, the storage tank temperature may exceed 65 °C.

- For this reason, some form of scalding protection needs to be included when you install the system (hot water mixing device, e.g. **VTA32**).

If the indoor unit is connected to a heating system with steel pipes, radiators or non-diffusion-proof floor heating pipes, sludge and chips can enter the hot water storage tank and cause blockages, local overheating or corrosion damage.

- To prevent possible damage, install a dirt filter or sludge separator into the heating return flow of the system (SAS 1 or SAS 2).
- The dirt filter must be cleaned at regular intervals.

1.2.7 Operation

The indoor unit:

- Do not operate until all installation and connection work is completed.
- Only operate with a completely full storage tank (check level indicator) and heating circuit.
- Operate at a maximum pressure of 3 bar.
- Only connect with a pressure reducer on the external water supply (supply line).
- Only operate if the protective cover is installed.

The specified servicing intervals should be adhered to and inspection work must be carried out.

1.3 Maintenance, troubleshooting and decommissioning

Work for maintenance, troubleshooting and decommissioning must not be carried out without knowledge of the relevant safety precautions and in the event of disposal of the country-specific guidelines. Please refer to the corresponding information in the installer reference guide.

Recommendations for disposal

We designed the indoor unit in an environmentally friendly manner. During the disposal process, the only waste created is that which can be used for material or thermal recycling. The materials used that are suitable for recycling can be sorted into individual types.

Thanks to the environmentally friendly design of the indoor unit, we have established requirements to ensure environmentally friendly disposal. Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

The designation of the product means that electrical and electronic products may not be disposed of together with unsorted domestic waste.

Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

- Disassembly of the system, handling of coolant, oil and other parts may only be carried out by a qualified fitter.
- Disposal may only be carried out by an organization that specialises in reuse, recycling and recovery.

Further information is available from the installation company or the responsible local authorities.

1.4 Warranty conditions

The legal guarantee conditions fundamentally apply. Our more extensive warranty conditions can be found in the Internet. Ask your suppliers if necessary.

Incorrect installation, commissioning and maintenance will void the warranty. If you have any questions, please contact our customer service.

Warranty claims can only be made if the annual maintenance work is demonstrably carried out regularly according to the information in the installer reference guide.

2 Product description

2.1 Design and components

Outside of the device

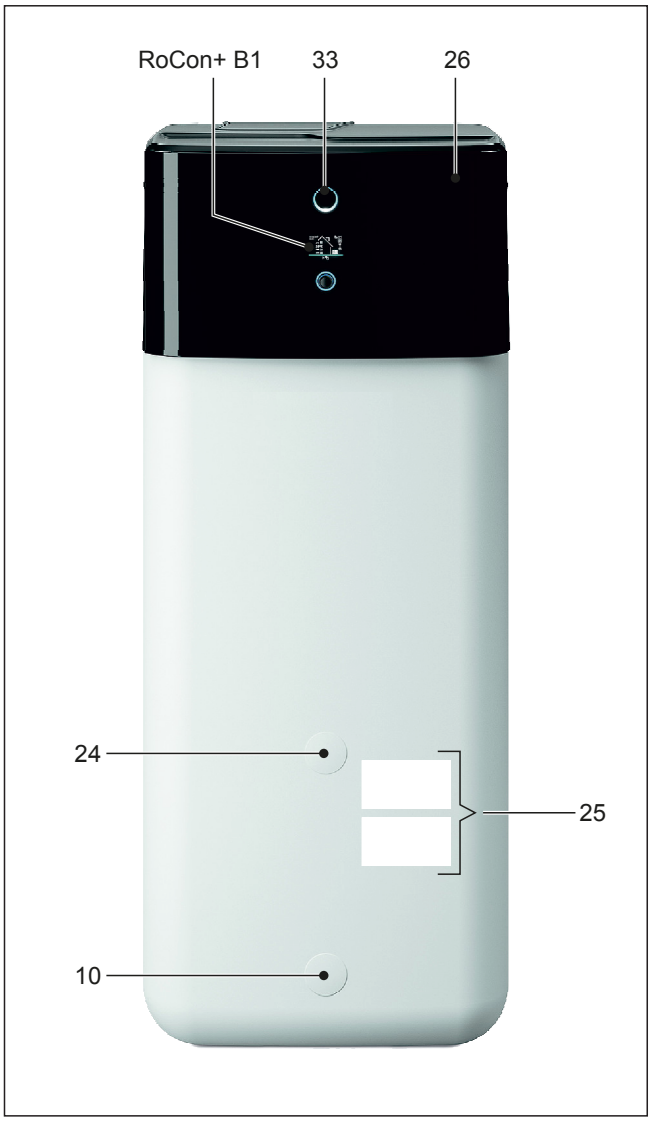


Fig. 2-1 Design and components – Outside of the device[1]

Upper side of the device

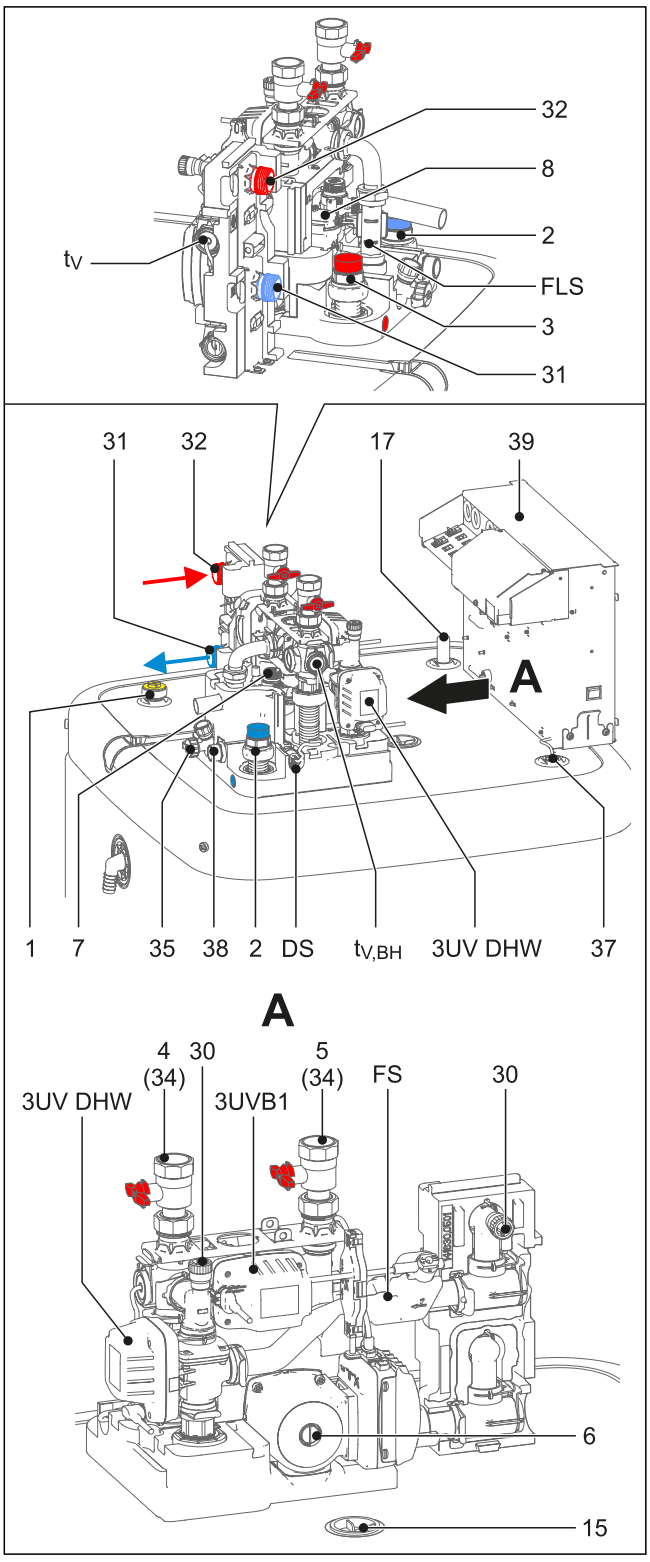


Fig. 2-2 Design and components – Top of the device[1]

[1] For legend, see Tab. 2-1

Internal structure of ETS(X/H)(B)16P30D

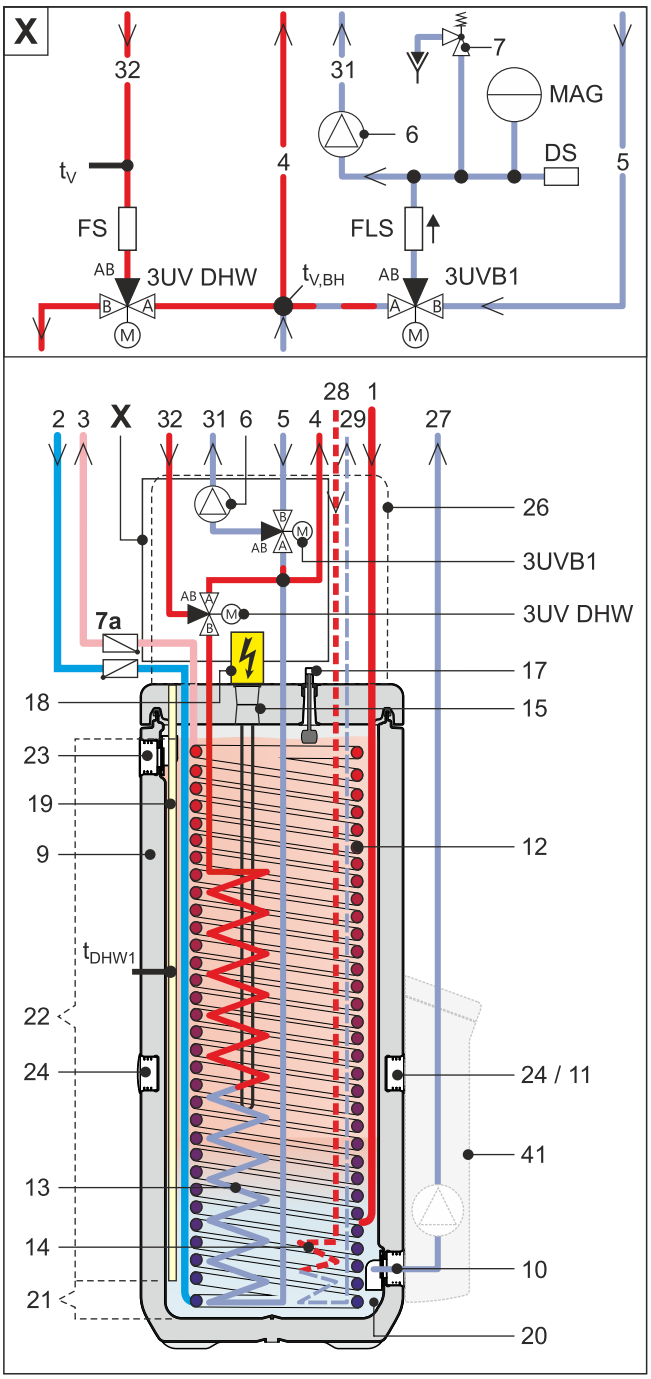


Fig. 2-3 Structure and components – internal structure of ETS(X/H)(B)16P30D(1)

Internal structure of ETS(X/H)(B)16P50D

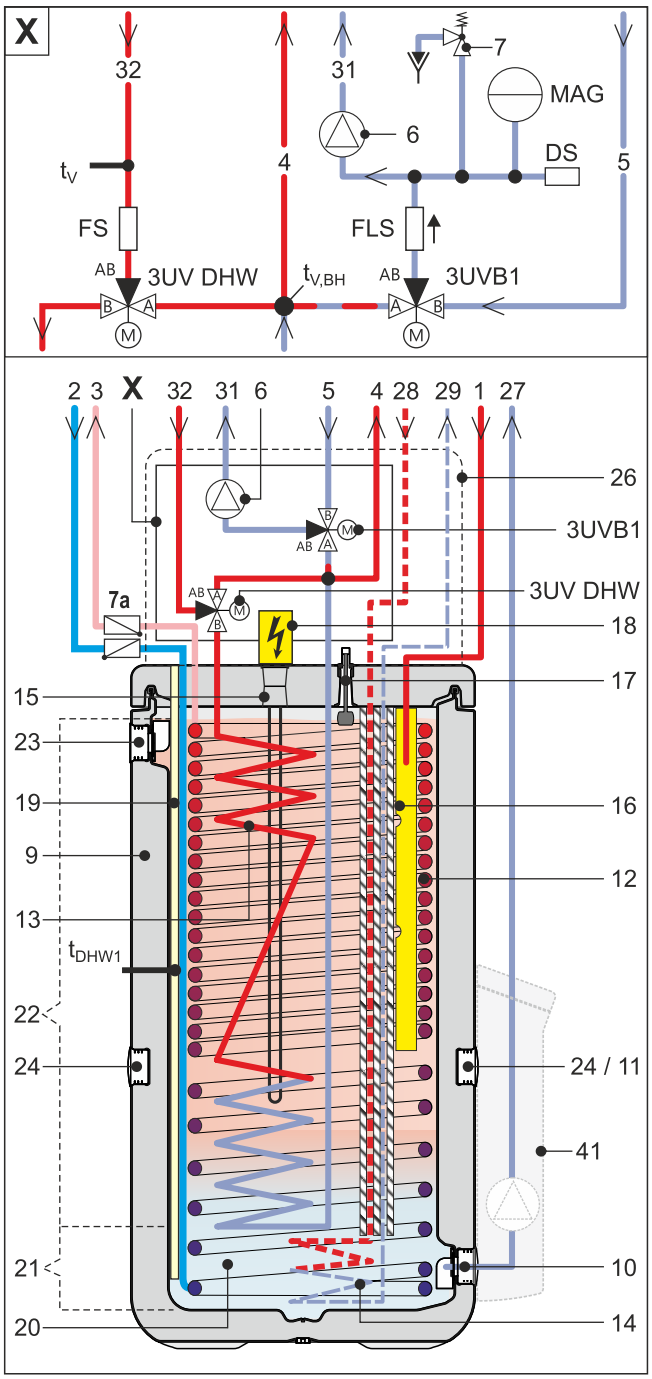


Fig. 2-4 Structure and components – internal structure of ETS(X/H)(B)16P50D(1)

Item	Designation	Item	Designation
1	Solar inflow	25	Type plate
2	Cold water connection	26	Protective cover
3	Hot water	27	Solar return flow
4	Heating flow	28	Bivalent feed (type ETS(X/H)B only)
5	Heating return flow	29	Bivalent return (type ETS(X/H)B only)
6	Circulation pump	30	Manual vent valve
7	Pressure relief valve	31	Outdoor unit water inlet connection
7a	Circulation stop valve (accessory)	32	Outdoor unit water outlet connection

(1) For legend, see Tab. 2-1

Item	Designation	Item	Designation
8	Automatic vent valve	33	Status display
9	Storage tank (polypropylene, double-walled jacket with PUR hard foam heat insulation)	34	Ball valve (heating circuit)
10	Filling and draining connection or solar return flow connection	35	Combined filling and draining valve (heating circuit)
11	Mount for solar controller or handle	37 t_{DHW1}	Storage tank temperature sensor
12	Heat exchanger (stainless steel) for domestic hot water heating	38	Diaphragm expansion vessel connection
13	Heat exchanger (stainless steel) for storage tank charging or heating support	39	Controller housing
14	Biv heat exchanger (stainless steel) for charging with external heat generator (e.g. pressurised solar system)	41	EKSRPS4 Optional: Solar control and pump unit
15	Connection for optional electrical backup heater EKBUxx	3UVB 1	3-way switch valve (internal heat generator circuit)
16	Solar inflow layering pipe	3UV DHW	3-way switch valve (hot water/heating)
17	Fill level indicator (tank water)	DS	Pressure sensor
18	Optional: electric backup heater (EKBUxx)	FLS	FlowSensor
19	Sensor pocket for tank temperature sensor t_{DHW1}	t_V	Inflow temperature sensor
20	Pressure-free storage water	$t_{V, BH}$	Backup heater inflow temperature sensor
21	Solar zone	RoCon + B1	Controller control panel
22	Hot water zone	MAG	Diaphragm expansion vessel
23	Safety overflow connection	FS	Flow switch
24	Mount for handle		

Tab. 2-1 Legend for Fig. 2-1 to Fig. 2-4

2.2 Function of the 3-way switch valves

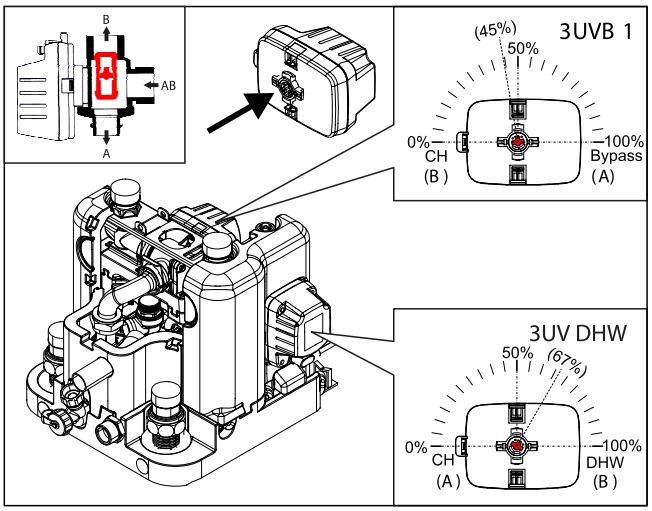


Fig. 2-5 Function of 3-way switch valve

3 Set-up and installation

WARNING

Cooling systems (heating pumps), climate control systems and heating devices that have been set up and installed incorrectly can both endanger human life and health and be impaired in their function.

- Work on the indoor unit (such as installation, repair, connection and initial commissioning, for example) must only be carried out by persons who are authorised, who have successfully completed qualifying technical or vocational training for the respective activity and who have taken part in advanced training sessions recognised by the relevant responsible authority. These include, in particular, certified heating engineers, qualified electricians and HVAC specialists who, because of their professional training and expert knowledge, have experience in the professional installation and maintenance of heating, cooling and air conditioning systems and heat pumps.

Incorrect set-up and installation would render the manufacturer's guarantee void. If you have questions, please contact our Technical Customer Service.

3.1 Dimensions and connection dimensions

Dimensions, ETS(X/H)B16P30D

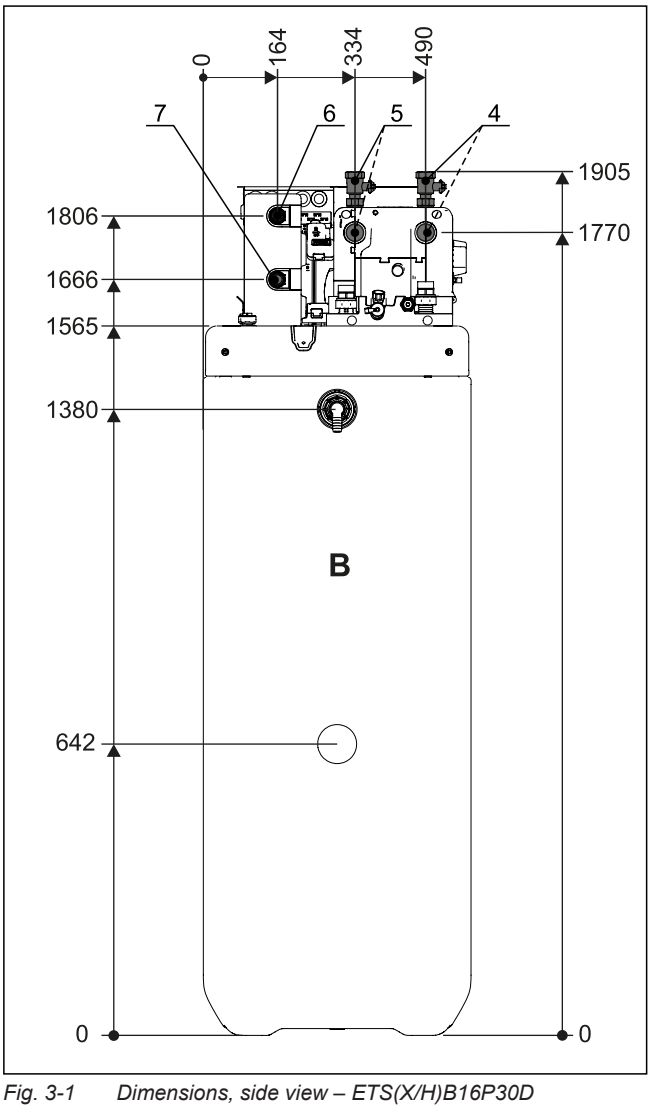


Fig. 3-1 Dimensions, side view – ETS(X/H)B16P30D

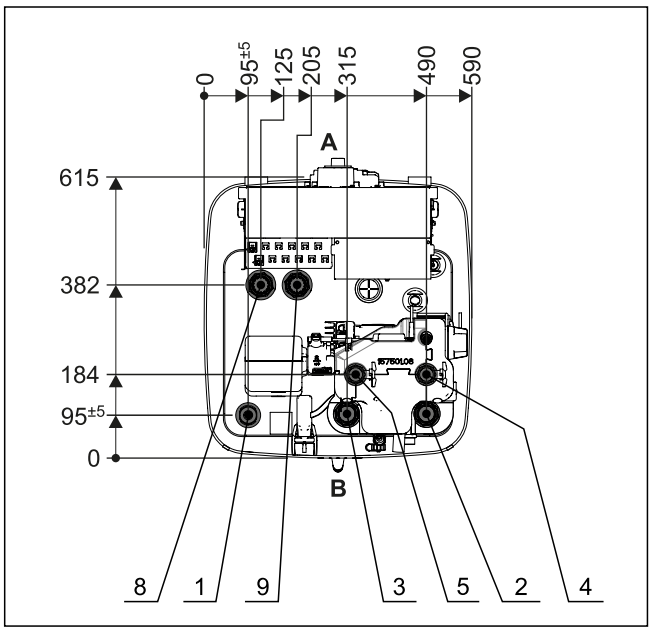


Fig. 3-2 Dimensions, top of unit – type ETS(X/H)B16P30D

Dimensions, ETS(X/H)B16P50D

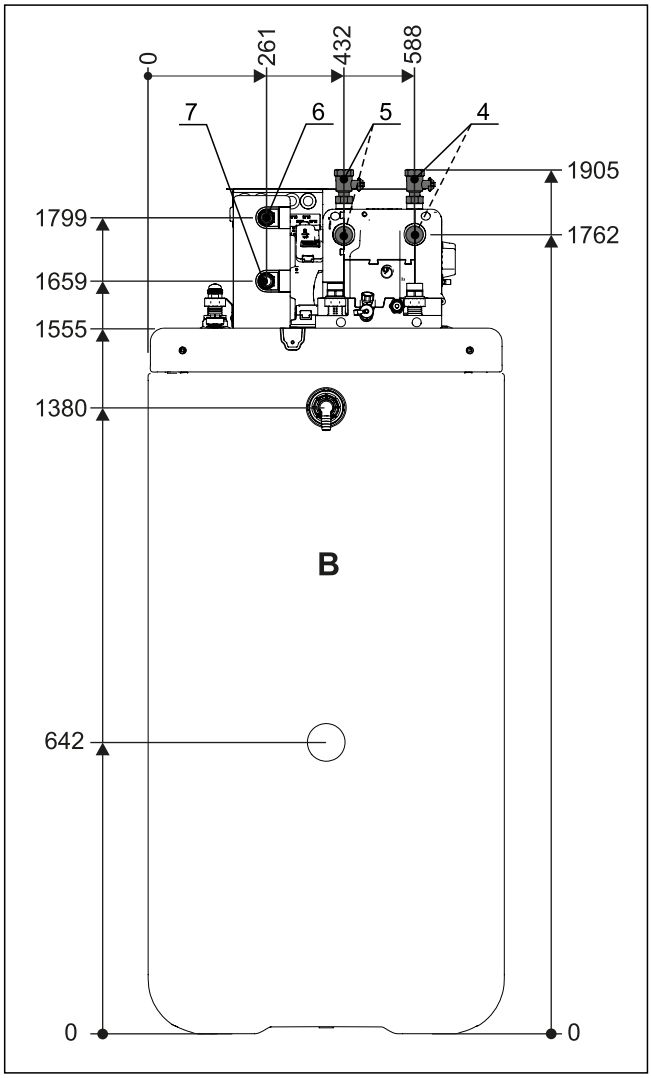


Fig. 3-3 Dimensions, side view – type ETS(X/H)B16P50D

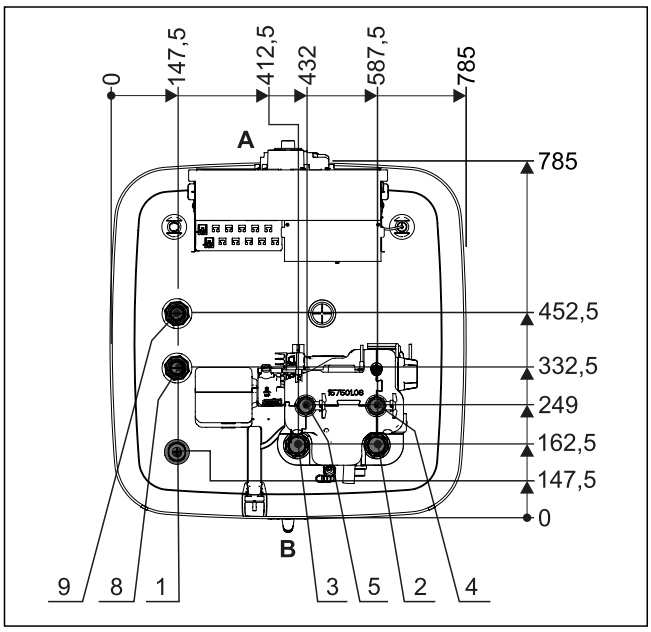


Fig. 3-4 Dimensions, top of unit – type ETS(X/H)B16P50D

Item	Designation	Item	Designation
1	Solar inflow	7	Outdoor unit water inlet connection
2	Cold water	8	Bivalent feed (type ETS(X/H)B only)
3	Hot water	9	Bivalent return (type ETS(X/H)B only)
4	Heating flow		
5	Heating return flow	A	front
6	Outdoor unit water outlet connection	B	rear

Tab. 3-1 Legend for Fig. 3-1 to Fig. 3-4

3.2 Transport and delivery

WARNING

When unfilled, the indoor unit is top-heavy and could tip over during transport. That could put persons in danger or damage the unit.

- Secure the indoor unit well, transport carefully, use the handles.

The indoor unit is delivered on a pallet. All industrial trucks, such as lifting trucks and forklift trucks, are suitable for transport.

Scope of delivery

- Indoor unit (pre-mounted),
- Bag of accessories (see Fig. 3-5),
- Document pack.

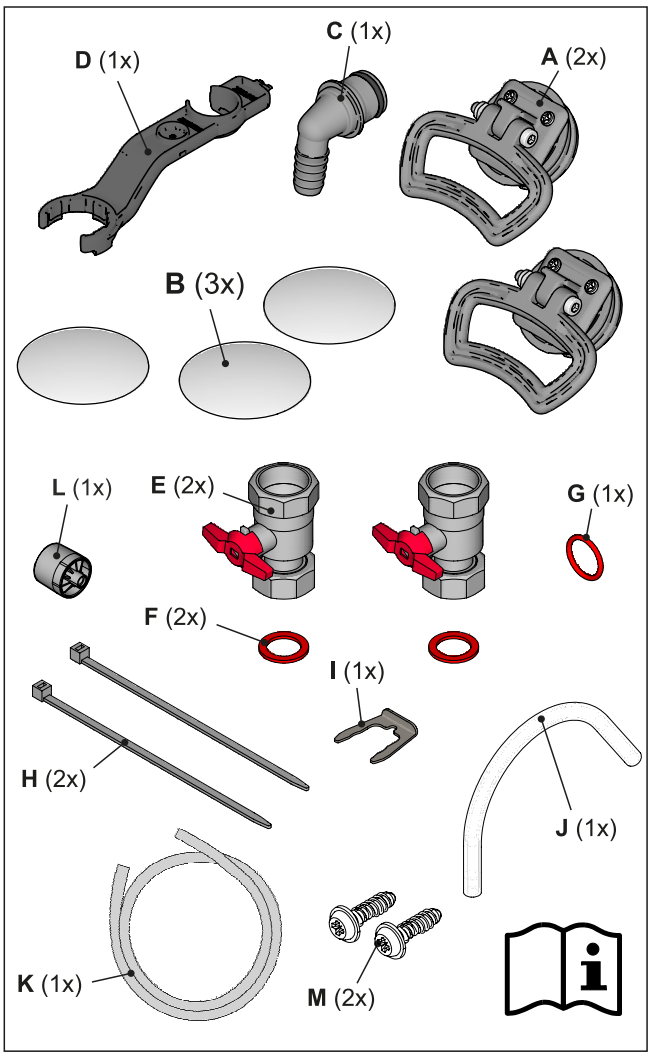


Fig. 3-5 Contents of bag of accessories

- **A** Handles (only required for transport)
- **B** Cover panel
- **C** Hose connecting piece for safety overflow
- **D** Assembly wrench
- **E** Ball valve
- **F** Flat gasket
- **G** O-ring
- **H** Cable tie
- **I** Securing clip
- **J** Venting hose
- **K** Drain hose cover
- **L** Controller rotary switch
- **M** Hood screws

For further accessories for the indoor unit, see price list.

3.3 Installing the heat pump

3.3.1 Selecting the installation site

The installation site of the indoor unit must meet the minimum requirements below (see also Chap. 1.2.3).

Installation area

- The base must be level and smooth and have sufficient **ground load-bearing capacity** of **1050 kg/m²** plus safety factor. Install a pedestal if necessary.
- Observe the installation dimensions (see Chap. 3.1).

Minimum distance

DANGER: RISK OF BURNING

The plastic wall of the storage tank on the indoor unit can melt under the effects of external heat (>80 °C) and, in the extreme case, can catch fire.

- Only install the indoor unit at a minimum clearance of 1 m from other heat sources (>80 °C) (e.g. electrical heater, oil heater, chimney) and combustible material.

CAUTION

p=0 If the indoor unit is not installed at a **sufficient** distance **below** the flat solar panels (the top edge of the storage tank is higher than the bottom edge of the solar panels), the unpressurised solar system in the outdoor area will not be able to drain completely.

- When a solar connection is used, install the indoor unit low enough under the flat solar panels (observe the minimum gradient of the solar connection lines).

Recommended minimum distances:

From the wall: (rear) ≥100 mm, (sides) ≥500 mm

From the ceiling: ≥1200 mm, at least 480 mm.

Distances from the outdoor unit:

When selecting the installation location, the data in the Tab. 3-2 must be taken into account.

Maximum line length between the indoor and outdoor units	50 m
Maximum height difference between the indoor and outdoor units	10 m

Tab. 3-2

3.3.2 Installing the device

WARNING

When unfilled, the indoor unit is top-heavy and could tip over during transport. That could put persons in danger or damage the unit.

- Secure the indoor unit well, transport carefully, use the handles.

Precondition

- The installation site complies with applicable country-specific regulations and meets the minimum requirements described in Chap. 3.3.1.

Installation

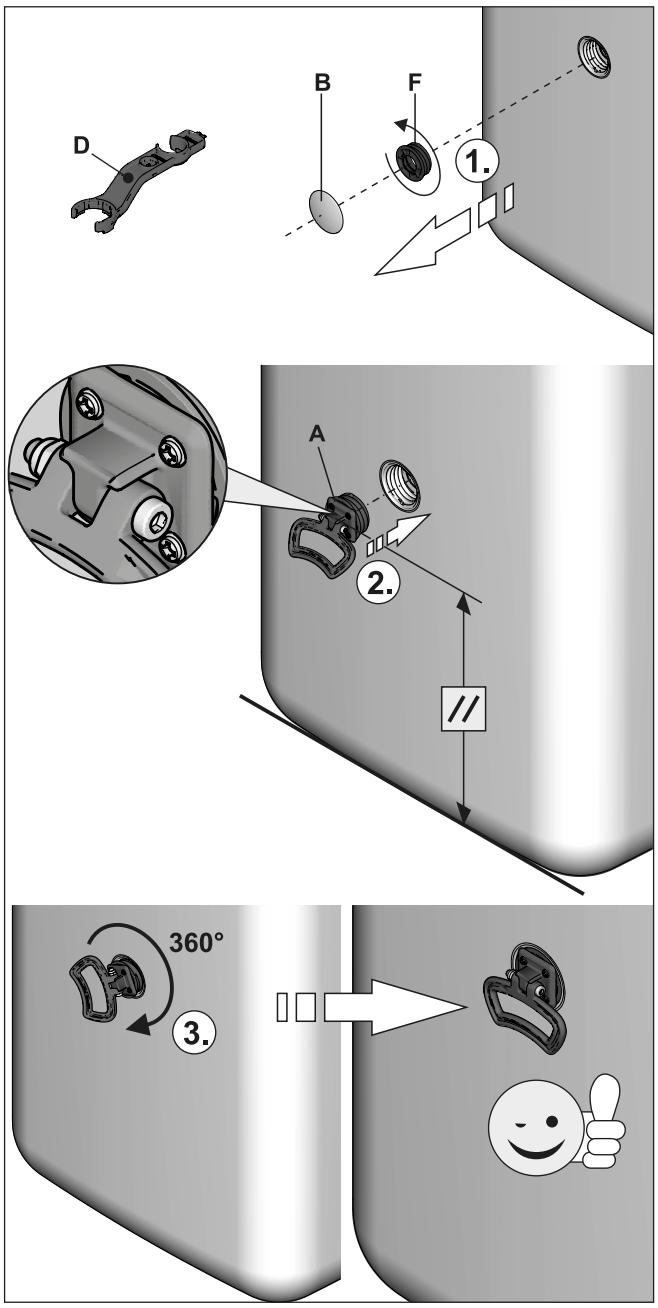


Fig. 3-6 Installing the handles
A Handle
B Cover panel
F Threaded piece

1. Remove the packaging and dispose of it in an environment-friendly manner.
2. Pull the cover screens off the storage tank (Fig. 3-6, item B) and unscrew the threaded fittings (Fig. 3-6, item F) from the openings at which the handles are to be fitted.
3. Screw the handles (Fig. 3-6, item A) into the now uncovered threaded holes.
4. Carefully transport the indoor unit to the installation site, use the **handles**.
5. Install the indoor unit at the installation site.

3.4 Preparing the device for installation

3.4.1 Remove the front screen

1 Undo the screws (1.).

2 Press the lateral holding burls upwards with your fingers (2.), stem from above with the thumbs.

3 Remove the front screen to the front (3.).

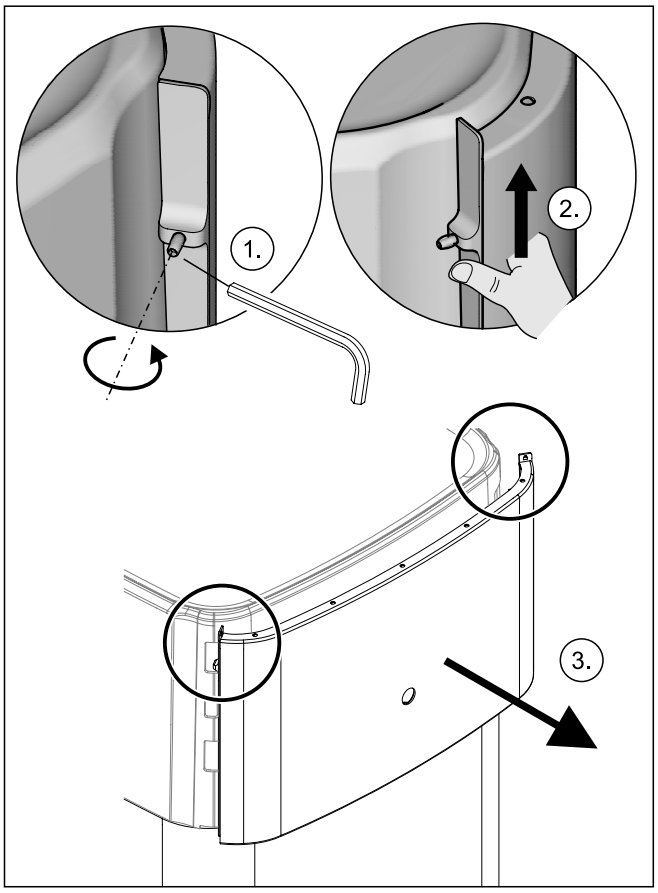


Fig. 3-7 Remove the front screen

3.4.2 Remove the protective cover

1 Unhook the protective cover from the rearward facing holding burls (1.), lift at the back (2.) and remove to the front (3.).

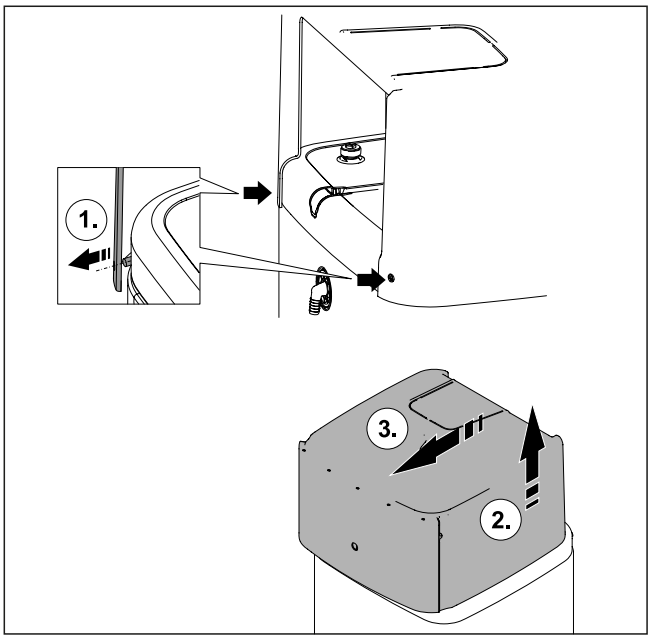


Fig. 3-8 Remove the protective cover

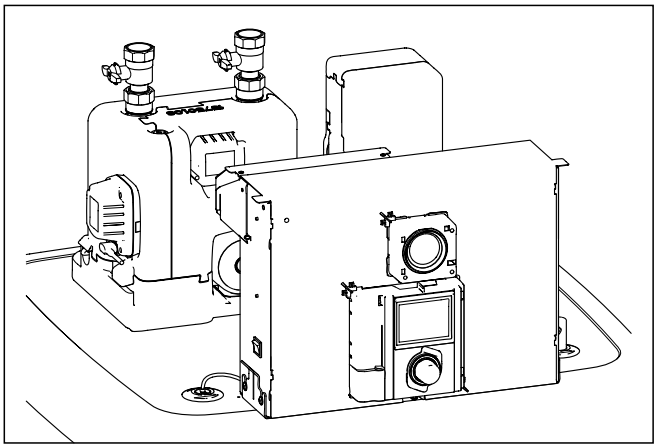


Fig. 3-9 Without protective cover

3.4.3 Moving the controller housing to the service position

To facilitate work on the hydraulics of the indoor unit, the control box can be moved to the service position.

1 Loosen the screws (1) of the holder of the controller housing.

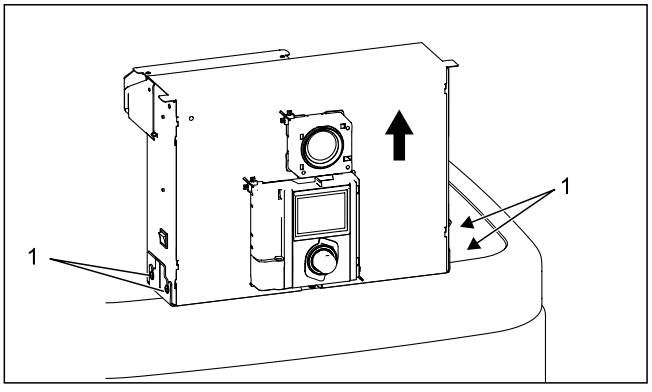


Fig. 3-10 Moving the controller housing to the service position

2 Remove the controller housing from the front and insert it into the bracket with the hooks on the rear brackets.

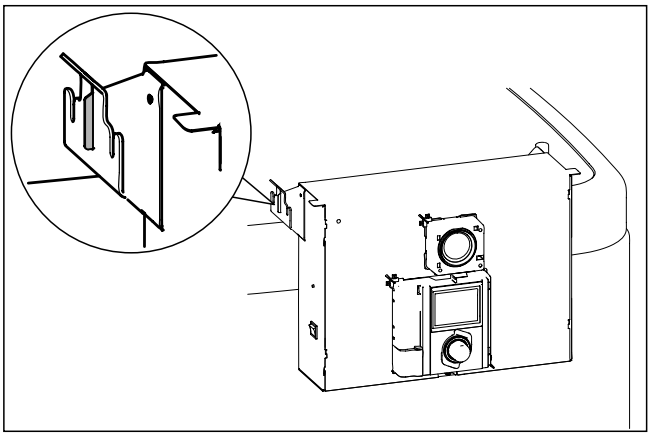


Fig. 3-11 Controller housing in the service position

3.4.4 Open the controller housing

To make the electrical connections, the controller housing itself must be opened. This can be done in both the normal and the service position.

1 Loosen the front screw.

2 Push the cover upwards and pull it away to the front.

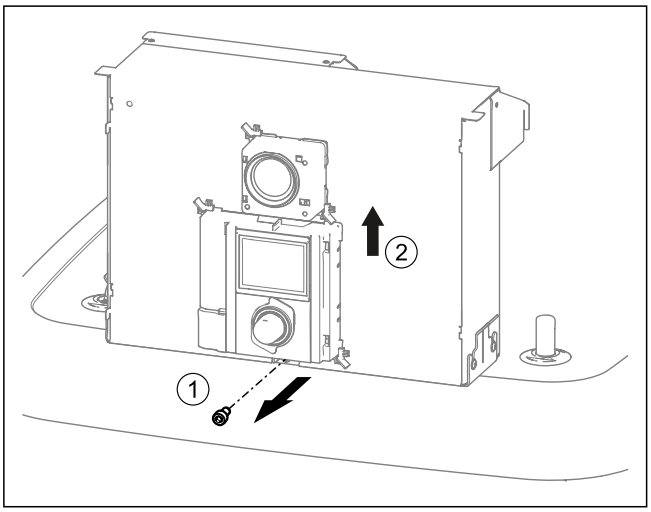


Fig. 3-12 Open the controller housing

3 Hook in the cover on the controller housing with the lateral hooks.

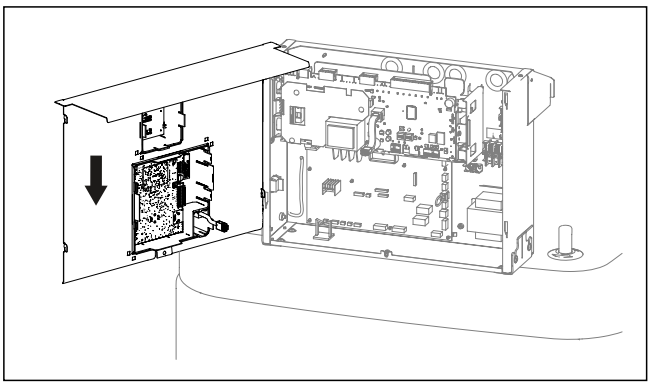


Fig. 3-13 Hooking in the cover

3.4.5 Removing the bottom thermal insulation

CAUTION

The thermal insulation consists of pressure-sensitive EPP moulded parts that can be easily damaged if not handled correctly.

- Only remove the thermal insulation in the order stated below and in the stated directions.
- Do not use force.
- Do not use tools.

1 Remove the thermal insulation in the following order:

- Pull the side insulating element off horizontally (item A).
- Pull the rear insulating element off horizontally (item B).
- Pull the front insulating element off horizontally (item C).

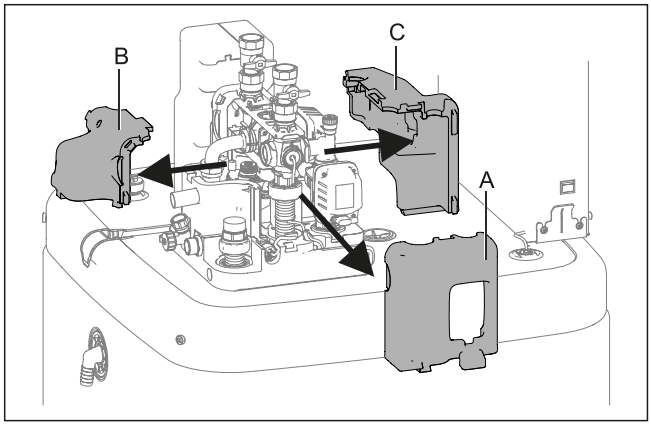


Fig. 3-14 Removing the top thermal insulation

2 **As required:** Remove the bottom thermal insulation in the following order:

- Pull the side insulating element off vertically (item A).
- Pull the rear insulating element off vertically (item B).

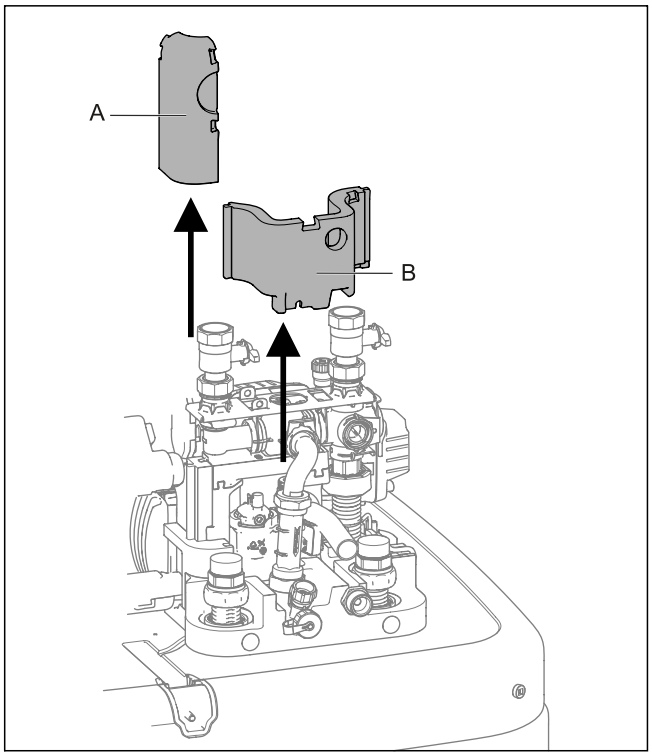


Fig. 3-15 Removing the bottom thermal insulation

INFORMATION

The thermal insulation is installed in reverse order.

3.4.6 Opening the vent valve

1 Removing the thermal insulation (see Chap. 3.4.5).

2 Open the vent valve on the pump by one turn.

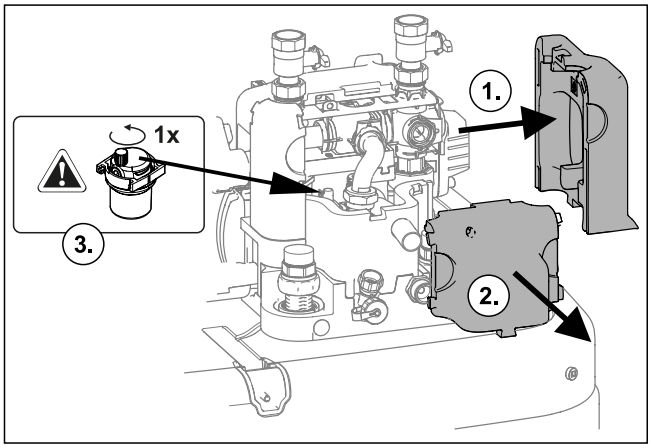


Fig. 3-16 Opening the vent valve

3.4.7 Aligning the connections of the heating inflow and return flow

CAUTION

When working on the hydraulics, pay attention to the installation position of the O-rings to avoid damaging them and causing leaks.

- Always place O-rings on the part to be inserted after disassembly or before assembly (see Fig. 3-19).
- The heating lines must be connected free of tension via the plug connectors. Establish a suitable strain relief especially when connecting with flexible lines (not open to diffusion!) (see Fig. 3-31).

CAUTION

If the plug brackets cannot be put on properly, the couplings can be detached from their mountings to ensure a very strong or continuous escape of liquid can occur.

- Before putting on a plug bracket, make sure that the stirrup engages in the coupling groove. To do so, insert the coupling far enough into the mounting that the groove is visible through the plug bracket mounting.
- Insert the plug bracket up to the end stop.

The connections of the heating inflow and return flow can be directed upwards or backwards in order to adapt it optimally to the structural conditions of the installation site.

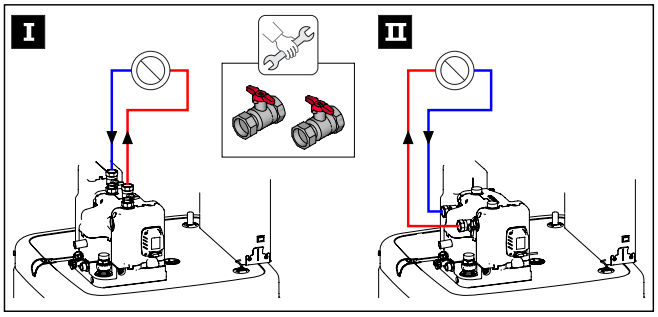


Fig. 3-17 Variants for aligning the heating feed and return

The device is supplied with upwards aligned connections as standard. The following conversion steps are required in order to direct the connections to the rear out of the device:

1 Remove the protective cover and top thermal insulation (see Chap. 3.4.2).

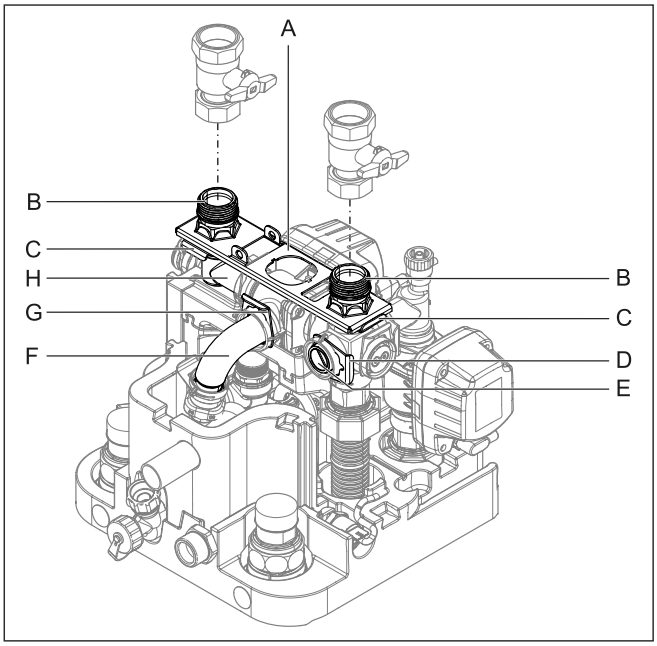


Fig. 3-18 Aligning the heating inflow and return flow upwards

2 Pull the two securing clips off the connection couplings (Fig. 3-18, item C).

3 Pull off the two connection couplings (Fig. 3-18, item B).

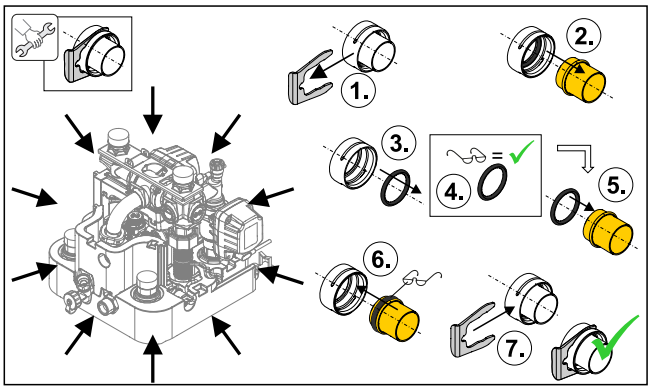


Fig. 3-19 Hydraulic system plug connectors

4 Remove the retaining plate (Fig. 3-18, item A).

5 Pull off the sealing plug securing clip (Fig. 3-18, item D).

6 Pull out the sealing plug (Fig. 3-18, item E).

7 Turn the elbow (Fig. 3-18, item H) 90° to the rear.

8 Pull the securing clip off the manifold (Fig. 3-18, item G).

9 Carefully pull the manifold (Fig. 3-18, item F) so far backwards out of its horizontal mounting that the retaining plate (Fig. 3-20, item A) can be pushed vertically in between.

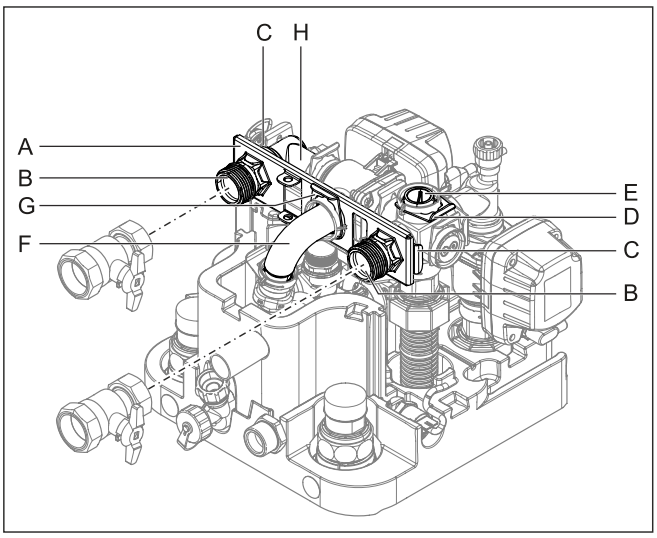


Fig. 3-20 Heating inflow and return flow connections aligned to the rear

10 Slide the retaining plate between the manifold and its horizontal mounting and insert the manifold (Fig. 3-20, item F) back into its mounting through the middle hole of the retaining plate.

11 Secure the manifold with securing clip (Fig. 3-20, item G) in its mounting again.

12 Insert the two connection couplings (Fig. 3-20, item B) into the lateral mountings through the retaining plate.

13 Secure the two connection couplings with securing clips (Fig. 3-20, item C) in their mountings.

14 Insert the sealing plug (Fig. 3-20, item E) into the upper mounting.

15 Secure the sealing plug with securing clip (Fig. 3-20, item D).

16 Cut out side openings in the thermal insulation (Fig. 3-21, item A) using a suitable tool.

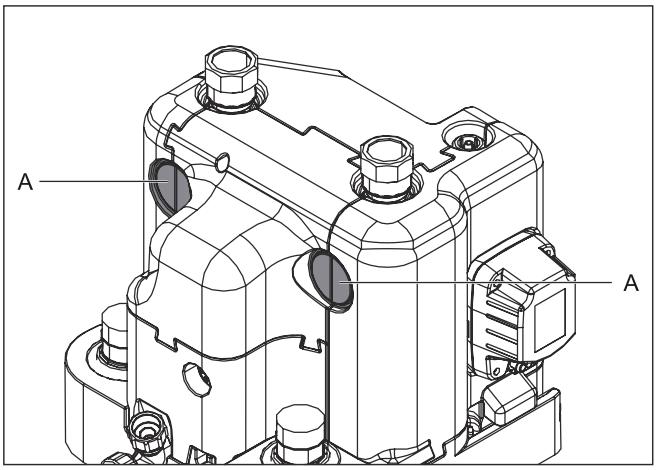


Fig. 3-21 Cut-out in thermal insulation

3.4.8 Making the hood opening

1 With the heating inflow and return flow directed upwards: Cut the hood along the perforation with a suitable tool.

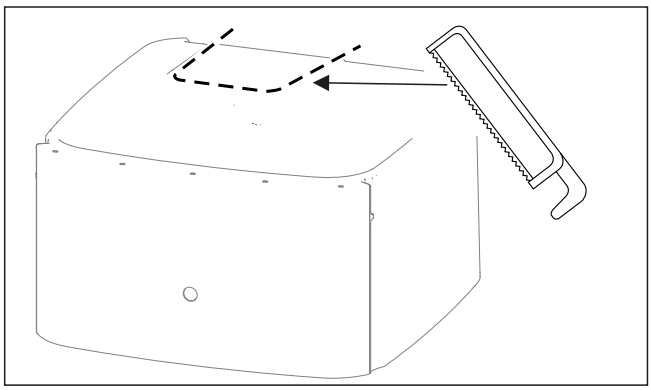


Fig. 3-22 Making the hood opening

3.4.9 Installing the rotary switch of the controller

1 Place the rotary switch on the rotary switch holder of the RoCon + HP and press it on.

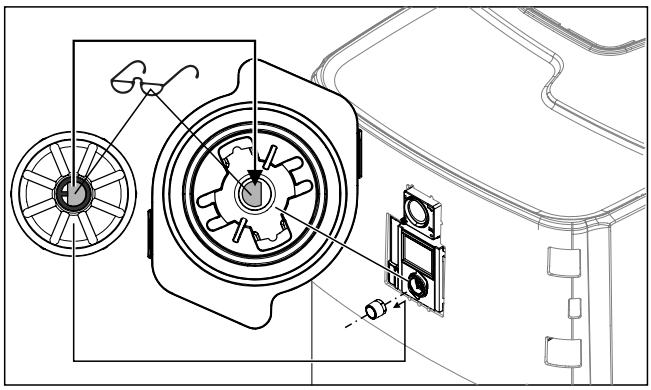


Fig. 3-23 Putting on the rotary switch

3.4.10 Securing the hood

After the installation is fully completed:

1 Attach the screws for fixing the hood (accessory bag).

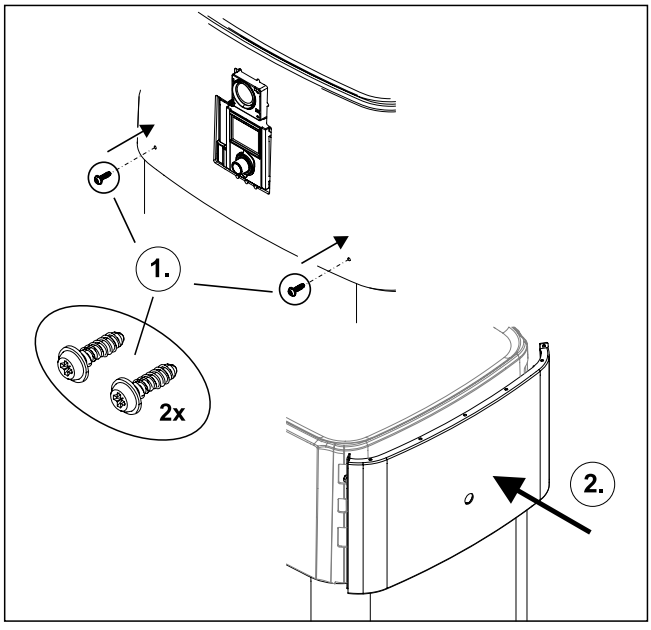


Fig. 3-24 Securing the hood

2 Place the front cover straight over the rotary switch of the RoCon + HP. Press on the top and bottom until the front screen is securely engaged again.

3.5 Installing optional accessories

3.5.1 Installation of electric backup heater (EKBUxx)

INFORMATION

If the ceiling height is low, the storage tank must be tilted to install the backup heater when empty. This must be done before any further installation steps.

The indoor unit provides the option of installing an electrical auxiliary heater (backup heater EKBUxx). For example, renewable energy can be used as an additional heat source.

INFORMATION

A separate manual containing instructions about installation and operation is included with this component.

3.5.2 Installation of the external heat generator connection set

The connection set for external heat generators must be installed to control an electrical backup heater or another external heat generator.

1 Open the housing by removing the screw.

2 Remove additional components from the housing (strain relief clip, cable tie, grommet).

3 Attach the connection set to the controller housing of the indoor unit. To do this, insert the hooks (1) of the connection set into the slots of the controller housing (2); then press the connection set downwards.

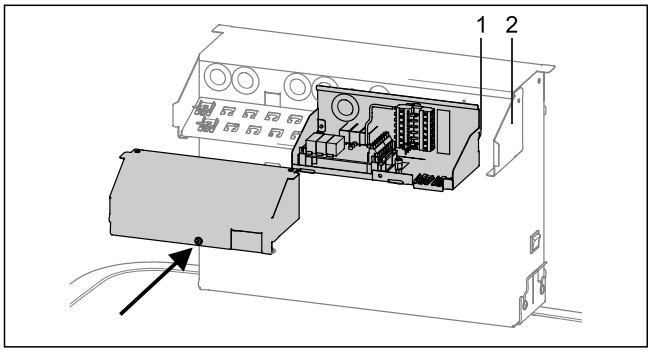


Fig. 3-25 Fitting the connection set

4 Attach the grommet (3) to the bushing between the connection set (A) and the controller housing (B).

5 Attach the fastening rivet (4).

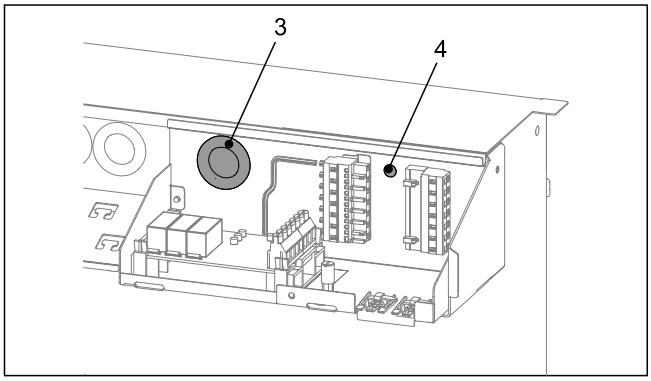


Fig. 3-26 Cable gland

6 Guide the cable of the Ultra EHS PCB through the cable grommet and connect it to the RoCon BM2C (see Fig. 3-41).

7 After the installation and the electrical connections (see Chap. 3.6 or Chap. 3.7) have been completed, replace the cover and close it with the screw.

3.5.3 Installation of the DB connection kit

The optional DB connection kit allows better access for connecting the DrainBack pipe (solar feed).

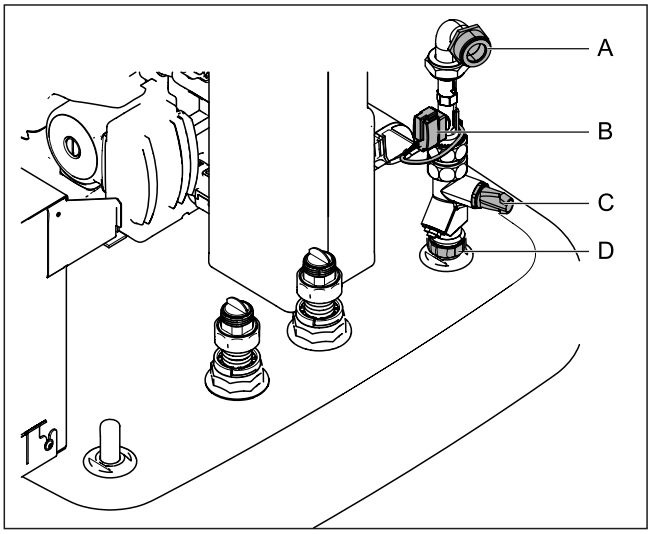


Fig. 3-27 DB connection kit

- **A** DB pipe connection (solar inflow)
- **B** FlowSensor (not part of the DB connection kit, but included with EKSRPS4)
- **C** Flow rate limiter (FlowGuard)
- **D** Solar inflow connection p=0 on the storage tank

3.5.4 Installation of the P connection kit

The optional P connection kit for Biv device types allows better access for connecting the inflow and return flow lines of a pressurised solar system or another external heat generator on the storage tank. The kit contains two thermally insulated corrugated pipes that are connected to the connections of the storage tank via a union nut. At the other end of the corrugated pipes there is an adapter for different connection sizes of the supply and return pipes.

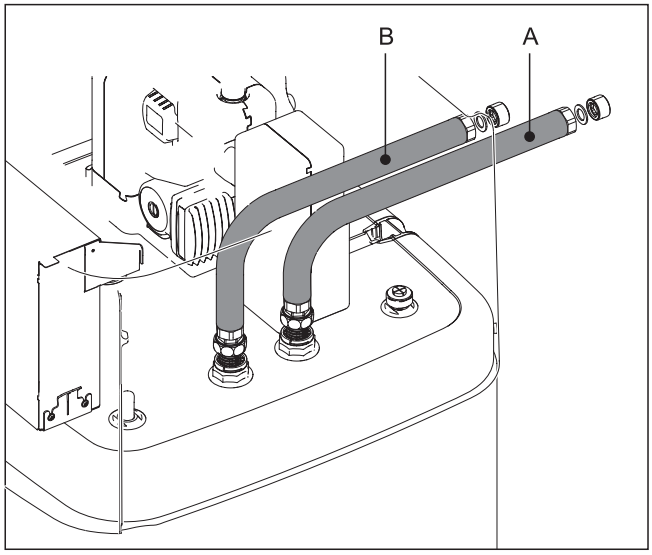


Fig. 3-28 P connection kit for Biv device types

- **A** Connection for inflow (red)
- **B** Connection for return flow (blue)

3.6 Water connection

Important information

CAUTION

If the indoor unit is connected to a heating system with **steel pipes or radiators** or non-diffusion-proof floor heating pipes, slurry and swarf could enter the hot water storage tank and cause **blockages**, local **overheating** or **corrosion damage**.

- Rinse supply lines before filling the device.
- Rinse out the heat distribution network (in the existing heating system).
- Install a dirt filter or sludge separator in the heating return flow (see Chap. 1.2.6).

CAUTION

If the indoor unit is connected to a cold water line where steel pipes are used, chips can get into the stainless steel corrugated pipe heat exchanger and remain there. This can lead to contact corrosion damage and subsequently to leakage.

- Flush the feed pipes before filling the heat exchanger.
- Install the dirt filter in the cold water supply (e.g. SAS 1 or SAS 2).

CAUTION: BIV ONLY

If the **heat exchanger** for **pressurised solar system** charging (see Chap. 3.1, items 8 + 9) is connected to an **external heater** (e.g. wood-burning boiler), the indoor unit can be damaged or destroyed due to an excessively high inflow temperature at these connections.

- The **inflow temperature** of the external heater should be **limited to max. 95 °C**.

CAUTION

Corrosion may be caused by air entering the heating water network and by a quality of the heating water that does not comply with the requirements in accordance with Chap. 1.2.5. Corrosion products (particles) thus created may clog pumps and valves and cause malfunctions.

- Device may not be connected by permeable, flexible lines.

INFORMATION

In accordance with EN 12828, a safety valve that limits the maximum permissible operating pressure in the heating system must be installed on or in the immediate vicinity of the heat generator. There may not be any hydraulic blocking elements between the heat generator and the safety valve.

Any steam or heating water that may escape must be drained by a suitable blow-off line with constant gradient in a frost-protected, safe and observable manner.

A diaphragm expansion vessel suitably sized and preset for the heating system must be connected to the Daikin Altherma 3 H HT ECH_2O. There may not be any hydraulic blocking elements between the heat generator and the diaphragm expansion vessel.

We recommend installing a mechanical pressure gauge for filling the heating system.

- For potable water lines, observe the provisions of EN 806, DIN 1988 and the additional applicable national regulations for potable water installation.
- Install the indoor unit close to the withdrawal point to dispense with the need for a circulation line. If a circulation line is mandatory, it must be installed according to the schematic diagrams in Chap. 9.5.1.

3.6.1 Connecting hydraulic lines

DANGER: RISK OF BURNING

There is a danger of scalding at hot water temperatures over 65 °C. This is possible when using solar energy if an external heater is connected, the Legionella protection is activated, or the target hot water temperature is set to be greater than 65 °C or if the Smart-Grid function is activated.

- Install scalding protection (hot water mixer device (e.g. VTA32)).

INFORMATION

The indoor unit is equipped with a pressure sensor. The system pressure in monitored electronically and can be displayed with the device switched on.

Nevertheless, we recommend installing a mechanical pressure gauge between the indoor unit and the diaphragm expansion vessel, for example.

- Install the manometer so that it is easy to see when filling.

Prerequisite: Optional accessories (e.g. solar, backup heater) are mounted on the Daikin Altherma 3 H HT ECH_2O as specified in the enclosed instructions.

1 Check cold water pressure (maximum 6 bar).
   - If a higher pressure is present in the domestic water pipe, a pressure reducer will need to be installed.
2 Make the hydraulic connections to the Daikin Altherma 3 H HT ECH_2O.
   - Refer to Fig. 3-1 up to Fig. 3-4 and from Tab. 2-1 for the position and dimensions of the heater connections and the outdoor unit connections. The details of the hydraulic connection from the indoor unit to the water inlet and outlet of the outdoor unit can be seen in Fig. 3-29.

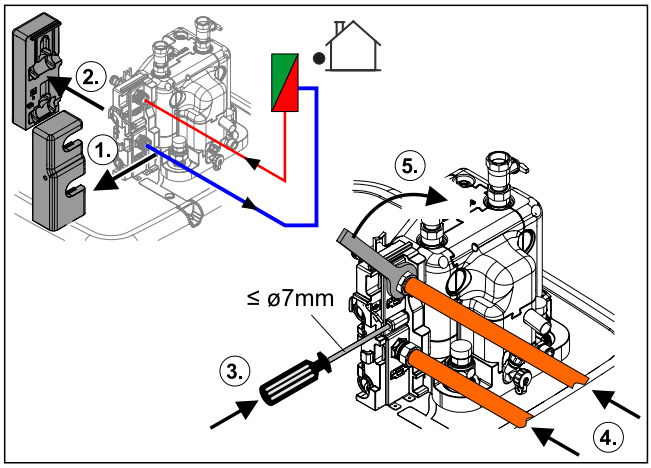


Fig. 3-29 Establishing the hydraulic connection to the outdoor unit

   - Pay attention to the stipulated tightening torque (see Chap. 9.2). To avoid damage, apply the necessary counter-torque with a suitable tool, see Fig. 3-30.

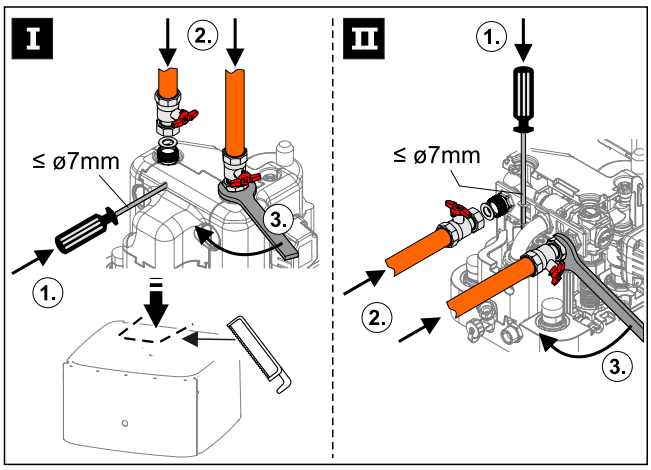


Fig. 3-30 Establishing the heating connections

- Install the line so that the sound insulation hood can be positioned easily after installation.
- For rearward facing connections: Support hydraulic lines suitably according to the spatial conditions, see Fig. 3-31.

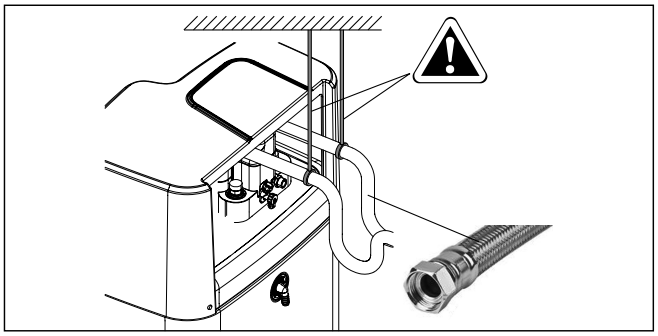


Fig. 3-31 Supporting rear-facing hydraulic lines

- Connect the water for filling or refilling the heating system as per EN 1717 so that contamination of the drinking water due to return flow is reliably prevented.

3 Connect the drain line to the safety overpressure valve and diaphragm expansion vessel as per EN 12828.

- Check the seat of the drain hose on the pressure relief valve.
- If necessary, connect and install a separate hose.

4 Carefully insulate pipework against heat loss and to avoid condensation (insulation thickness at least 20 mm).

- Water shortage protection: the controller's pressure and temperature monitoring function reliably shuts off the Daikin Altherma 3 H HT ECH$_2$O if there is a shortage of water. No additional water shortage protection is needed in the construction.
- Avoid damage caused by deposits and corrosion: see Chap. 1.2.5

5 Connect the drain hose to the hose connecting piece for the safety overflow (Fig. 2-3, item 23).

- Use transparent drain hose (draining water must be visible).
- Connect the drain hose to an adequately dimensioned waste water installation.
- Drain should not be lockable.

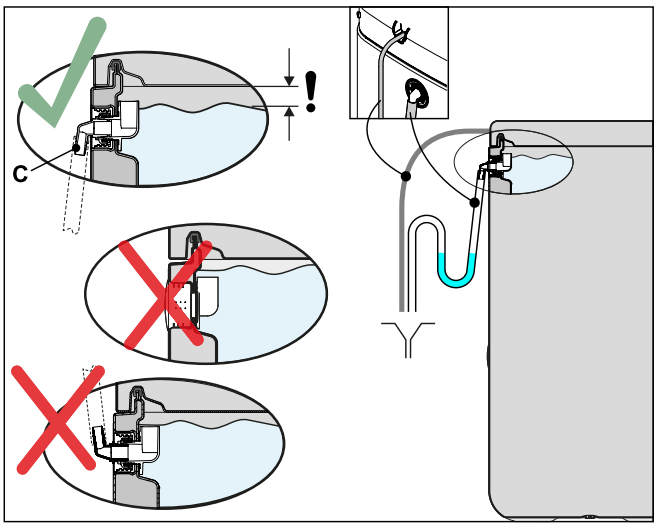


Fig. 3-32 Installation of drain hose at safety overflow

6 Connect the discharge fitting on the cover (Fig. 2-2, item 30) to the waste water installation with the enclosed hose section.

7 Connecting a diaphragm expansion vessel (see Fig. 3-33)

- Connect a suitably dimensioned and preset diaphragm expansion vessel for the heating system. There may not be any hydraulic blocking elements between the heat generator and the safety valve.
- Position the diaphragm expansion vessel in an easily accessible place (maintenance, parts replacement)

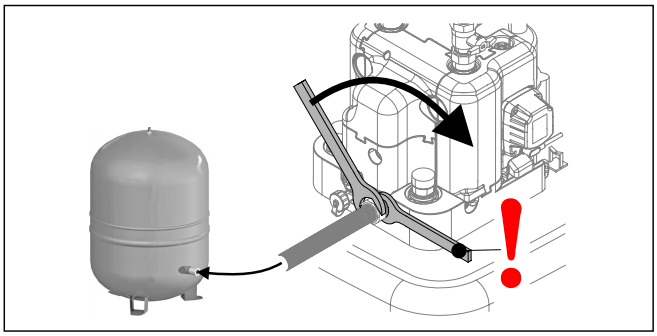


Fig. 3-33 Mounting the diaphragm expansion vessel

3.7 Electrical connection

DANGER: RISK OF ELECTROCUTION

Touching live parts can result in an **electric shock** and lead to potentially fatal injuries and burns.

- Before beginning work on live parts, disconnect all of the systems circuits **from the power supply** (switch off external main switch, disconnect fuse) and secure against unintentional restart.
- Establishment of the electrical connection and work on electrical components should only be performed by **electrical technicians** in compliance with valid standards and guidelines as well as the specifications of the energy supply company and the instructions in this manual.
- Never make constructional changes to connectors or other electrical equipment components.
- **Device covers and service panels** must be **replaced** as soon as the work is completed.

CAUTION

Increased temperatures can occur in the controller housing of the indoor unit during operation. This can result in currently-carrying wires from reaching higher temperatures during operation due to self-heating. For this reason, these lines need to have a continuous use temperature of 90 °C.

- For the following connections, only use cables with a long-term use temperature ≥ 90 °C: Heat pump outdoor unit and optional: Electric backup heater (EKBUxx)

CAUTION

If the mains cable of the indoor unit is damaged, it must be replaced by the manufacturer or his customer service or a similarly qualified person to avoid hazards.

All electronic control and safety devices of the indoor unit are connected ready for use and tested. Modifications on the electrical installation are dangerous and prohibited. The operator alone bears responsibility for any resulting damage.

3.7.1 Overall connection diagram

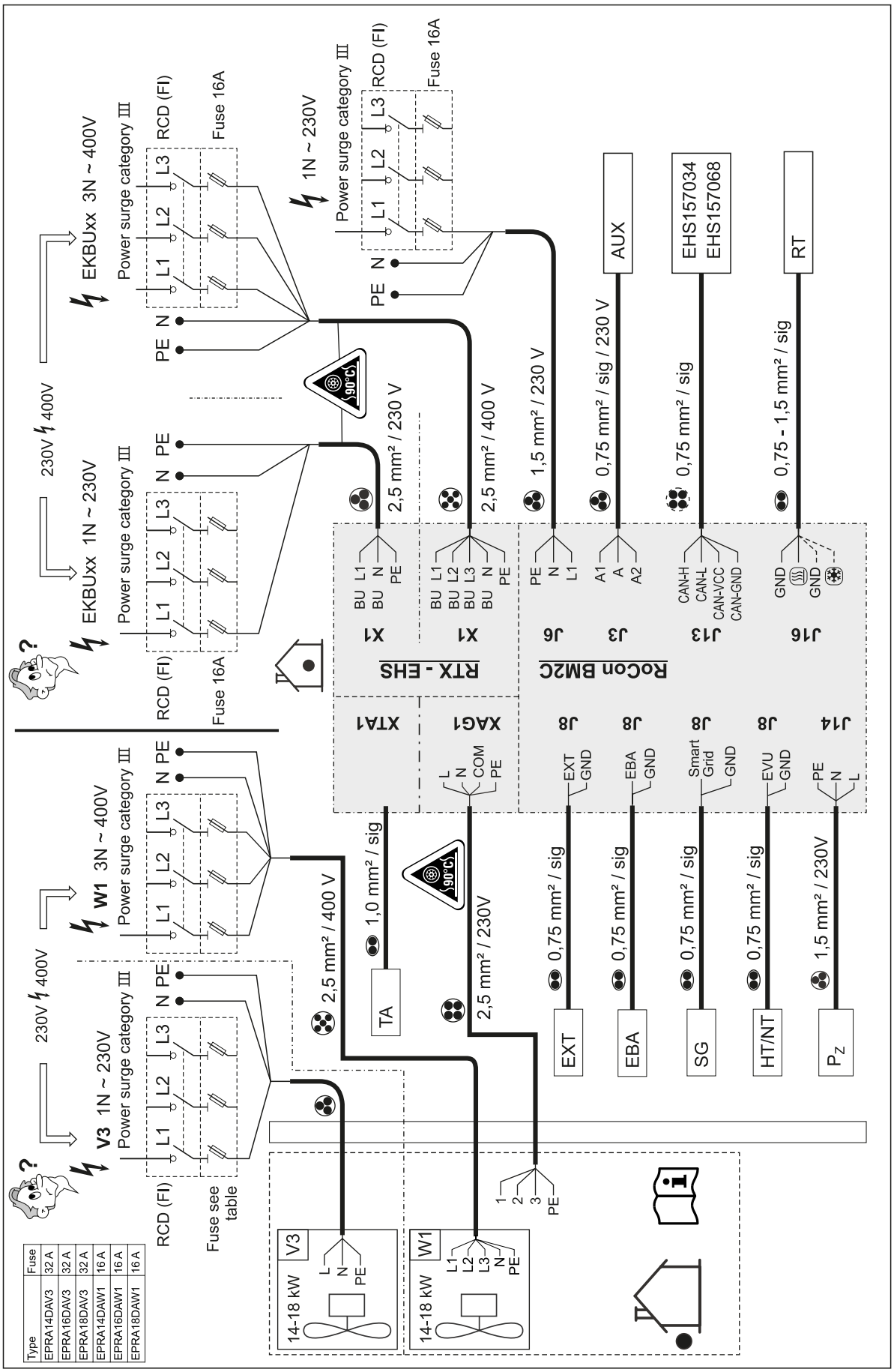


Fig. 3-34 Overall connection diagram – for the electrical connection during the device installation (for the legend and pin assignment of the PCB, see Chap. 9.3)

3.7.2 Position of the printed circuit boards and terminal strips

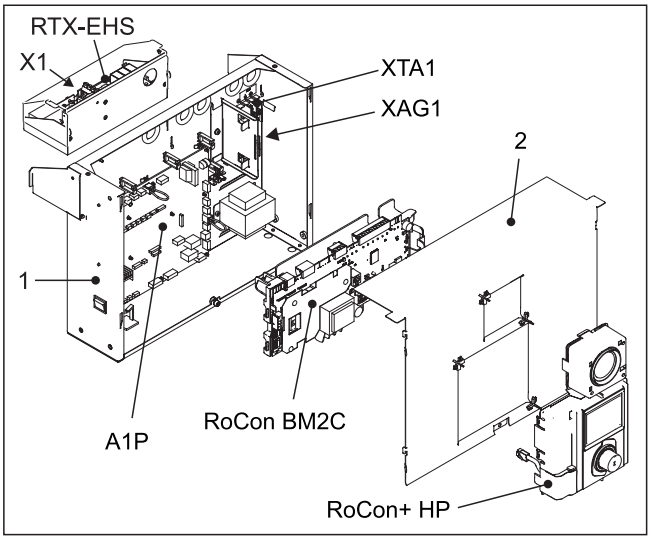


Fig. 3-35 Position of the printed circuit boards and terminal strips (for the legend, see Chap. 9.3)

3.7.3 Mains connection

A flexible cable for the mains connection is already connected inside the device.

1 Check the supply voltage (~230 V, 50 Hz).

2 Disconnect the junction box of the domestic installation.

3 Connect the cable for connecting the indoor unit to the mains to the domestic installation's junction box (isolator according to EN 60335-1) via an all-pole separating main switch to be installed in the building. Ensure that the polarity is correct.

3.7.4 General information on the electrical connection

1 Check the supply voltage.

2 Set the mains switch to "Off".

3 Switch off the circuit breaker in the junction box of the domestic power supply.

4 Open the controller housing (see Chap. 3.4.4).

5 Insert the cable through one of the cable glands into the interior of the controller housing. When cutting and laying cables to be connected, make sure that the controller housing can be brought into the service position without any tension.

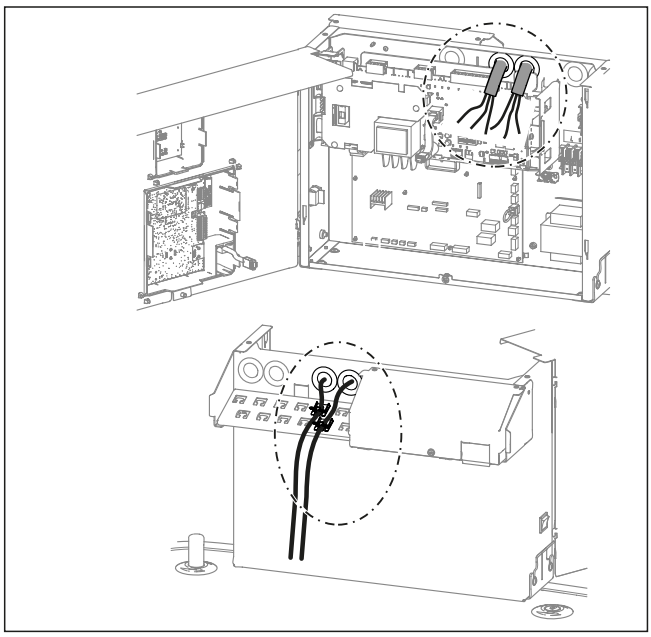


Fig. 3-36 Cable gland

6 Make electrical connections according to Chap. 3.7.1 and the following sections.

7 Effective strain relief in the controller housing by means of cable ties must be ensured for all cables connected to the indoor unit (steps 1 – 3, Fig. 3-37).

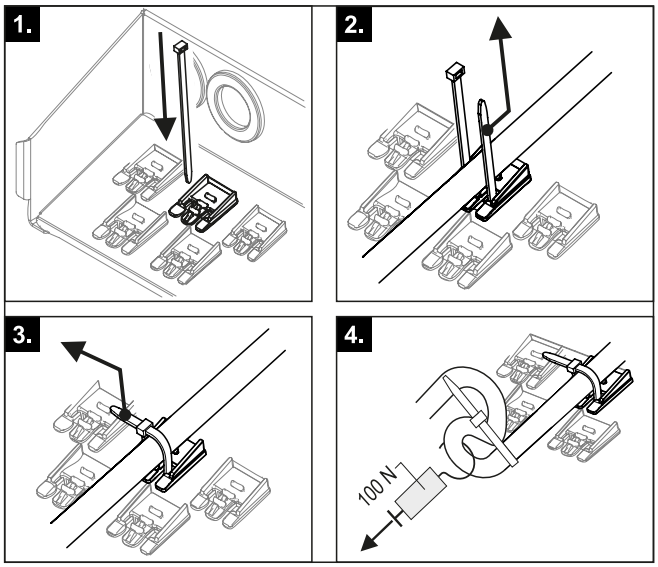


Fig. 3-37 Establishing and checking the strain relief

8 Check the holding force of the strain relief (step 4, Fig. 3-37).

9 After the installation is complete: Close the controller housing again and, if necessary, move it to the normal position.

3.7.5 Connecting the heat pump outdoor unit

INFORMATION

A separate manual containing instructions about installation and operation is included with this component.

1 Follow the installation steps in Chap. 3.7.4.

2 Connect the heat pump outdoor unit to terminal strip XAG1 (see Fig. 3-38).

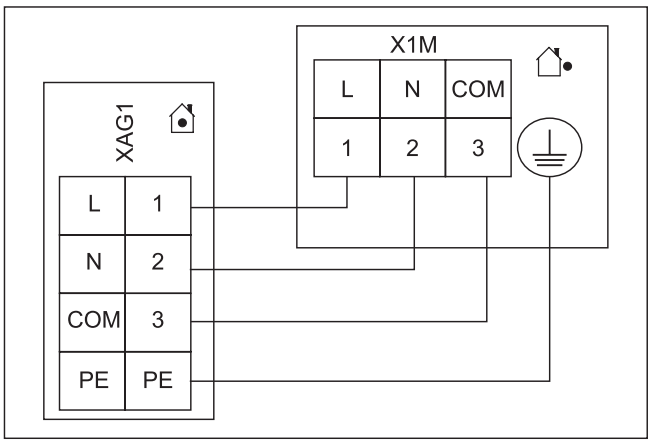


Fig. 3-38 Connecting the heat pump outdoor unit

INFORMATION

If the heat pump outdoor unit is shut off via a circuit specified by the utility company, the indoor unit is not shut off.

3.7.6 Connecting the outside temperature sensor (optional)

The heat pump outdoor unit has an integrated outside temperature sensor which is used for weather-compensated inflow temperature control with frost protection function. The weather-compensated inflow temperature control can be further optimised with the optional outside temperature sensor.

- Choose a location at about one third of the building height (minimum distance from floor: 2 m) on the coldest side of the building (north or north-east). Ensure that the location is not near any external heat sources (flues, air ducts), nor subject to direct solar radiation.
- Place outside temperature sensors in such a way that the cable exit points face downwards (prevents the ingress of humidity).

CAUTION

Laying the sensor and mains lines in parallel within an installation conduit can lead to major malfunctions during controlled operation of the indoor unit.

- Always lay the sensor line separately.

1 Connect the outside temperature sensor to a twin-core sensor line (minimum diameter **1 mm**^{2}).

2 Lay the sensor line to the indoor unit.

3 Follow the installation steps in Chap. 3.7.4.

4 Connect the sensor line to terminal strip XTA1 (see Chap. 3.7.2).

5 In the controller, RoCon+ HP set the [Outside temperature sensor] parameter to "On" [→ Main menu → Configuration → Sensors].

3.7.7 External switching contact

Connecting an external switching contact (Fig. 3-39) enables the operating mode of the indoor unit to be switched over.

The current operating mode is switched by a changing resistance value (Tab. 3-3). The changeover of the operating mode is only effective for a long as the external switching contact is closed.

The operating mode has an effect on the direct circuit of the indoor unit as well as all other heating circuits connected to this device as an option.

When special functions (e.g. "Manual operation") are activated, the input is not evaluated.

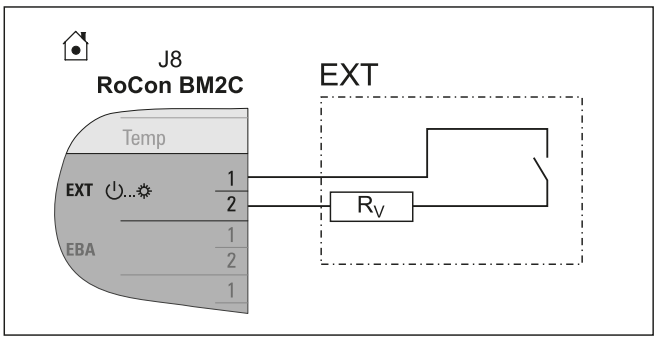


Fig. 3-39 EXT switching contact connection

Operating mode	Resistance RV	Tolerance
Standby	< 680 Ω	± 5 %
Heating	1200 Ω	
Reduce	1800 Ω	
Summer	2700 Ω	
Automatic 1	4700 Ω	
Automatic 2	8200 Ω	

Tab. 3-3 Resistance values for evaluating the EXT signal

INFORMATION

The input is not considered for resistance values greater than the value for "Automatic 2".

INFORMATION

The [Heating support (HZU)] function integrated in the RoCon+ HP controller (see the controller operating instructions) makes it unnecessary to connect the EXT connection to the burner blocking contact connection of the solar system.

3.7.8 EBA (external requirement request)

By connecting the EBA switching contact to the indoor unit (Fig. 3-40) and corresponding parametrisation in its RoCon+ HP controller, an external switching contact can be used to generate a heat request. If the switching contact is closed, the indoor unit switches to heating mode. The feed temperature is regulated to the temperature set in the [Feed temperature, heating mode] parameter [→ Main menu → Configuration → Heating].

The EBA switching contact has priority over a request from the room thermostat.

The switching contact is not evaluated in cooling mode, standby, manual or summer mode. The heating limits are also ignored.

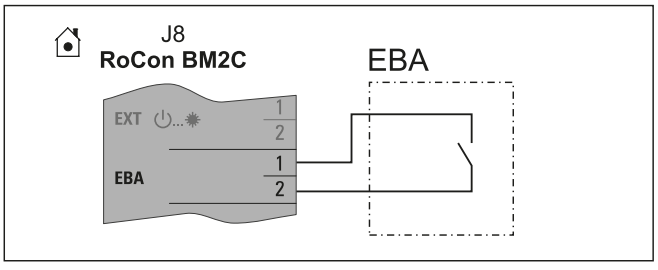


Fig. 3-40 EBA switching contact connection

3.7.9 Connecting an external heat generator

INFORMATION

To connect an external heat generator, the connection set for external heat generators must be installed (see Chap. 3.5).

For heating support or as an alternative to an electric backup heater, an external heat generator (e.g. gas- or oil-fired boiler) can be connected to the indoor unit. To connect an external heat generator, the connection set for external heat generators must be installed (see Chap. 3.5).

The heat supplied by the external heat generator must be fed to the unpressurised storage tank water in the hot water storage tank of the indoor unit.

Implement the hydraulic connection according to one of the two following options:

- p=0 unpressurised via the connections (solar inflow and solar return flow) of the hot water storage tank
- for ...bivalent indoor unit device types, via the integrated pressurised solar heat exchanger.
  - Comply with the instructions on hydraulic connections (see Chap. 1.2)
  - Examples of the hydraulic connection (see Chap. 9.5).

The external heat generator request is connected on PCB RTX-EHS (see Fig. 3-41) via a relay. Electrical connection to the indoor unit is possible as follows:

- External heat generator has a potential-free switching contact connection for heat request:
  - Connection to K3 if the external heat generator is responsible for the domestic hot water preparation and the backup heating (setting of the [Config. ext. heat source] parameter = DHW + heating support [→ Main menu → Settings → Ext. source])

or

  - Connection to K1 and K3 if two external heat generators are used (setting of the [Config. ext. heat source] parameter = Two external heat generators [→ Main menu → Settings → Ext. source]). In this case, K1 connects the external heat generator (e.g. gas-fired or oil-fired boiler) for heating support and K3 connects the external heat generator (EKBUxx) for domestic hot water preparation.

or

  - Connection to AUX connection A (see Chap. 3.7.13)
- External heat generator can only be connected via mains voltage: Connection (~230 V, maximum load 3000 W) to K1 and K3.

CAUTION

Danger of voltage flash-overs.

- The connections of the RTX-EHS PCB must not be used simultaneously for connecting mains voltage (~230 V) and SELV ("Safety Extra Low Voltage").

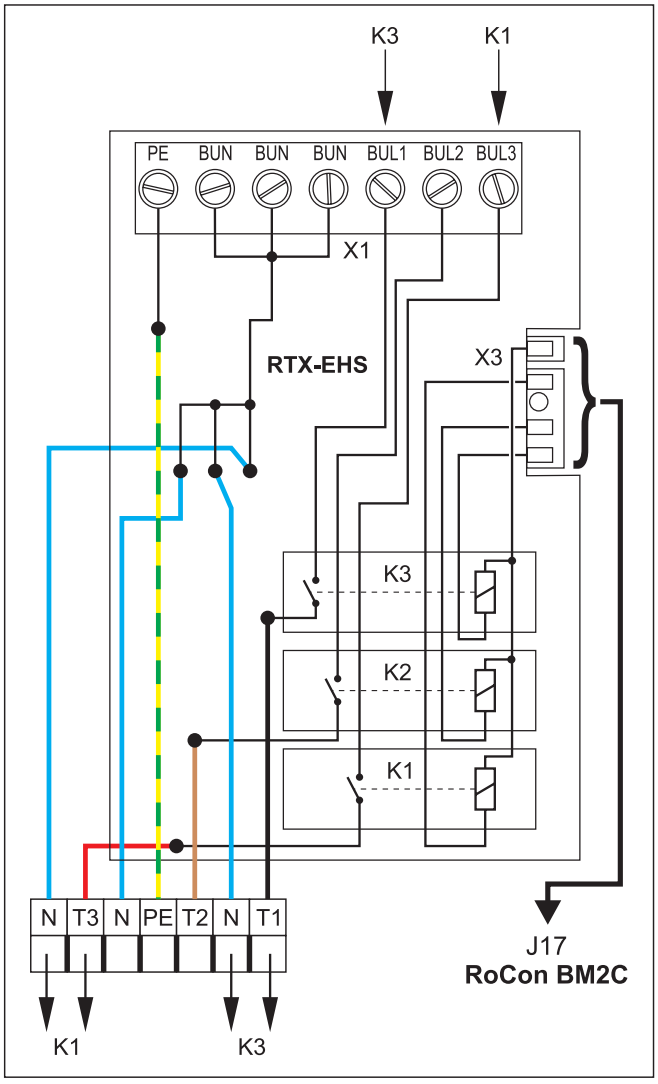


Fig. 3-41 Connection on the RTX-EHS printed circuit board

1 Refer to the external heat generator's respective installation instructions for a suitable electrical connection.

2 Installing the connection set for external heat generators (see Chap. 3.5).

3 Make suitable connections on the RTX-EHS PCB of the connection set (see Fig. 3-41).

4 Fix cables that are fed into the connection set from the outside using the strain relief clips and cable ties included (see steps 7 and 8 in Chap. 3.7.4).

3.7.10 Connecting the room thermostat

INFORMATION

A separate manual containing instructions about installation and operation is included with this component.

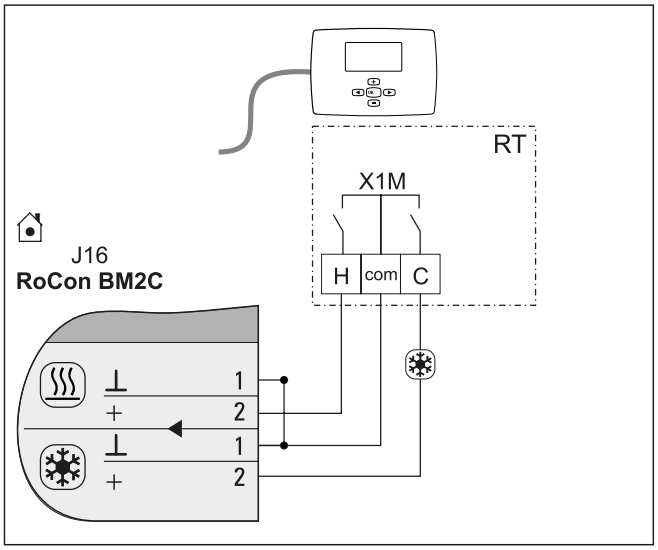


Fig. 3-42 Connection with wired room thermostat (RT = Daikin EKRTW)

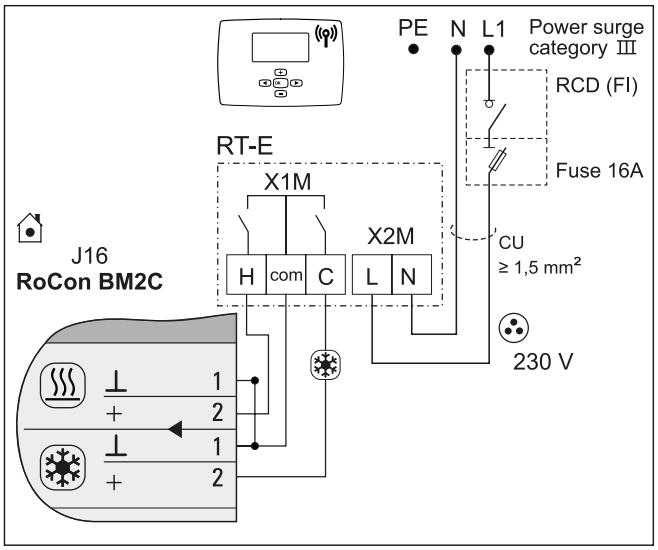


Fig. 3-43 Connection with radio-controlled room thermostat (RT-E = Daikin EKRTR)

3.7.11 Connection of optional RoCon system components

The optional RoCon devices must be connected to the indoor unit via a 4-wire CAN bus cable (connection J13).

For this, we recommend shielded lines with the following characteristics:

- Standardisation according to ISO 11898, UL/CSA type CMX (UL 444)
- PVC outer sheath with flame retardancy according to IEC 60332-1-2
- Up to 40 m, minimum cross-section 0.75 mm². Larger conductor cross-section necessary with increasing length.

Commercially available junction boxes can be used to connect CAN bus lines of several RoCon devices.

Ensure that mains, sensor and data bus lines are routed separately. Use only cable ducts with separators or separate cable ducts spaced at least 2 cm apart. Line crossings are permissible.

A maximum of 16 devices with a total line length of up to 800 m can be connected in the entire RoCon system.

EHS157034 room controller

A separate EHS157034 room controller can be connected for each heating circuit to enable remote adjustment of operating modes and target room temperatures from another room.

INFORMATION

Separate installation instructions are included with this component. See the enclosed control system manual for instructions on setting and operation.

EHS157068 mixer module

The EHS157068 mixer module can be connected to the indoor unit (J13 PCB connector) and is controlled by the electronic controller.

INFORMATION

Separate installation instructions are included with this component. See the enclosed control system manual for instructions on setting and operation.

EHS157056 Internet gateway

The controller can be connected to the internet with the optional EHS157056 gateway. This enables remote control of the indoor unit by mobile phones (by app).

INFORMATION

Separate installation instructions are included with this component. See the enclosed control system manual for instructions on setting and operation.

3.7.12 Connecting the HP convector

INFORMATION

Only the EKRTCTRL1 and EKWHCTRL(0/1) convector controllers can be connected to the indoor unit.

INFORMATION

A separate manual containing instructions about installation and operation is included with this component.

INFORMATION

When changing the operating mode (Heating/Cooling) on a convector, all other convectors must either also be changed or deactivated.

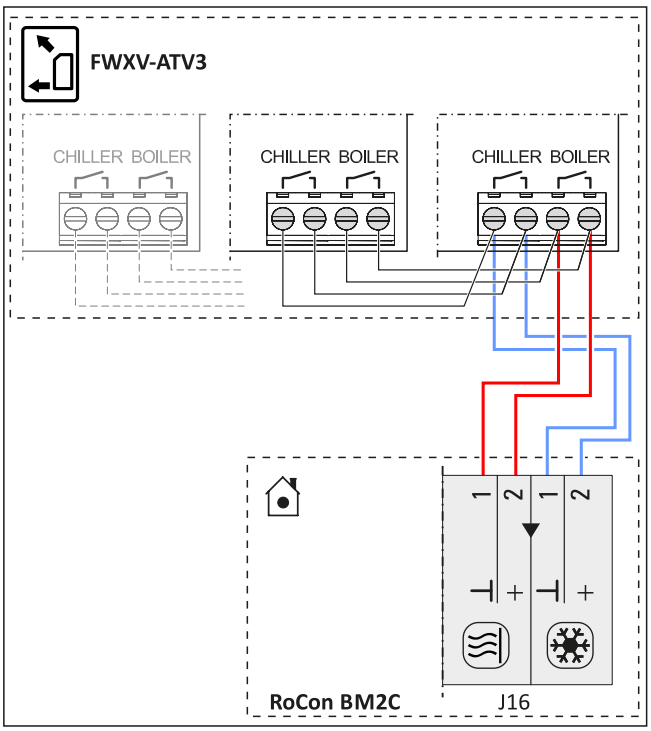


Fig. 3-44 FWX(V/M)-AATV3 connection

3.7.13 Connecting switching contacts (AUX outputs)

The switching contacts (AUX outputs) can be used for various parametrisable functions.

Switchover contact A-A1-A2 switches under the conditions set in parameter [AUX switching function] [→ Main menu → Settings → Inputs/Outputs] (see controller operating instructions).

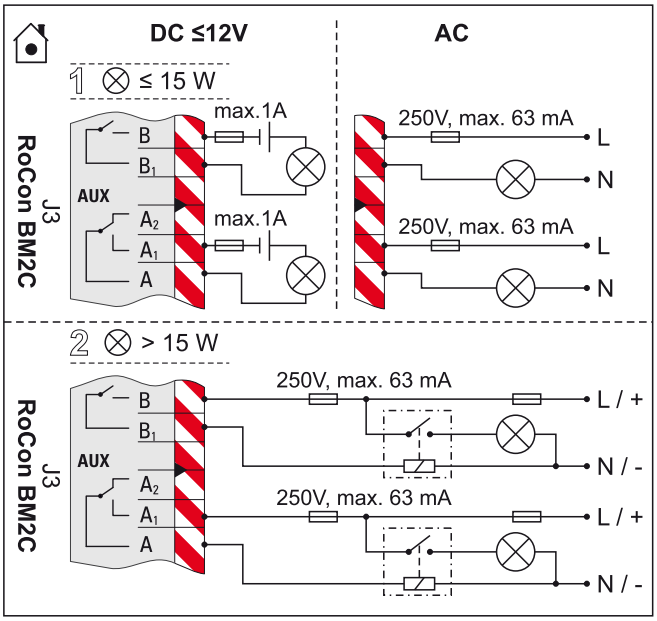


Fig. 3-45 Connection of switching contact (AUX output)

The relays user for variant 2 (switched output > 15 W) must be suitable for a 100 % power-on time.

Connection terminals B+B1 are not occupied for these devices or are available for additional functions.

The relays user for variant 2 (switched output > 15 W) must be suitable for a 100 % power-on time.

Switchover contact A-A1-A2 can be used, for example, to control the heat generators in bivalent heating systems consisting of an indoor unit and an oil- or gas-fired boiler. Examples of the integration of the hydraulic system are described in Chap. 9.5.

INFORMATION

If an A2 F or G-plus condensing boiler is connected, the [AUX switching function] and [AUX wait time] parameters must be set according to the desired function [→ Main menu → Settings → Inputs/Outputs].

See Controller operating instructions → chapter Parameter settings.

Precise information on the electrical connection and the required parameter settings for such bivalent heating systems are available on the Internet (www.daikin.com) or from your service partner.

3.7.14 Off-peak mains connection (HT/NT)

If the outdoor unit is connected to a low rate mains connection, the potential-free switching contact S2S of the receiver, which evaluates the low rate input signal output from the utility company must be connected to plug J8, EVU connection on the RoCon BM2C PCB (see Fig. 3-46).

When setting the [HT/NT function] parameter > 0 [→ Main menu → Settings → Inputs/Outputs], certain system components are switched off during peak periods (see controller operating instructions).

The following types of low rate mains connection are common:

- Type 1: With this type of low rate mains connection, the power supply to the heat pump outdoor unit is not interrupted.
- Type 2: With this type of low rate mains connection, the power supply to the heat pump outdoor unit is interrupted after a certain period of time.
- Type 3: With this type of low rate mains connection, the power supply to the heat pump outdoor unit is interrupted immediately.

Potential-free switching contact S2S can be implemented as a normally closed or normally open switching contact.

- If implemented as a normally closed switching contact, the [HT/NT contact] parameter = 1 must be set [→ Main menu → Settings → Inputs/Outputs]. When the utility company sends the off-peak signal, switching contact S2S is opened. The system switches to "Mandatory OFF". If the signal is sent again, potential-free switching contact S2S closes and the system resumes operation.
- If implemented as a normally open switching contact, the [HT/NT contact] parameter = 0 must be set [→ Main menu → Settings → Inputs/Outputs]. When the utility company sends the off-peak signal, switching contact S2S is closed. The system switches to "Mandatory OFF". If the signal is sent again, potential-free switching contact S2S opens and the system resumes operation.

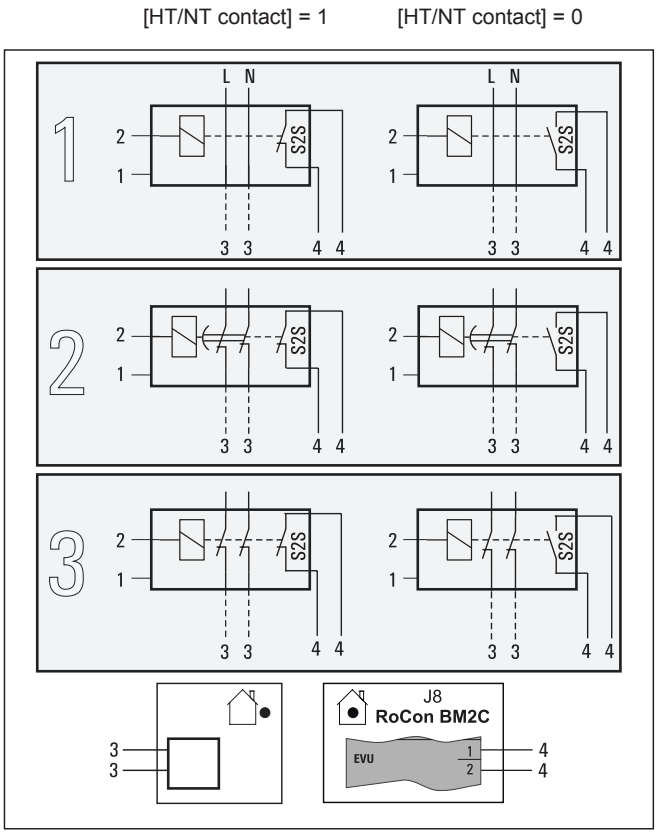


Fig. 3-46 HT/NT contact connection

1 Mains connection box for low rate mains connection
2 Receiver for evaluating the HT/NT control signal
3 Power supply of the heat pump outdoor unit (see respective installation manual for the heat pump outdoor unit)
4 Potential-free switching contact for heat pump indoor unit

3.7.15 Connecting an intelligent controller (Smart Grid - SG)

If the [Smart grid] parameter = 1, the function [→ Main menu → Settings → Inputs/Outputs] is activated (see controller operating instructions), the heat pump is switched to normal or a mode with higher temperatures depending on the utility company signal.

For this purpose, the SG1/SG2 floating switching contacts of the intelligent controller must be connected to the J8 connector, Smart Grid and EVU connections on the RoCon BM2C PCB (see Fig. 3-47).

As soon as the Smart Grid function is active, the HT/NT function is automatically deactivated. Smart grid mode The heat pump is operated differently depending on the value of the parameter [→ Main menu → Settings → Inputs/Outputs] (see controller operating instructions).

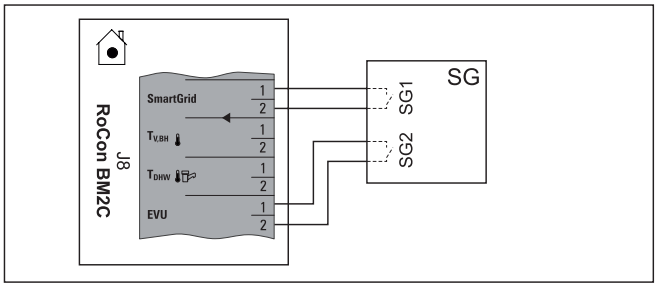


Fig. 3-47 Connecting the Smart Grid

3.8 Filling the system

Only fill the indoor unit after all installation work is completed in the order shown below.

3.8.1 Checking the water quality and adjusting the pressure gauge

1 Comply with the instructions for the water connection (see Chap. 3.6) and for the water quality.

2 Adjust the mechanical pressure gauge (mounted on site in accordance with Chap. 3.6.1 or temporarily installed with filling hose): Turn the pressure gauge glass so that the minimum pressure marking corresponds to the **system height +2 m** (1 m water column corresponds to 0.1 bar).

3.8.2 Filling hot water heat exchangers

1 Open the shut-off valve for the cold water supply pipe.

2 Open the hot water tap connections so that the draw-off volume can be set as high as possible.

3 Once water has been discharged from the tap connections, do not interrupt the cold water flow to ensure that the heat exchanger will be fully vented and that any impurities or residue will be discharged.

3.8.3 Filling the storage tank

CAUTION

Filling the storage tank with too high a water pressure or too high a flow speed can cause damage to the indoor unit.

- Only fill with a water pressure <6 bar and a flow speed <15 l/min.

Without installed p=0 solar system

1 Connect the **filling hose** with non-return valve (1/2") **to** the **"Solar inflow" connection** (Fig. 3-48, item 1).

2 **Fill** the storage tank of the indoor unit **until water** escapes from the **overflow connection** (Fig. 3-48, item 2).

3 Remove the filling hose with non-return valve (1/2").

With installed p=0 solar system

1 Install the filling connection with combined filling and draining valve (accessory **KFE BA**) following the solar control and pump unit (EKSRPS4).

2 Connect the **filling hose** with non-return valve (1/2") to the previously installed combined filling and draining valve.

3 **Fill** the storage tank of the indoor unit **until water** escapes from the **overflow connection** (Fig. 3-48, item 2).

4 Remove the filling hose with non-return valve (1/2").

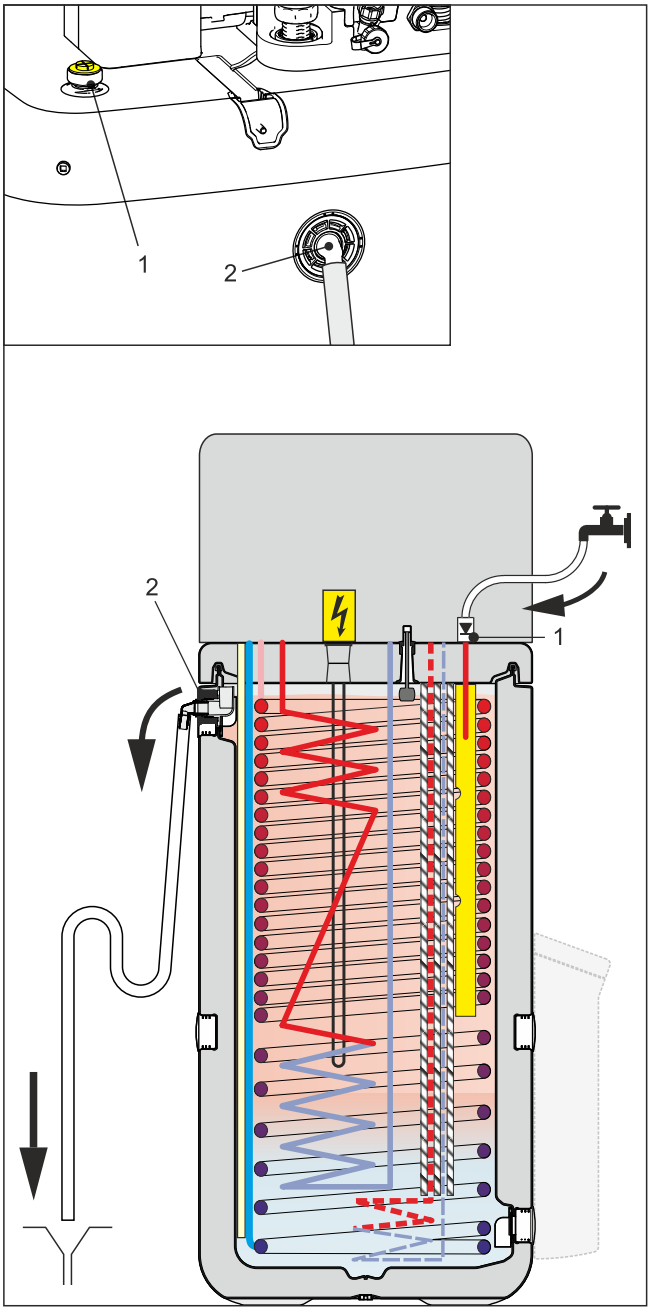


Fig. 3-48 Filling the buffer tank - without connected DrainBack solar system

1 p=0 Solar inflow
2 Safety overflow

3.8.4 Filling the heating system

DANGER: RISK OF ELECTROCUTION

During the filling process, water can escape from any leaking points and can cause an electric shock if it comes into contact with live parts.

- Before the filling process, de-energise the indoor unit.
- After the first filling and before switching on the indoor unit at the mains switch, check that all electric parts and connection points are dry.

WARNING

Polluted domestic water is hazardous to health.

- When filling the heating system, make sure that heating water cannot flow back into the domestic water pipe.

INFORMATION

Comply with the instructions for the water connection (see Chap. 3.6) and water quality (see Chap. 1.2.6).

1 Connect the filling hose (Fig. 3-49, item 1) with the non-return valve (1/2") and an external pressure gauge (on the building side) to the combined filling and draining valve (Fig. 3-49, item 2) and secure it against slipping off with a hose clamp.

2 Connect the drain hose to the vent valve, and route it away from the device. Open the vent valve with the hose connected; check to make sure that the other vent valve is closed.

3 Open the water tap (Fig. 3-49, item 4) on the feed pipe.

4 Open the combined filling and draining valve (Fig. 3-49, item 2) and monitor the pressure gauge.

5 Fill the system with water until the external pressure gauge shows that the system target pressure is reached (system height +2 m; 1 m water column = 0.1 bar). The overpressure valve must not actuate!

6 Close the manual vent valve as soon as water emerges free of bubbles.

7 Close the water tap (Fig. 3-49, item 4). The combined filling and draining valve must remain open in order to read off the water pressure on the external pressure gauge.

8 Switch on the power supply of the indoor unit.

9 In the RoCon+ HP controller in the "Operating mode" menu, select the "Heating" operating mode [→ Main menu → Operating mode].

– After the start phase, the indoor unit runs in hot water heating operation.

10 Constantly check the water pressure on the external pressure gauge during hot water heating mode, and top up water via the combined filling and draining valve (Fig. 3-49, item 2) if necessary.

11 Vent the entire heating system as described in Chap. 5.3 (open the system's control valves. At the same time, the underfloor heating system can be filled and flushed by the underfloor distributor.

12 Again check the water pressure on the external pressure gauge, and top up water via the combined filling and draining valve (Fig. 3-49, item 2) if necessary.

13 Disconnect the filling hose (Fig. 3-49, item 1) with non-return valve from the combined filling and draining valve (Fig. 3-49, item 2).

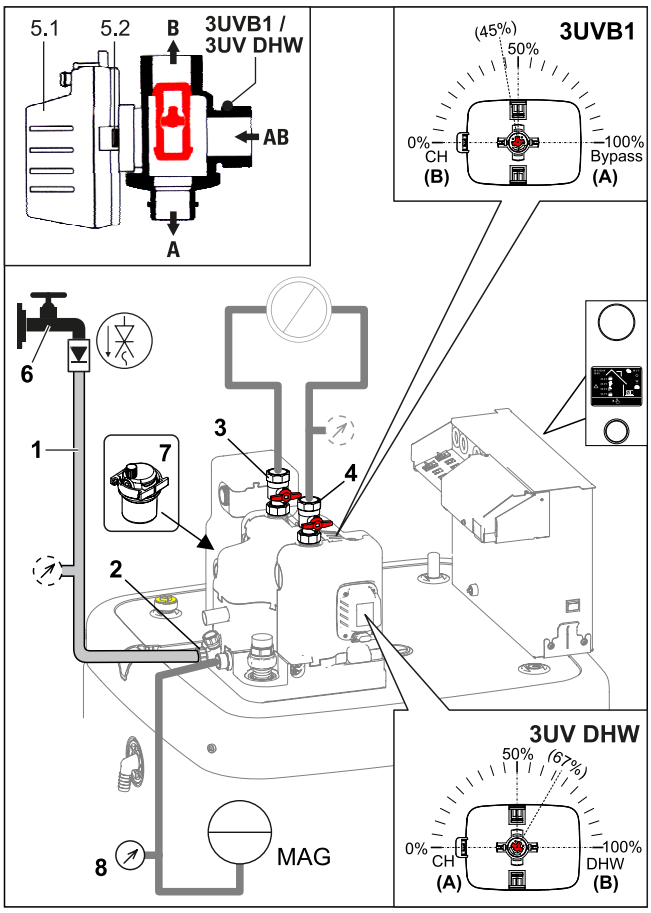


Fig. 3-49 Filling the heating circuit

1	Filling hose with non-return valve (and pressure gauge[1])
2	Combined filling and draining valve
3	Heater ball valve inflow
4	Heater ball valve return flow
5.1	Valve drive
5.2	Unlocking key of the drive lock
6	Water tap
7	Automatic vent valve
8	Pressure gauge
3UV DHW	3-way distribution valve (distribution valve, hot water/heating/heating support)
3UVB1	3-way distribution valve
MAG	Diaphragm expansion vessel

Protecting the water circuit against freezing

Frost can damage the system. To prevent the hydraulic components from freezing, the software is equipped with special frost protection functions, that include the activation of pump, internal heaters, and/or backup heater operation in case of low temperatures.

However, in case of a power failure, these functions cannot guarantee protection. It is therefore recommended to add glycol to the water circuit. The required concentration depends on the lowest expected outdoor temperature, and on whether you want to protect the system from bursting or from freezing. To prevent the system from freezing, more glycol is required. Add glycol according to the table below.

INFORMATION

- Protection against bursting: the glycol protects the pipes against bursting, but does NOT protect the fluid in the pipes against freezing.
- Protection against freezing: the glycol protects the fluid in the pipes against freezing.

Lowest anticipated outside temperature	Protection against bursting	Protection against freezing
-5 °C	10%	15%
-10 °C	15%	25%
-15 °C	20%	35%
-20 °C	25%	
-25 °C	30%	

Tab. 3-4 Required glycol concentration

CAUTION

- The required concentration may vary depending on the type of glycol. ALWAYS compare the requirements from the table above with the specifications provided by the glycol manufacturer. If necessary, meet the requirements set by the glycol manufacturer.
- The added concentration of glycol must NEVER exceed 35%.
- If the fluid in the system is frozen, the pump CANNOT start. Mind that if you only prevent the system from bursting, the liquid inside might still freeze.
- If NO glycol has been added to the system and a power failure or a pump failure occurs, drain the water from the system.
- When the water inside the system is stationary, it can easily freeze and thus damage the system.

CAUTION

Use only propylene glycol including the required inhibitors, classified as category III as per EN 1717.

CAUTION

Glycol absorbs water from its environment. Therefore do NOT add glycol that has been exposed to air. Leaving the cap off the glycol container causes the concentration of water to increase. The glycol concentration is then lower than assumed. As a result, the hydraulic components might freeze up after all. Take preventive actions to ensure a minimal exposure of the glycol to air.

CAUTION

- If overpressure occurs, the system releases some of the fluid through the pressure relief valve. If glycol was added to the system, take adequate measures so as to safely recover it.
- Under all circumstances, make sure that the hose of the pressure relief valve is ALWAYS free to release the pressure. Prevent water from staying and/or freezing up inside the hose.

[1] if not already installed in the heating system

4 Configuration

If the system is not configured correctly, it may not work as expected.

The system is configured via the control panel of the controller. Please refer to the operating instructions.

If necessary, the configuration of optional components (such as the room thermostat or the solar system) must be carried out according to the respective instructions.

5 Start-up

INFORMATION

Read chapter "General safety precautions" thoroughly before carrying out the steps described here.

INFORMATION

If the outdoor unit has been disconnected from the power supply for an extended period of time or the indoor unit was operated before the outdoor unit for an extended period of time, the indoor unit must be restarted to establish communication between the units. Without communication, the outdoor unit is not used to generate heat.

5.1 Requirements

- The indoor unit is fully connected.
- The refrigerant system is dehumidified and filled with the specified amount of refrigerant.
- The heating and hot water system has been filled and pressurised to the correct pressure (see Chap. 3.8.4).
- The storage tank is filled up to the overflow (see Chap. 3.8.3).
- Optional accessories have been installed and connected up.
- The heating system's control valves are open.

5.2 Commissioning at low ambient temperatures

At low ambient temperatures, the safety settings of the indoor unit may prevent heat pump operation. In such cases, an external heat generator is required to temporarily raise both the storage and return temperatures of the heating network.

Minimum storage temperatures for heat pump operation:

Ambient temperature < -2 °C: 30 °C

Ambient temperature < 12 °C: 23 °C

The following steps must be performed:

With electrical backup heater:

1 Parameter [Heating support (HZU)]: "On" select [→ Main menu → Settings → ISM]

2 Parameter [Config. ext. heat source]: "Backup heater BUH" select [→ Main menu → Settings → Ext. source]

3 Parameter [External power hot water]: Select maximum output of backup heater [→ Main menu → Settings → Ext. source]

4 Parameter [1 x hot water]: "On" select [→ Main menu → User → 1x load]

Without electrical backup heater:

1 Parameter [Heating support (HZU)]: "On" select [→ Main menu → Settings → ISM]

2 The storage water must be heated to the required minimum temperature by an external heat generator.

5.3 Bleeding the hydraulic system

1 Make sure that the automatic vent valve cap is open (item A).

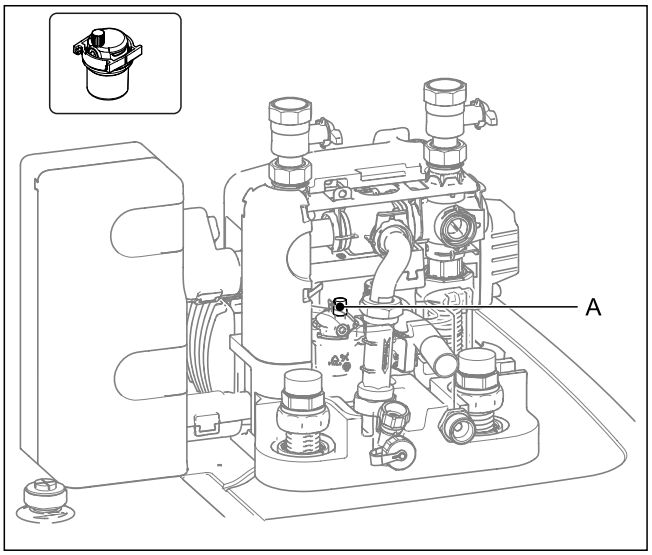


Fig. 5-1 Automatic vent valve

2 Provide the manual vent valve (item B) with a hose and direct it away from the unit. Open the valve until air no longer comes out.

3 Fit the second manual vent valve (item C) with a hose and open until no more air escapes.

4 Activate the ventilation function (see RoCon+ HP operating instructions).

By activating the ventilation function, the RoCon+ HP controller starts a permanently defined sequence program with start/stop operation of the integrated heating circulation pump and various settings of the 3-way switch valves integrated in the indoor unit.

Air present in the hydraulics and the connected heating circuits can escape via the automatic vent valve during the venting function.

INFORMATION

The activation of this function does not replace correct venting of the heating circuit.

The heating circuit must be completely full before activating this function.

5 Check the water pressure and replenish water if necessary (see Chap. 3.8.4).

6 Repeat the ventilation, checking and replenishing process until:

- It is completely vented.
- There is sufficient water pressure.

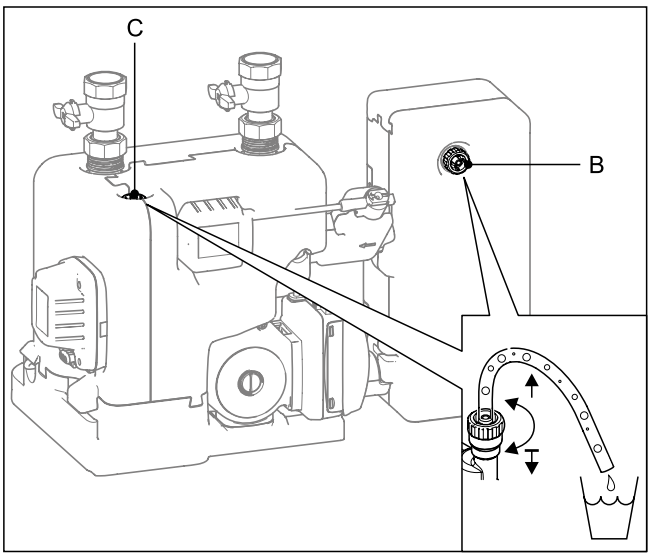


Fig. 5-2 Manual vent valves

5.4 Checking the minimum flow

"Heating" mode	10 l/min
"Cooling" mode	15 l/min
"Defrost" mode	25 l/min

Tab. 5-1 Required minimum flow rate

1 Use the heating circuit configuration to determine which heating circuits can be closed by mechanical, electronic or other valves.

2 Close all closable heating circuits (see step 1).

3 Select the "Heating" operating mode [→ Main menu → Operating mode].

4 Check the [Volume flow] information parameter [→ Main menu → Information → Values]. The displayed value must be equal to or greater than the value for "Heating" mode in Tab. 5-1.

5 If the flow rate is too low:

- Bleed the hydraulics and heating circuits.
- Check the function of the valve drives; replace the valve drive if necessary.

5.5 Start screed drying (only if required)

In the screed program, the inflow temperature is controlled according to a pre-set temperature profile.

See the controller operating instructions for further information on the screed program, its activation and sequence.

After the screed program has ended, the RoCon+ HP controller continues to work in the previously set operating mode.

5.6 Commissioning checklist

Commissioning checklist/Check off measures carried out ☑			Chapter	
1.	Supply indoor unit and outdoor unit (if present) with voltage	These instructions	Chap. 3.7	☐
2.	Enter "Expert code"	RoCon+	4.5.1	☐
3.	Set the operating parameters [→ Configuration Wizard → Setting parameters] [Hot water temperature target 1] ▪ Do not set below 40 °C during commissioning. ▪ Never set below 35 °C after commissioning!	RoCon+	5.2	☐
4.	Activate the ventilation function	RoCon+	4.5.7	☐
	▪ Check the water pressure	These instructions	Chap. 5.3	☐
	▪ Checking the minimum flow		Chap. 5.4	☐
5.	Activate the "Heating" operating mode Observe the waiting time (up to 5 min) Observe Chap. 5.2 at low ambient temperatures.	RoCon+	4.1	☐
6.	Commissioning is complete when a DHW temperature of more than 40 °C appears on the display.			☐
7.	[Screed drying] (if necessary) Screed drying only after commissioning is complete. As soon as the temperature of the storage tank is at least 40 °C, activate (also possible without outdoor unit).	RoCon+	4.5.7	☐

5.7 Hand-over to the user

Once the test run is finished and the unit operates properly, please make sure the following is clear for the user:

- Fill in the installer setting table (in the user reference guide) with the actual settings.
- Make sure that the user has the printed documentation and ask him/her to keep it for future reference. Inform the user that he can find the complete documentation on the url as earlier described in this manual.
- Explain the user how to properly operate the system and what he/she has to do in case of problems.
- Show the user what he/she has to do in relation to maintaining the unit.
- Explain the user about energy saving tips as described in the operation manual.

6 Inspection and maintenance

6.1 General overview of inspection and maintenance

Regular inspection and maintenance of the indoor unit reduces energy consumption and ensures a long service life and smooth operation.

Please observe the respective instructions for work on the outdoor unit. The outdoor unit contains refrigerant. The relevant statutory provisions must be observed.

INFORMATION

Have inspection and maintenance carried out by authorised and trained heating engineers once a year and, if possible, **before the heating period**. This will avoid malfunctions during the heating period.

We recommend an inspection and maintenance contract to ensure regular inspection and maintenance.

6.2 Maintenance work to be carried out annually

WARNING

Work carried out improperly on the indoor unit and its optionally connected components can endanger human life and health and affect the function of these components.

- Work on the indoor unit (such as maintenance or servicing) must only be carried out by persons who are authorised and have successfully completed qualifying technical or vocational training and who have taken part in advanced training sessions recognised by the relevant authorities responsible for the specific activity. These include, in particular, certified heating engineers, qualified electricians and HVAC specialists who, because of their professional training and expert knowledge, have experience in the professional installation and maintenance of heating, cooling and air conditioning systems and heat pumps.

WARNING

Under the cover of the indoor unit, temperatures of up to 90 °C can occur during operation. During operation, hot water temperatures of > 60 °C occur.

- Touching components during or after operation leads to a risk of burns.
- Water discharged during maintenance and repair work can cause scalding on contact with the skin.
- Before carrying out maintenance and inspection work, allow the indoor unit to cool down sufficiently.
- Wear protective gloves.

WARNING

Touching live parts can result in electric shock and lead to potentially fatal injuries and burns.

- Before beginning work on live parts, disconnect all circuits of the system from the power supply (switch off external main switch, disconnect fuse) and secure against unintentional restart.
- The electrical connection and work on the electrical components should only be performed by electrical engineers in compliance with valid standards and guidelines as well as the specifications of the energy supply company.
- Device covers and service panels must be replaced as soon as the work is completed.

1 Removing the cover and thermal insulation (see Chap. 3.4.2).

2 Check the function of the indoor unit and all installed accessory components (backup heater, solar system) by checking the temperature display and switch states in the individual operating modes.

3 If a solar system of the DrainBack type is connected and in operation, shut it off and empty the collectors.

4 If the indoor unit is operated in a bivalent, alternative system, switch off all heat generators and deactivate the bi-valence controller.

5 Visual inspection of the general condition of the indoor unit.

6 Visual check of the water storage tank level (filling level indicator).

- If necessary, replenish water (Chap. 6.3), determine and remedy the reason for the low water level.

7 Check the connection of the safety overflow, drain hose and lid drain for leaks, free drainage and gradient.

- If necessary, clean the safety overflow and drain hose and relay it; replace damaged parts.

INFORMATION

Thanks to its design, the indoor unit requires very little maintenance. No corrosion protection equipment is required (such as expendable anodes). This means there is no need for maintenance work such as changing the protective anodes or cleaning the inside of the storage tank.

8 Check the connection of the safety overflow and drain hose for leaks, free drainage and gradient.

- If necessary, clean the safety overflow and drain hose and relay it; replace damaged parts.

9 Check all electrical components, connections and cables.

- Repair damaged parts or replace them.

INFORMATION

If the connection cable of the optional backup heater is damaged, the entire backup heater must be replaced.

The connection cable cannot be exchanged separately.

10 Check the water pressure of the cold water supply (<6 bar)

- and, if necessary, the fitting or adjustment of the pressure reducer.

11 Check the system water pressure on the RoCon+ HP controller of the indoor unit.

- If necessary, top up the water in the heating system until the pressure display is in the permissible range (see Chap. 6.4).

12 Check and clean the filter/sludge separator.

13 Check the minimum flow (see Chap. 5.4).

14 Clean the plastic surface of the indoor unit with soft cloths and mild detergent. Do not use any cleaners with aggressive solvents (damage to the plastic surface may occur).

15 Re-install the cover (see Chap. 3.4.2).

16 Perform maintenance on the outdoor unit and other heating components connected to the indoor unit according to the respective installation and operating instructions.

17 Complete the confirmation of maintenance in the supplied operating manual of the indoor unit.

6.3 Filling, topping up the storage tank

See Chap. 3.8.3.

6.4 Filling, topping up the heating system

See Chap. 3.8.4.

7 Faults and malfunctions

DANGER: RISK OF ELECTROCUTION

Electrostatic charges can lead to voltage arcing that can destroy the electronic components.

- Before touching the control panel PCB, ensure potential equalisation.

7.1 Troubleshooting

The electronics of the indoor unit indicate an error by the status display lighting red, the error screen appearing on the display and the error symbol appearing on the start screen.

Troubleshooting: Error code E90XX

An error reset can be performed. If the same error is displayed again shortly, the cause of the error must be found and rectified by a specialist. In the meantime, emergency operation may be maintained.

Troubleshooting: Other error codes

The cause of the error must be found and rectified by a specialist. In the meantime, emergency operation may be maintained.

7.2 Overview of possible malfunctions

Fault	Possible cause	Possible solution
System not working (nothing on the display, operation LED on RoCon BM2C off)	No mains voltage	▪ Switch on the system's external main switch. ▪ Switch on system fuse(s). ▪ Replace system fuse(s).
Switching time programs are not operating or programmed switching times are carried out at the wrong time.	The date and time are not set correctly.	▪ Set the date. ▪ Set the time. ▪ Check the weekday to switching time assignment.
	Incorrect operating mode set.	▪ Set "Automatic 1" or "Automatic 2" operating mode
	During a switching time the user made a manual setting (e.g. changed the target temperature, changed the operating mode)	1 Select "Operating mode" menu [→ Main menu → Operating mode]. 2 Select the correct operating mode.
The controller does not respond to inputs	The controller's operating system has crashed.	▪ RESET the controller. To do this, disconnect the system from the power supply for at least 10 s and then switch on again.
Operating data are not updated	The controller's operating system has crashed.	▪ RESET the controller. To do this, disconnect the system from the power supply for at least 10 s and then switch on again.
Heating does not warm up	Requirement heating mode shut off (e.g. switching time program is in the economy phase, outside temperature is too high, parameters for optional backup heater (EKBUxx) incorrectly set, requirement for hot water active)	▪ Check the operating mode setting. ▪ Check the request parameters. ▪ Check the date, time and switching time program settings on the controller.
	Refrigerant compressor is not working.	▪ With backup heater (EKBUxx) installed: ▪ Check that the backup heater heats the return flow temperature to at least 15 °C (at a low return flow temperature, the heat pump uses the backup heater first to achieve this minimum return flow temperature). ▪ Check mains supply of the backup heater (EKBUxx). ▪ Thermal contactor (STB) on the backup heater (EKBUxx) has triggered. Unlock.
	The system is in the "Cooling" operating mode.	▪ Switch the operating mode to "Heating".
	Settings for off-peak mains connection do not correspond to settings for electrical connections.	▪ HT/NT function is active and the [HT/NT contact] parameter is set incorrectly. ▪ Other configurations are also possible. However, these must match the type of off-peak mains connection. ▪ The parameter [Smart grid] is active and the connections are set incorrectly.
	The electricity company has sent the peak rate signal.	▪ Wait for the repeat off-peak rate signal which reactivates the power supply.

Fault	Possible cause	Possible solution
Heating does not warm up enough	Water flow too low.	▪ Check that all stop valves of the water circuit are fully open. ▪ Check that the water filter is dirty. ▪ Check if the expansion tank is defective. ▪ Completely vent the heating system and the internal circulation pump. ▪ On the controller ("Information" menu), check that sufficient water pressure (> 0.5 bar) is available; if necessary, top up the heating water. ▪ Check that the resistance in the water circuit is not too high for the pump (see Chap. 9).
	Target value range is too low.	In [→ Main menu → Configuration → Heating]: ▪ Increase parameter [Heating curve]. ▪ Increase parameter [Heating support max. temp.]. ▪ Increase parameter [Max. feed temperature].
	Weather-dependent inflow temperature control active.	▪ Check the [Heat limit, heating mode], [Heating curve] parameters in [→ Main menu → Configuration → Heating].
	Optional backup heater (EKBUxx) or alternative heater booster not cut in.	▪ Check mains supply of the backup heater (EKBUxx). ▪ Thermal contactor (STB) on the backup heater (EKBUxx) has triggered. Unlock. ▪ Check the [Config. ext. heat source], [External power stage 1] and [External power stage 2] parameters [→ Main menu → Settings → Ext. source].
	Water volume in heating system too low	▪ Check the admission pressure in the expansion tank and water pressure; if necessary, top up the heating water and adjust the admission pressure (see Chap. 3.8.4).
	Hot water supply is taking too much of the output of the heat pump.	▪ Check the settings of the [Config. ext. heat source] parameters [→ Main menu → Settings → Ext. source]. ▪ Check the settings of the [External power hot water] parameters [→ Main menu → Settings → Ext. source].
Hot water does not warm up	Hot water preparation shut off (e.g. switching time program is in the economy phase, parameters for hot water preparation incorrectly set).	▪ Check the operating mode setting. ▪ Check the request parameters.
	Storage tank charging temperature too low.	▪ Increase the target hot water temperature.
	Draw-off rate too high.	▪ Reduce the draw-off rate, limit throughput.
	Output of heat pump too low.	▪ Check the switching times for room heating and hot water supply for overlaps.
	Water volume in heating system too low.	▪ Check the admission pressure in the expansion tank and water pressure; if necessary, top up the heating water and adjust the admission pressure.
	Optional backup heater (EKBUxx) or alternative heater booster not cut in.	▪ Check mains supply of the backup heater (EKBUxx). ▪ Thermal contactor (STB) on the backup heater (EKBUxx) has triggered. Unlock. ▪ Check the [Config. ext. heat source], [External power stage 1] and [External power stage 2] parameters [→ Main menu → Settings → Ext. source].

7 Faults and malfunctions

Fault	Possible cause	Possible solution
Room cooler does not cool	Water flow too low.	▪ Check that all stop valves of the water circuit are fully open. ▪ Check that the water filter is dirty. ▪ Check if the expansion tank is defective. ▪ Completely vent the heating system and the internal circulation pump. ▪ On the controller [→ Main menu → Information → Overview → Psyst], check that sufficient water pressure (> 0.5 bar) is available; if necessary, top up the heating water. ▪ Check that the resistance in the water circuit is not too high for the pump (see Chap. 9).
	"Cooling" shut off (e.g. room thermostat requests "Cooling", but switching time program is in the economy phase, outside temperature too low).	▪ Check the operating mode setting. ▪ Check the request parameters. ▪ Check the date, time and switching time program settings on the controller.
	Refrigerant compressor is not working.	▪ With backup heater (EKBUxx) installed: ▪ Check that the backup heater heats the return flow temperature to at least 15 °C (at a low return flow temperature, the heat pump uses the backup heater first to achieve this minimum return flow temperature). ▪ Check mains supply of the backup heater (EKBUxx). ▪ Thermal contactor (STB) on the backup heater (EKBUxx) has triggered. Unlock.
	System is in "Heating" operating mode.	▪ Switch the operating mode to "Cooling".
	Outside temperature < 4 °C	▪ The heat pump has automatically switched to "Heating" operating mode to be able to guarantee frost protection if the outside temperature continues to fall. No room cooling possible.
Cooling output for room cooling too low	Water flow too low.	▪ Check that all stop valves of the water circuit are fully open. ▪ Check that the water filter is dirty. ▪ Check if the expansion tank is defective. ▪ Completely vent the heating system and the internal circulation pump. ▪ On the controller [→ Main menu → Information → Overview → Psyst], check that sufficient water pressure (> 0.5 bar) is available; if necessary, top up the heating water. ▪ Check that the resistance in the water circuit is not too high for the pump.
	Water volume in heating system too low.	▪ Check the admission pressure in the expansion tank and water pressure; if necessary, top up the heating water and adjust the admission pressure.
Internal circulation pump generates excessively high operating noises	Air in the water circuit.	▪ Completely vent the heating system and the internal circulation pump.
	Noises caused by vibrations.	▪ Check the indoor unit, its components and covers to ensure they are fastened correctly.
	Bearing damage in the internal circulation pump	▪ Replace the internal circulation pump.
	Water pressure at pump inlet too low.	▪ On the controller [→ Main menu → Information → Overview], check that sufficient water pressure (> 0.5 bar) is available. ▪ Check that the pressure gauge is working correctly (connection of an external pressure gauge). ▪ Check the admission pressure in the expansion tank and water pressure; if necessary, top up the heating water and adjust the admission pressure.
Safety pressure relief valve is leaking or always open.	Expansion tank is defective.	▪ Replace the expansion tank.
	Water pressure in heating system is too high.	▪ On the controller [→ Main menu → Information → Overview], check that the water pressure is below the specified maximum pressure. If necessary, drain sufficient water until the pressure is in the middle of the permissible range.
	Safety pressure relief valve is stuck.	▪ Check the safety pressure relief valve and if necessary, replace it. ▪ Turn the red knob on the safety pressure relief valve anticlockwise. If you can hear a rattling noise, the safety pressure relief valve needs replacing.

Tab. 7-1 Possible malfunctions

7.3 Fault codes

Error number	Code	Component/Designation	Error	Possible error rectification
75		Inflow temperature sensor $t_{V, BH}$	Flow temperature sensor error	Inflow temperature sensor defective. ▪ Check, replace.
76		Storage tank temperature sensor t_{DHW1}	Storage tank temperature sensor error	Storage tank temperature sensor t_{DHW1} or connecting cable defective or not connected. ▪ Check, replace. ▪ Check the [Hot water sensor] setting.
81		Circuit board RoCon BM2C	Communication fault	Parameter storage in the EEPROM corrupted. ▪ Contact service partner.
88		Circuit board RoCon BM2C		Parameter storage in the external flash memory corrupted. ▪ Contact service partner.
91		Connected CAN modules		CAN module bus ID duplicated, set unique data bus address.
128		Return flow temperature sensor t_{R1}	Return flow temperature sensor error	Return flow temperature sensor t_{R1} in FLS flow sensor connecting cable defective. ▪ Check, replace.
129		Pressure sensor DS	Pressure sensor error	Pressure sensor DS defective. ▪ Check, replace.
198		FLS flow sensor, 3-way mixer valve 3UVB1	Flow measurement not plausible	Error occurs when 3UVB1 3-way mixer valve is in the bypass position, the internal circulation pump is running but too low a volumetric flow is measured. Required minimum water flow rate: See Chap. 5.4 ▪ Air in heating system. ▪ Vent. ▪ Internal circulation pump is not running. ▪ Check electrical connection and controller settings. If the circulation pump is defective, replace it. ▪ FLS flow sensor dirty, clogged. ▪ Check, clean. ▪ FLS flow sensor defective. ▪ 3UVB1 3-way mixer valve drive defective. ▪ Check, replace.
200		Electrical components	Communication fault	Communication between RoCon BM2C and printed circuit board A1P is disturbed. ▪ Wiring or connections, poor contact. ▪ Check, replace
8005		Pressure sensor DS	Water pressure in heating system too low	Water pressure has fallen below permissible minimum value. ▪ Insufficient water in the heating system. ▪ Check the heating system for leaks, top up water. ▪ Pressure sensor DS defective. ▪ Check, replace.
8006		Pressure sensor DS	Pressure drop in heating system too high	Pressure drop too fast. ▪ Insufficient water in the heating system. ▪ Check the heating system for leaks, top up water. ▪ Pressure sensor DS defective. ▪ Check, replace.

Error number	Code	Component/Designation	Error	Possible error rectification
8007		Pressure sensor DS	Water pressure in heating system too high	Warning message: Water pressure has exceeded permissible maximum value. ▪ Diaphragm expansion vessel defective or incorrect admission pressure set. ▪ Check, replace. ▪ Parameter [Max pressure] setting too low. ▪ Set the parameter if necessary. If the setting is correct, drain water to lower the system pressure. ▪ Pressure sensor DS defective. ▪ Check, replace.
8100		Electrical components	Communication	Initialisation after heat pump start failed. ▪ Printed circuit board A1P defective. ▪ Check, replace.
9000			Temporary internal message	Not relevant for proper system operation.
9001	80	Return flow temperature sensor t_{R2}	Return flow temperature sensor error	Sensor or connecting cable defective. ▪ Check, replace.
9002	81	Feed temperature sensor t_{V1} or $t_{V, BH}$	Flow sensor error	Sensor or connecting cable defective. ▪ Check, replace.
9003	89	Frost protection function error	Plate heat exchanger (PWT), outdoor unit	Measured value t_{V1} < 0 °C ▪ Failure of the frost protection function for the plate heat exchanger because the water flow is too low. See error code 9004 / 7H. ▪ Failure of the frost protection function for the plate heat exchanger because there is a lack of refrigerant in the system. See error code 9015 / E4.
9004	7H	FLS flow sensor	Flow rate error	Water flow rate is too low or non-existent. Required minimum flow rate: see Chap. 5 Check the following items: ▪ All stop valves of the water circuit must be completely open. ▪ Optional water filters must not be contaminated. ▪ Heating system must run within its operating range. ▪ Heating system and internal circulation pump must be completely vented. ▪ On the controller, check that sufficient water pressure (> 0.5 bar) is available. [→ Main menu → Information → Overview → Psyst] ▪ Check the function of the 3UVB1 3-way mixer valve: Compare the actual position of 3UVB1 with the displayed position [→ Main menu → Information → Overview → BPV]. ▪ Does this fault occur during defrosting in room heating or hot water preparation operating mode? With optional backup heater: check its power supply and fuses. ▪ Check the fuses (pump fuse (FU1) on printed circuit board A1P and the conductor plate fuse (F1) on printed circuit board RoCon BM2C). ▪ Check the FLS flow sensor for soiling and function; clean, replace if necessary. ▪ Frost damage on the plate heat exchanger (outdoor unit)
9005	8F	Inflow temperature sensor $t_{V, BH}$	Flow temperature tV, BH > 75 °C	Feed temperature of backup heater ($t_{V, BH}$) is too high. ▪ Feed temperature sensor is supplying incorrect values. Temperature sensor or connecting cable defective. ▪ Check, replace. ▪ Contact problem, A1P jumper on X3A.
9006	8H	Inflow temperature sensor $t_{V, BH}$	Flow temperature tV, BH > 65 °C	

Error number	Code	Component/Designation	Error	Possible error rectification
9007	A1	Circuit board A1P	IG circuit board defective	Communication between the heat pump outdoor unit and heat pump indoor unit lost. ▪ Electromagnetic influences. ▪ Perform reset. ▪ Printed circuit board A1P defective. ▪ Replace A1P printed circuit board.
9008	A5	Temperature sensor (refrigerant fluid side) t_{L2}, outdoor unit	Refrigerant temperature outside the valid range	No heat consumption at the plate heat exchanger. ▪ Check the flow rate. ▪ If the flow rate is OK, replace the refrigerant temperature sensor.
9009	AA	Optional: STB backup heater (EKBUxx)	STB fault	Thermal contactor (STB) in the backup heater (EKBUxx) has triggered. ▪ Check and unlock the position of the STB.
9010	AC	Jumper on A1P circuit board	STB fault	Jumper missing on the "X21A" connection socket of the A1P circuit board. ▪ Install the jumper.
9011	C0	FLS flow sensor	Flow sensor error	FLS flow sensor defective. ▪ Replace the FLS flow sensor.
9012	C4	Refrigerant temperature sensor	Refrigerant temperature outside the valid range	Measured value outside the permissible value range. Sensor or connecting cable defective. ▪ Check, replace.
9013	E1	Heat pump outdoor unit main circuit board, outdoor unit	AG circuit board defective	▪ Main circuit board in the heat pump outdoor unit defective. ▪ Fan motor defective. ▪ Check, replace.
9014	E3	High-pressure switch S1PH in the refrigerant system, outdoor unit	PRefrigerant high	Pressure in refrigerant system is too high. ▪ High-pressure switch S1PH or fan motor defective. ▪ Check, replace. ▪ Poor wiring contact. ▪ Flow rate in the heating system too low. ▪ Filled refrigerant quantity too high. ▪ Check, replace. ▪ Service valves in the heat pump outdoor unit not open. ▪ Open the service valves.
9015	E4	Pressure sensor S1NPH in the heat pump outdoor unit	PRefrigerant low	Pressure in refrigerant system too low. ▪ Refrigerant quantity too low. ▪ Check, eliminate cause, top up refrigerant. ▪ Pressure sensor S1NPH in the heat pump outdoor unit defective. ▪ Temperature sensor of fin heat exchanger R4T in the heat pump outdoor unit defective. ▪ Solenoid valve in the heat pump outdoor unit not opening. ▪ Main circuit board in the heat pump outdoor unit defective. ▪ Check, replace.
9016	E5	Electronic overload protection in the refrigerant compressor, outdoor unit	Compressor load protection	Refrigerant compressor overload protection has triggered. Pressure difference in the refrigerant circuit between high and low pressure side too high (> 26 bar). ▪ Refrigerant compressor defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Refrigerant compressor/inverter circuit board wiring, poor contact. ▪ Filled refrigerant quantity too high. ▪ Check, replace. ▪ Service valves in the heat pump outdoor unit not open. ▪ Open the service valves.

Error number	Code	Component/Designation	Error	Possible error rectification
9017	E7	Fan motor in the heat pump outdoor unit	Ventilator blocked	▪ A fan in the heat pump outdoor unit is blocked. ▪ Check the fan for dirt or blockages; if necessary, clean and free up. ▪ Fan motor defective. ▪ Fan motor wiring, poor contact. ▪ Overvoltage at fan motor. ▪ Fuse in the heat pump outdoor unit defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, replace.
9018	E9	Electronic expansion valve, outdoor unit	Expansion valve	The electronic expansion valve in the heat pump outdoor unit is defective, replace.
9019	EC	Storage tank temperature sensor t_{DHW2}	Hot water temperature > 85 °C	The storage tank temperature sensor t_{DHW2} delivers a temperature value > 85 °C. Sensor or connecting cable defective. ▪ Check, replace.
9020	F3	Outlet temperature sensor (hot gas sensor) R2T on the heat pump outdoor unit refrigerant compressor too high	TEvaporator high	▪ Outlet temperature sensor R2T on the refrigerant compressor or connecting cable defective. ▪ Refrigerant compressor defective. ▪ Check, replace.
9021	H3	High-pressure switch S1PH in the heat pump outdoor unit	HPS system	▪ High-pressure switch S1PH defective. ▪ Main circuit board in the heat pump outdoor unit defective. ▪ Wiring, poor contact. ▪ Check, replace.
9022	H9	Outside temperature sensor R1T in the heat pump outdoor unit	Outside temperature sensor error	Sensor or connecting cable defective. ▪ Check, replace.
9023	HC	Storage tank temperature sensor t_{DHW1} or t_{DHW2}	Hot water sensor error	
9024	J1	Pressure sensor S1NPH in the heat pump outdoor unit	Pressure sensor	
9025	J3	Outlet temperature sensor R2T in the heat pump outdoor unit	Return flow sensor error	
9026	J5	Intake temperature sensor R3T in the heat pump outdoor unit	Intake pipe sensor error	
9027	J6	Temperature sensor of fin heat exchanger R5T in the heat pump outdoor unit	Aircoil sensor, defrost	
9028	J7	Temperature sensor of fin heat exchanger R4T in the heat pump outdoor unit (only in 11–16 kW system)	Aircoil sensor, temp	
9029	J8	Fluid side temperature sensor R6T in the heat pump outdoor unit	AG cold sensor error	
9030	L4	Temperature sensor R10T on inverter circuit board in the heat pump outdoor unit (only in 11–16 kW system)	Electrically defective	Overtemperature in the heat pump outdoor unit. ▪ Very high outdoor temperature. ▪ Insufficient cooling of the inverter board. ▪ Air intake dirty/blocked. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Temperature sensor on inverter circuit board defective, plug connection X111A not correct. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.

Error number	Code	Component/Designation	Error	Possible error rectification
9031	L5	Electrical components overvoltage fault	Electrically defective	If the error occurs <15x, the functional safety of the indoor unit is still guaranteed. ▪ Sporadic message during continuous self-monitoring by the device. ▪ No further measures are required. If the error occurs 15x, it is locked and may have the following causes: ▪ Current mains overvoltage. ▪ Refrigerant compressor blocked or defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Wiring, poor contact. ▪ Service valves in the heat pump outdoor unit not open. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.
9032	L8	Electrical components	Electrically defective	▪ Refrigerant compressor defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, replace. ▪ If necessary, contact service partner.
9033	L9	Electrical components	Electrically defective	▪ Refrigerant compressor blocked or defective. ▪ Pressure difference between high and low pressure side too high before starting refrigerant compressor. ▪ Service valves in the heat pump outdoor unit not open. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.
9034	LC	Electrical components	Electrically defective	Communication error - internal communication in the heat pump outdoor unit lost. ▪ Electromagnetic influences. ▪ Perform reset. ▪ Main circuit board in the heat pump outdoor unit defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Fan motor defective. ▪ Wiring, poor contact. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.
9035	P1	Inverter circuit board in the heat pump outdoor unit	AG circuit board defective	No supply voltage from the mains connection. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.
9036	P4	Temperature sensor R10T on inverter circuit board in the heat pump outdoor unit (only in 11–16 kW system)	Electrically defective	Overtemperature in the heat pump outdoor unit ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Temperature sensor on inverter circuit board defective, plug connection X111A not correct. ▪ Check, eliminate cause, replace. ▪ If necessary, contact service partner.
9037	PJ	Output setting	Power setting for heat pump outdoor unit incorrect	▪ Contact service partner.
9038	U0	Sensors and parameter settings in the heat pump outdoor unit	Refrigerant leak	Refrigerant loss. ▪ Refrigerant quantity too low. See error code 9015 / E4. ▪ Blockage or leak in refrigerant line. ▪ Check, eliminate cause, top up refrigerant.

Error number	Code	Component/Designation	Error	Possible error rectification
9039	U2		Undervoltage/overvoltage	Mains voltage outside the permissible range ▪ Sporadic error shortly after a power failure. ▪ No fault elimination necessary. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, replace. ▪ If necessary, contact service partner.
9041	U4	Transmission fault	Electrical components	Communication between the heat pump outdoor unit and heat pump indoor unit lost. ▪ Wiring or connections, poor contact. ▪ No heat pump outdoor unit connected. ▪ Printed circuit board A1P defective. ▪ Main circuit board in the heat pump outdoor unit defective. ▪ Check, replace.
9042	U5	Transmission fault	Electrical components	Communication between RoCon BM2C and printed circuit board A1P is lost. ▪ See error code 200.
9043	U7	Transmission fault	Electrical components	Communication between the main circuit board and inverter circuit board in the heat pump outdoor unit lost. ▪ Main circuit board in the heat pump outdoor unit defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Wiring, poor contact. ▪ Check, eliminate cause, replace.
9044	UA	Transmission fault	Electrical components	Configuration of the A1P printed circuit board does not match the heat pump outdoor unit ▪ Replace A1P printed circuit board. ▪ If necessary, contact service partner.
9045	AJ-03	Software	Hot water heating time	DHW heating > 6 hours ▪ Check the heating element. ▪ Check that the power supply meets the regulations. Check for frequency fluctuations. ▪ Check the fuses on the printed circuit boards. ▪ Check DHW consumption (poss. too high). ▪ Check the building's DHW tap. ▪ Confirm that the software and EEPROM on the hydro printed circuit board match.
9046	E6-00	Software	Compressor start-up	System detects an abnormal electricity wave shape 16 times in 5 min ▪ Check that the power supply meets the regulations. Check for frequency fluctuations. ▪ Check the compressor. ▪ Check the compressor's connection and wiring. ▪ Check the operation of the expansion valve (fluid return flow). ▪ Check the refrigerant filling capacity and check for leaks. ▪ After resetting the power supply, check if the error occurs when the compressor is not in operation: check the expansion valve.

Error number	Code	Component/Designation	Error	Possible error rectification
9047	E8-00	Software	Overvoltage	System detects an overcurrent of > 20 A to the compressor for > 2.5 seconds 16x in 5 min ▪ Check the compressor. ▪ Check the compressor's connection and wiring. ▪ Check the operation of the expansion valve (fluid return flow). ▪ Check the refrigerant filling capacity and check for leaks. ▪ Check the power transistor. ▪ Check the outer inverter conductor plate. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed. ▪ Check that the outer main conductor plate is receiving a power supply. ▪ Check that the power supply meets the regulations. Check for frequency fluctuations.
9048	EA-00	4-way distribution valve, outdoor unit	4-way valve	The following condition occurs for 10 min after operation for 5 min: Heating: temperature of the condenser negative outlet water temperature < -10 °C ▪ Check the thermistor for the outlet water in the heat exchanger. ▪ Check the thermistor for the refrigerant fluid side. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed. ▪ Check that the outer main conductor plate is receiving a power supply. ▪ Check the 4-way distribution valve coil/wiring harness. ▪ Check the 4-way distribution valve body. ▪ Check for insufficient refrigerant. Perform a leak test. ▪ Check the quality of the refrigerant. ▪ Check the shut-off valves. ▪ Check that the hydro printed circuit board is being supplied with voltage.
9049	F6-00	Temperature sensor on the evaporator	Cooling high pressure	The temperature measured by the temperature sensor on the fin heat exchanger exceeds 60 °C ▪ Check that the installation room meets the regulations. ▪ Check the fan. ▪ Check the fan motor's connection and wiring. ▪ Check the expansion valve. ▪ Check the outer inverter conductor plate. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed. ▪ Check that the outer main conductor plate is receiving a power supply. ▪ Check the shut-off valves. ▪ Check the heat exchanger. ▪ Check the temperature sensor on the fin heat exchanger. ▪ Check the quality of the refrigerant.

Error number	Code	Component/Designation	Error	Possible error rectification
9050	H0-00	Software	Voltage/current sensor	Power supply condition malfunction detected before or directly after the compressor starts up ▪ Check the compressor. ▪ Check the compressor's connection and wiring. ▪ Check the operation of the expansion valve (fluid return flow). ▪ Check the refrigerant filling capacity and check for leaks. ▪ Check the outer inverter conductor plate. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed. ▪ Check that the outer main conductor plate is receiving a power supply.
9052	H8-00	Software	Compressor system	Compressor operating frequency below 55 Hz, voltage below 0.1 V and input current below 0.5 A ▪ Check the compressor. ▪ Check the compressor's connection and wiring. ▪ Check the operation of the expansion valve (fluid return flow). ▪ Check the refrigerant filling capacity and check for leaks. ▪ Check that the power supply meets the regulations. Check for frequency fluctuations. ▪ Check the outer inverter conductor plate. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed.
9053 9054	JA-00	Pressure sensor, outdoor unit	Refrigerant pressure sensor	Pressure sensor detects an abnormal value for 3 minutes (> 4.5 MPa or < -0.05 MPa) ▪ Check the pressure sensor. ▪ Check that the current flow LED flashes at regular intervals. ▪ Check that the correct replacement part has been installed. ▪ Check that the outer main conductor plate is receiving a power supply.
9055		Room temperature sensor (optional)	Temperature sensor error	Sensor or connecting cable defective ▪ Check, replace
9056		Outside temperature sensor (optional)	Temperature sensor error	Sensor or connecting cable defective ▪ Check, replace
9057			Overpressure in refrigerant circuit	Contact service partner
9058		Controller housing in the outdoor unit	Temperature error	Contact service partner
9059		Inverter in the outdoor unit	Temperature error	Contact service partner
9060		Software	Screed program not ended correctly	▪ Check the screed program ▪ Restart the program if necessary
9061	C1-11	ACS communication malfunction	ACS communication malfunction	Contact service partner
9062	C5-00	Refrigerant/heat exchanger outside the range	Heat exchanger thermistor abnormality	▪ Check sensor and plug connections. ▪ If necessary, contact service partner
9063	C8-01	Input current sensor out of range	Current sensor abnormality	Contact service partner
9064	E2-00	Creepage current circuit board has detected a creepage current on the power line of the device	Leakage current detection error	Contact service partner
9065	E4-00	The suction pressure was several times too low (detected by the sensor/pressure sensor or low-pressure switch)	Abnormal suction pressure	Contact service partner

Error number	Code	Component/Designation	Error	Possible error rectification
9066	E9-00	Electronically-controlled expansion valve is defective or not well connected.	Malfunction of electronic expansion valve	Contact service partner
9067	H4-00	Low-pressure sensor is defective or not well connected.	Malfunction of low pressure switch	▪ Check sensor and plug connections. ▪ If necessary, contact service partner
9068	H5-00	Compressor overload protection is defective	Malfunction of compressor overload protection	Contact service partner
9069	J5-00	The sensor display on the intake manifold is out of range. (Short circuit or open connection)	Malfunction of suction pipe thermistor	Contact service partner
9070	J8-00	The refrigerant liquid sensor display is out of range. (Short circuit or open connection)	Malfunction of refrigerant liquid thermistor	Contact service partner
9071	L1-00	Inverter circuit board malfunction due to overcurrent or component problem.	Malfunction of INV PCB	Contact service partner
9072	L8-00	Protection defined by inverter circuit board due to overheating due to too high a load, lightning strike or too low a speed.	Malfunction triggered by a thermal protection in the inverter PCB	Contact service partner
9073	L9-00	Detection of start-up error after time has elapsed to avoid compressor shutdown.	Prevention of compressor lock	Contact service partner
9074	LC-00	Malfunction in communication system in outdoor unit (between control and inverter circuit board, between control and ACS circuit board)	Malfunction in communication system of outdoor unit	Contact service partner
9075	P1-00	Malfunction in transmission system in the outdoor unit (between control and inverter circuit board, between control and ACS circuit board)	Open-phase power supply imbalance	Contact service partner
9076	P3-00	Malfunction decision by exceeding the DC limit value.	Abnormal direct current	Contact service partner
9077	PJ-00	Power settings for outdoor and indoor unit do not match. Incorrect combination of the units.	Capacity setting mismatch	Contact service partner
9078	U1-00	Open phase or inverse phase is detected by inverter circuit board.	Malfunction by reverse phase/open-phase	Contact service partner
9079	UF-00	Detection of inverted pipes or faulty communication wiring	Reversed piping or bad communication wiring detection	Contact service partner
9080	H1-00	Input of the optional external sensor is out of range.	External temperature sensor problem	Contact service partner
9081	H6-00	Compressor does not start after the compressor start command has been sent	OU: Malfunction of position detection sensor	Contact service partner
9082	FA-00	High-pressure switch has been activated.	OU: Abnormal high pressure, actuation of HPS	Contact service partner

Error number	Code	Component/Designation	Error	Possible error rectification
9083	L3-00	Switch box temperature (outdoor unit) is too high.	OU: Electrical box temperature rise problem	Contact service partner
9084	L4-00	Radiation lamella sensor measures too high a temperature.	OU: Malfunction of inverter radiating fin temperature rise	Contact service partner
9085	J6-33	Water inlet (indoor unit) and outlet (outdoor unit) sensors both out of range.	Sensor communication error	▪ Check sensor and plug connections. ▪ If necessary, contact service partner

Tab. 7-2 Error codes

INFORMATION

Observe maximum temperature sensor tightening torque (see Chap. 9.2).

7.4 Emergency operation

If the heat pump fails, the backup heater or another external heat generator can be used as an emergency heater. If [Emergency] is set to "Yes", emergency operation is automatically activated in the event of an error. Otherwise, emergency operation can only be started in the event of an error via the error screen (see enclosed operating instructions for the controller).

8 Taking out of operation

DANGER: RISK OF BURNING

When opening the solar return flow connection and the heating and hot water connections, there is a **danger of scalding and flooding** from escaping hot water.

- Only empty the storage tank or heating system when it has cooled down sufficiently and if it is provided with a suitable device for safely draining off or collecting the escaping water.
- Wear suitable protective clothing.

8.1 Temporary shutdown

CAUTION

A heating system that is shut down can freeze in the event of frost and may suffer damage.

- Drain the heating system that is shut down if there is danger of frost.
- If the heating system is not drained, the power supply must be ensured and the external main switch must remain switched on if there is a danger of frost.

If the indoor unit is not required for a lengthy period, it can be temporarily decommissioned.

However, we recommend not to disconnect the system from the power supply but merely to switch it to "Standby mode" (see Controller operating instructions).

The system is then protected from frost. The pumps and valve protection functions are active.

If it is not possible to guarantee the power supply when there is danger of frost,

- completely drain the indoor unit on the water side, or
- apply suitable antifreeze measures to the connected heating system and hot water storage tank (e.g. draining).

INFORMATION

If there is a danger of frost for only a few days with uncertainly in the gas and power supply, the oes not need to be drained because the heat insulation is very good as long as the storage tank temperature is observed regularly and does not fall below + 3 °C.

However, this provides no frost protection for the connected heat distribution system.

8.1.1 Draining the storage tank

1 Switch off the main switch and secure against restarting.

2 Connect the drain hose to the **combined filling and draining filling connection** (**combined filling and draining BA accessories**) (Fig. 8-1, item A) and to a waste water drainage point which is at least at ground level.

INFORMATION

If no **combined filling and draining filling connection** is available, the connecting piece (Fig. 8-1, item C) can be detached from the safety overflow (item B) and used.

This must be re-installed after the draining process before the heating system is put back into operation.

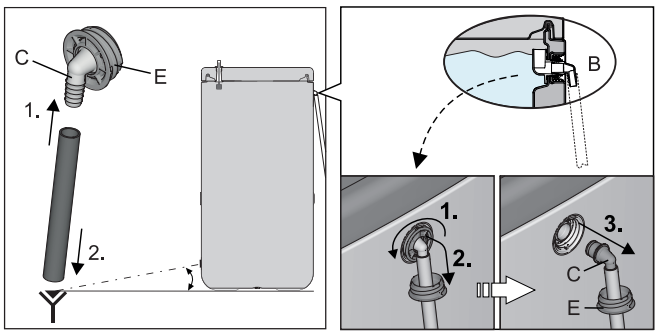


Fig. 8-1 Installing the drain hose; optional: Detaching the connecting piece from the safety overflow

Item	Designation	Item	Designation
A	Combined filling and draining connection (combined filling and draining BA accessory)	E	Threaded piece
B	Safety overflow	F	Sealing plug
C	Hose connecting piece for safety overflow	G	Connecting angle
D	Clamping piece	X	Valve insert

Tab. 8-1 Legend for Fig. 8-1 to Fig. 8-6

Without p=0 solar system

1 Remove the cover panel on the filling and draining connection.

2 **When using the combined filling and draining connection (combined filling and draining BA accessory):**

Remove the cover panel on the handle and unscrew the threaded piece (Fig. 8-2, item E) from the storage tank.

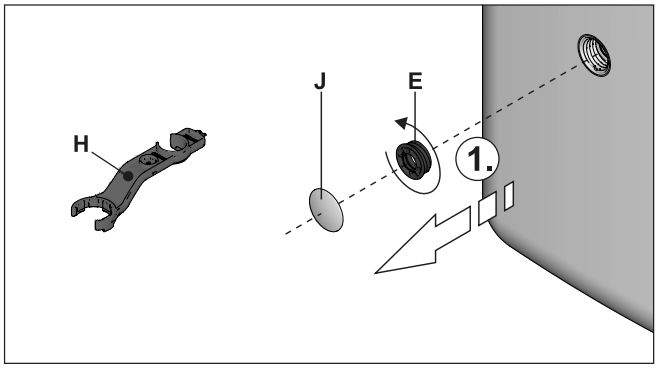


Fig. 8-2 Unscrewing the threaded piece

3 Insert the combined filling and draining filling connection in the threaded piece (Fig. 8-3, item E) and secure with the clamping piece (Fig. 8-3, item D).

4 Place a suitable collecting tray under the filling and draining connection.

5 Unscrew the threaded piece on the filling and draining connection (Fig. 8-4, item E), remove the sealing plug (Fig. 8-4, item F) **and immediately screw in** the pre-installed threaded insert with **combined filling and draining filling connection** into the filling and draining connection (Fig. 8-4) again.

CAUTION

After removing the sealing plug, storage tank water surges out.

There is no valve or check valve on the filling and draining connection.

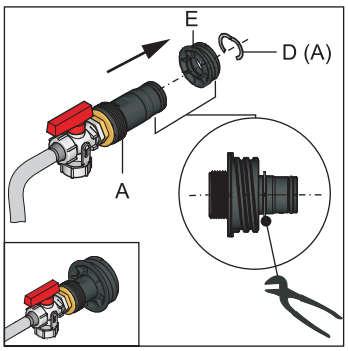


Fig. 8-3 Completing the combined filling and draining filling connection

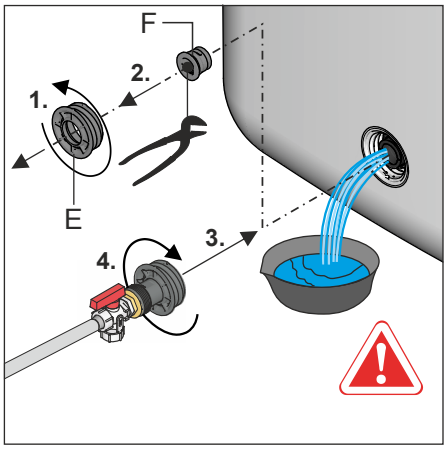


Fig. 8-4 Screwing the combined filling and draining filling connection into the filling and draining connection

6 Open the fill/drain cock on the **KFE filling connection** and drain the water content of the storage tank.

Only with p=0 solar system

1 Adjust the valve insert on the connection bracket so that the path to the blind plug is blocked off (Fig. 8-6).

2 Place a suitable collecting tray and remove the blind plug from the connection bracket (Fig. 8-6).

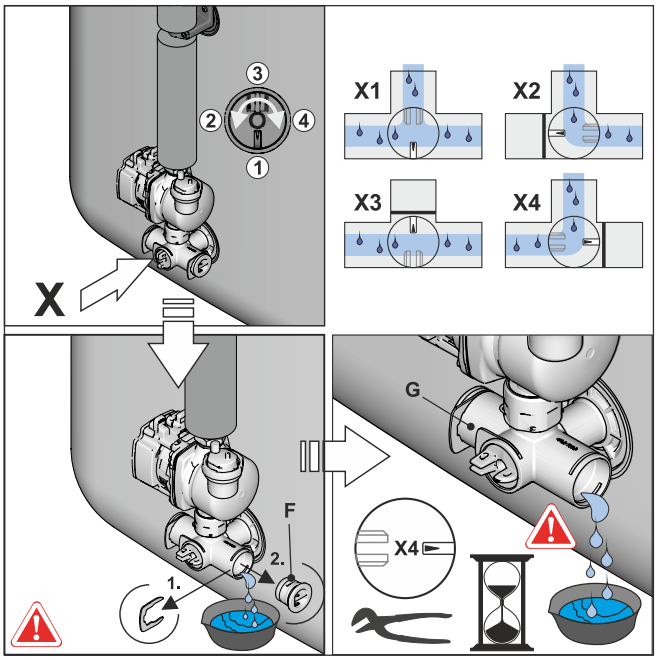


Fig. 8-5 Shut off the valve insert, remove the blind plug from the connection bracket

3 Insert the **combined filling and draining filling connection** in the connection bracket and secure with the holding clamp (Fig. 8-6).

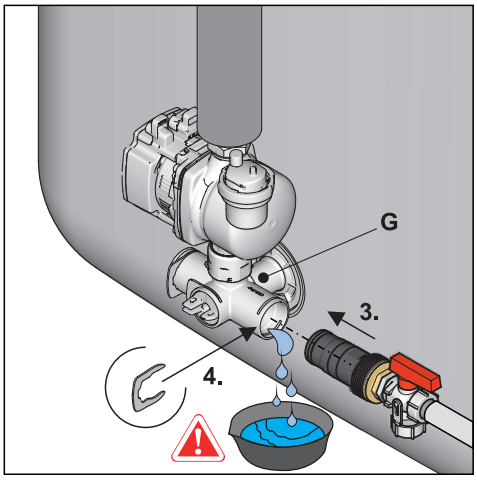


Fig. 8-6 Installing the combined filling and draining filling connection in the connection bracket

4 Open the fill/drain cock on the **KFE filling connection**.

5 Adjust the valve insert on the connection bracket so that the path to the drain hose is open (see also Fig. 8-5) and drain the water content of the storage tank.

8.1.2 Draining the heating circuit and hot water circuit

1 Connect the drain hose to the KFE cock of the indoor unit.

2 Open the KFE cock on the indoor unit.

3 Drain the heating and hot water circuits.

4 Disconnect the heating flow and return and the cold water feed and hot water discharge from the indoor unit.

5 Connect the discharge hose on the heating inflow and return flow as well as the cold water inflow and hot water outflow so that the hose opening is at ground level.

6 Allow the individual heat exchangers to run empty one after the other according to the siphon lifting principle.

8.2 Final shutdown and disposal

For final decommissioning of the indoor unit

1 taken out of service (see Chap. 8.1),

2 disconnected from all electrical and water connections,

3 dismantled in accordance with the installation manual in reverse order,

4 disposed of in a professional manner.

Recommendations for disposal

We designed the indoor unit in an environmentally friendly manner. During the disposal process, the only waste created is that which can be used for material or thermal recycling. The materials used that are suitable for recycling can be sorted into individual types.

Thanks to the environmentally friendly design of the indoor unit, we have established requirements to ensure environmentally friendly disposal. Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

The designation of the product means that electrical and electronic products may not be disposed of together with unsorted domestic waste.

Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

- Disassembly of the system, handling of coolant, oil and other parts may only be carried out by a qualified fitter.
- Disposal may only be carried out by an organization that specialises in reuse, recycling and recovery.

Further information is available from the installation company or the responsible local authorities.

9 Technical data

Part of the current technical data is available on the regional Daikin-website (publicly accessible). The complete technical data is available via the Daikin Business Portal (authentication required).

9.1 Information on the type plate

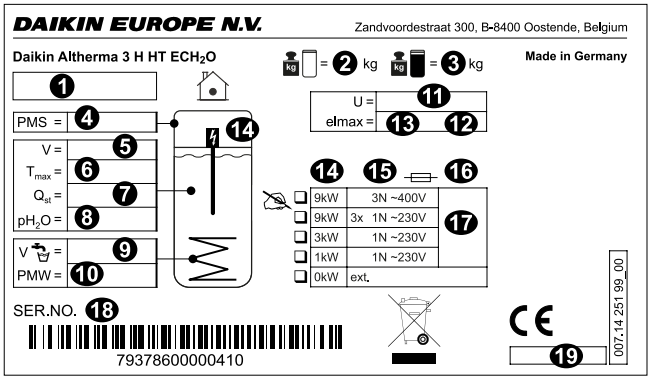


Fig. 9-1 Type plate

1 Device type
2 Empty weight
3 Total filled weight
4 Max. permissible operating pressure PMS (heating)
5 Total storage capacity
6 Max. permissible operating temperature T_{max}
7 Standby heat expenditure in 24 hours at 60 °C (storage tank) Q_{st}
8 Operating pressure of storage water pH_2O
9 Nominal capacity of drinking water
10 Max. operating pressure PMW (plumbing)
11 Nominal voltage U
12 Protection type
13 Electrical power consumption elmax
14 Backup-heater (optional)
15 Backup heater protection class (optional)
16 Backup heater fuse (optional)
17 Output/backup heater power supply (optional)
18 Serial number (specify in the event of complaints or inquiries)
19 Date of production

9.2 Tightening torque

Component	Thread size	Tightening torque in Nm
Temperature sensor	All	Max. 10
Hydraulic line connections (water)	1"	25 – 30
Backup heater	1.5"	Max. 10 (handtight)

Tab. 9-1 Tightening torques

9.3 Electrical connection diagram

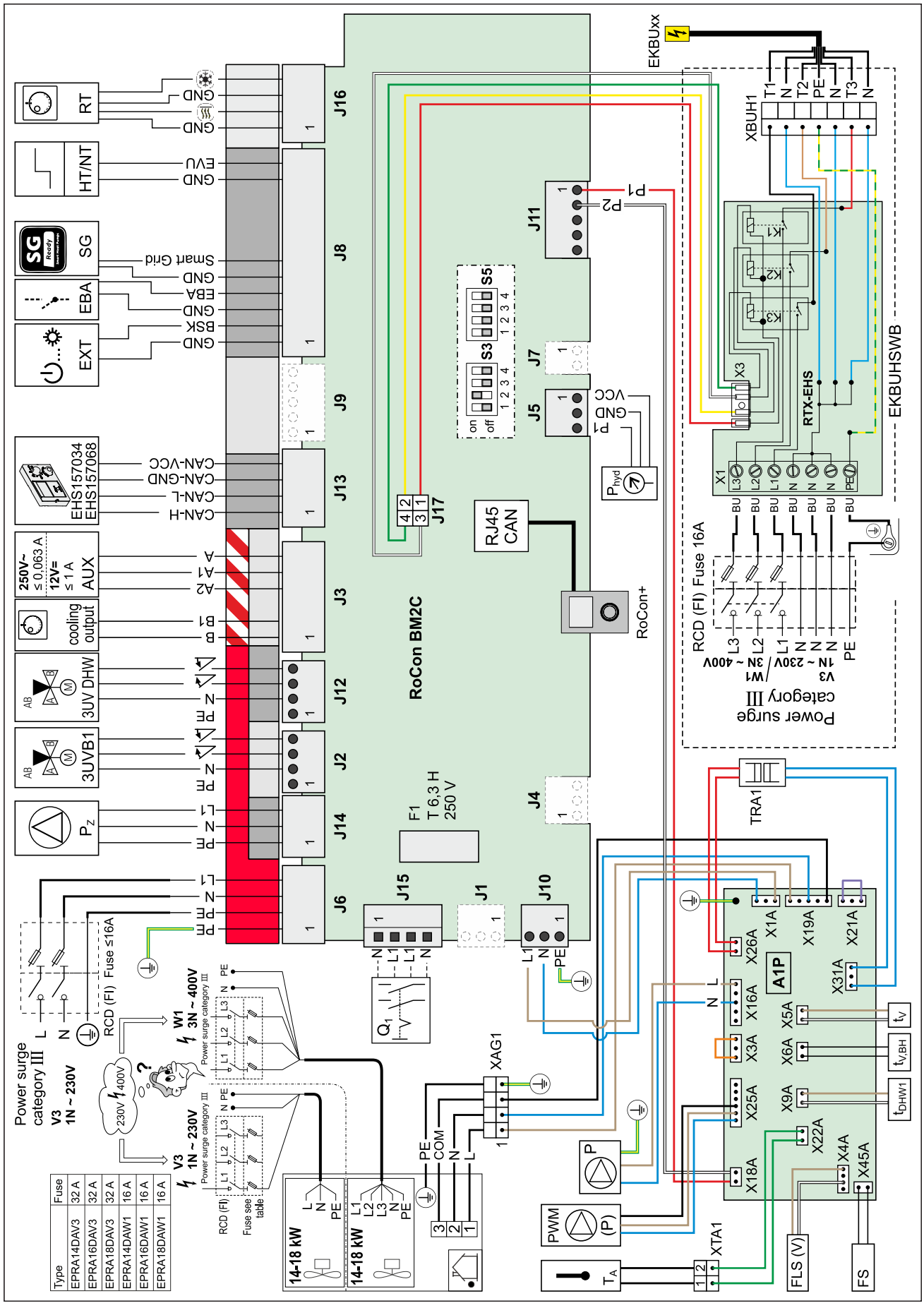


Fig. 9-2 Electrical connection diagram

9 Technical data

Item	Designation	Item	Designation
	Heat pump outdoor unit	K1	Relay 1 for backup heater
	Heat pump indoor unit	K2	Relay 2 for backup heater
3UVB1	3-way switch valve (internal heat generator circuit)	K3	Relay 3 for backup heater
3UV DHW	3-way switch valve (hot water/heating)	X1	Terminal strip for backup heater mains connection
A1P	Printed PCB (heat pump basic control)	X3	Internal wiring plug connection to J17 (RoCon BM2C)
X3A	Plug connection for internal wiring (bridging plug)	FLS	FlowSensor
X4A	Plug connection for FlowSensor FLS	FS	Flow switch
X5A	Plug connection for t_V inflow temperature sensor	HT/NT	Switching contact for low rate mains connection
X6A	Plug connection for $t_{V, BH}$ inflow temperature sensor	P	Heating circulation pump (connected inside the device)
X9A	Plug connection for storage tank temperature sensor t_{DHW1}	P_Z	Circulation pump
X16A	Plug connection for heating circulation pump	PWM	Pump connection (PWM signal)
X18A	Plug connection to J11 from RoCon BM2C	RJ45 CAN	Internal wiring plug connection (RoCon BM2C) (to RoCon+ B1)
X19A	Plug connection to XAG1	RoCon+ B1	Controller control panel
X21A	Plug connection for internal wiring (bridging plug)	RoCon BM2C	Printed PCB (basic controller module)
X26A	Plug connection to TRA1 (230 V)	J2	Plug connection for 3UVB1
X31A	Plug connection to TRA1 (12 V)	J3	Plug connection AUX switching contacts and cooling output status output
X45A	FlowSensor plug connection	J5	Pressure sensor plug connection
AUX	Switching contact outputs (A-A1-A2) + (B-B1)	J6	Plug connection mains voltage
EKBUxx	Backup heater	J8	Plug connection for EXT
DS	Pressure sensor		Plug connection for EBA
EBA	Switching contact for external requirement request		Plug connection for Smart Grid EVU switching contacts
EXT	Switching contact for external operating mode changeover		Plug connection for HT/NT EVU switching contact
F1	Fuse 250 V T 2 A (RoCon BM2C)	J10	Plug connection for internal wiring to X1A
SG	Switching contact for Smart Grid (intelligent mains connection)	J11	Plug connection for internal wiring to X18A (A1P)
TRA1	Transformer	J12	Plug connection 3UV DHW
t_A	Outside temperature sensor	J13	System bus plug connection (e.g. room station)
t_{DHW1}	Storage tank temperature sensor 1 (A1P)	J14	Circulation pump P_Z plug connection
t_V	Inflow temperature sensor (A1P)	J15	Mains switch plug connection
$t_{V, BH}$	Backup heater inflow temperature sensor	J16	Room thermostat (EKRTR / EKRTW) plug connection
EHS157068	Mixer module	XAG1	Heat pump outdoor unit plug connection
EHS157034	Room station	XBUH1	Backup heater plug connection (EKBUxx)
cooling output	Status output for "Cooling" operating mode (floor heating control connection cooling output)	X2M6	HPc-VK-1 connection cable clamp
RT	Room thermostat (EKRTW)	X2M7	HPc-VK-1 connection cable clamp
RT-E	Receiver for wireless room thermostat (EKRTR)	X11M	Terminal strip in FWXV-ATV3
RTX-EHS	Printed PCB (backup heater)		

Tab. 9-2 Key names for connection and wiring diagrams

9.4 Piping diagram for refrigerant circuit

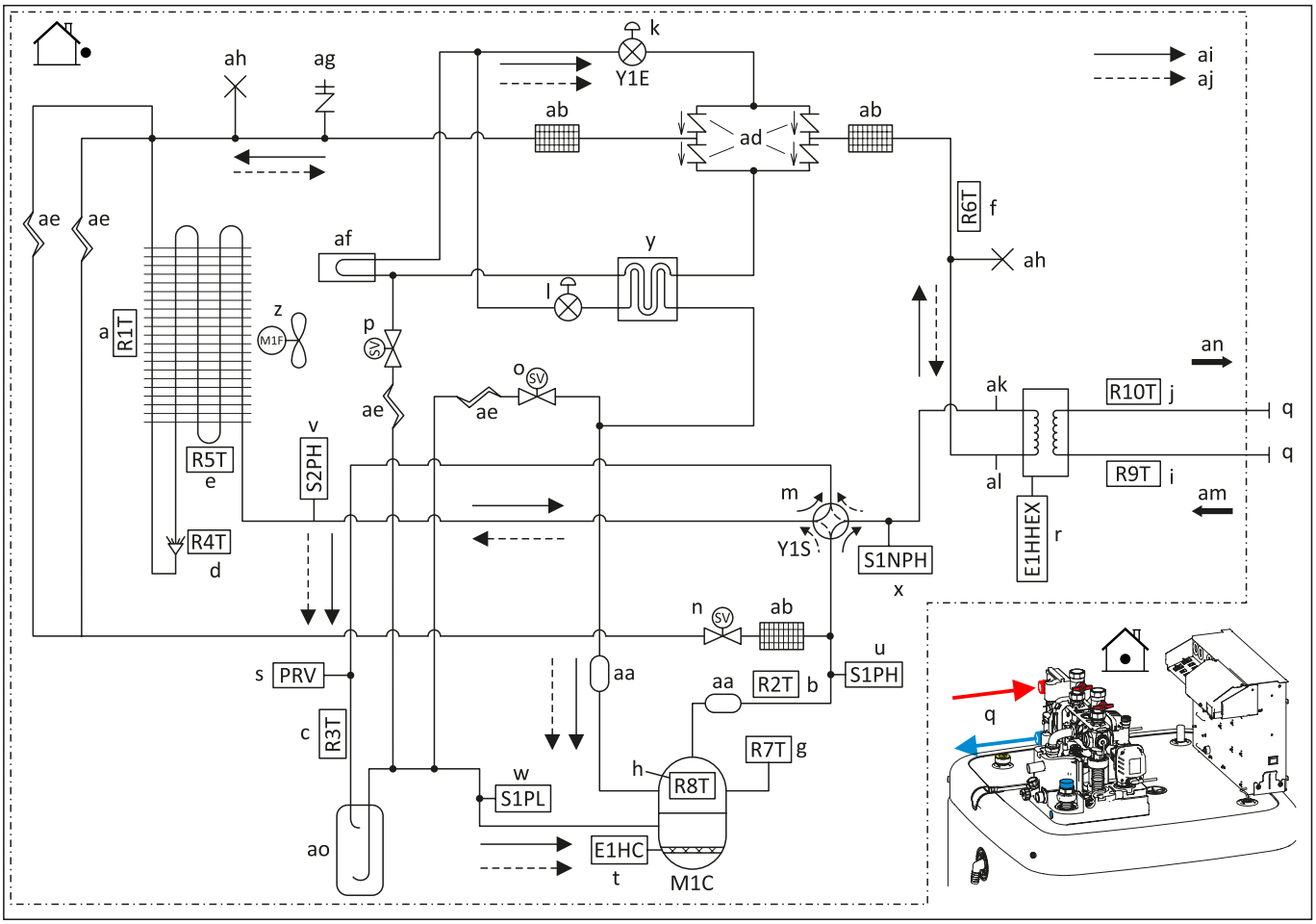


Fig. 9-3 Components in the heat pump circuit

- **a / R1T** Ambient temperature sensor
- **b / R2T** Temperature sensor (outlet)
- **c / R3T** Temperature sensor (extraction system)
- **d / R4T** Temperature sensor (heat exchanger) (distributor)
- **e / R5T** Temperature sensor (heat exchanger centre)
- **f / R6T** Temperature sensor (liquid)
- **g / R7T** Temperature sensor (compressor housing)
- **h / R8T** Temperature sensor (compressor connection)
- **i / R9T** Water inlet temperature sensor
- **j / R10T** Water outlet temperature sensor
- **k / Y1E** Electronic expansion valve (main)
- **l / Y3E** Electronic expansion valve (injection)
- **m / Y1S** Solenoid valve (4-way valve)
- **n / Y2S** Solenoid valve (hot gas bypass)
- **o / Y3S** Solenoid valve (low-pressure bypass)
- **p / Y4S** Solenoid valve (injection bypass)
- **q** Screw connection 1" M
- **r / E1 H HEX** Solenoid valve
- **s** Pressure relief valve
- **t** Crankcase heater
- **u** High-pressure switch (5.6 MPa)
- **v** High-pressure switch (4.17 MPa)
- **w / S1PL** Low-pressure switch
- **x** High-pressure sensor
- **y** Preheater
- **z** Fan motor
- **aa** Silencer
- **ab** Filter
- **ac** Compressor
- **ad** Safety valve
- **ae** Capillary tube
- **af** PCB – cooling
- **ag** Service connection -5/16" – Light signal
- **ah** Clamped pipe
- **ai** Heating
- **aj** Cooling
- **ak** Gaseous
- **al** Liquid
- **am** Water inlet (return)
- **an** Water outlet (feed)
- **ao** Hot water storage tanks

9.5 Hydraulic connection

DANGER: RISK OF BURNING

High temperatures can occur in the solar storage tank. Therefore, sufficient scalding protection must be included when the hot water system is installed (automatic hot water mixing device).

To avoid heat losses due to gravity flows, the devices can be optionally equipped with plastic circulation stop valves. These are suitable for maximum operating temperatures of 95 °C and for installation in all heat exchanger connections on the storage tank side (except heat exchangers for pressurised solar system charging).

Suitable circulation stop valves must be installed in the building for components connected to the heat exchanger for pressurised solar system charging.

9.5.1 Hydraulic system connection

INFORMATION

The system diagram below is an example, and is never a substitute for careful system planning. Please visit our website for more diagrams.

Item	Meaning
1	Cold water distribution network
2	Hot water distribution network
3	Heating flow
4	Heating return flow
5	Mixing circuit
6	Circulation (optional)
7	Check valve, return valve
7a	Circulation stop valves
8	Solar circuit
9	Gas line
10	Liquid line
3UV DHW	3-way distribution valve (hot water/heater)
3UVB1	3-way mixer valve (heater/internal boiler circuit)
C	Refrigerant compressor
CW	Cold water
DHW	Hot water
DSR1	Pressurised solar system
E	Expansion valve
EHS157068	Mixer valve controller
EKBUxx	Backup heater
EKSRDS2A	Pressure station
FLS	FlowSensor

Item	Meaning
FS	Flow switch
$H_1, H_2 \ldots H_m$	Heating circuits
MAG	Diaphragm expansion vessel
MIX	3-way mixer with drive motor
P	High-efficiency pump
P_{Mi}	Mixing circuit pump
P_S	Solar operating pump
P_Z	Circulation pump
RoCon+ HP	Indoor unit controller
PWT	Plate heat exchanger
SAS1	Sludge and magnetic separator
SK	Solar panel field
SV	Safety overpressure valve
t_{AU}	Outside temperature sensor
t_{DHW}	Storage tank temperature sensor
t_{Mi}	Inflow temperature sensor, mixer circuit
t_V	Inflow temperature sensor
t_K	Solar solar panel temperature sensor
T_R	Solar return flow temperature sensor
T_S	Solar storage tank temperature sensor
V	Fan (vaporiser)
VS	Burns guard VTA32

Tab. 9-3

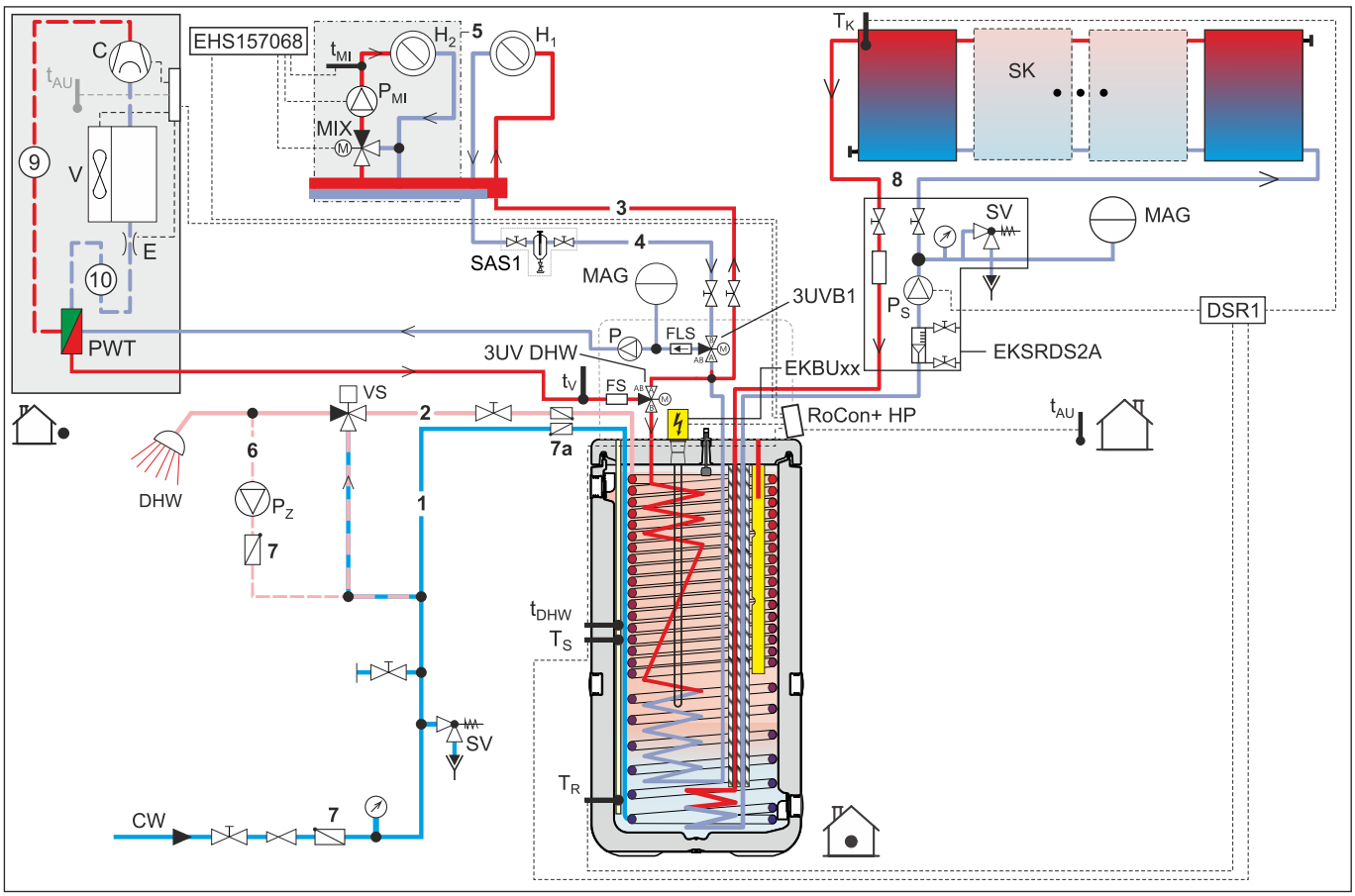


Fig. 9-4 Hydraulic diagram (Biv types) with pressurised solar

9.6 Technical data

Basic data				ETS(X/H) 16P30DA	ETS(X/H)B 16P30DA	ETS(X/H) 16P50DA	ETS(X/H)B 16P50DA
Outdoor unit				EPRA14DAV3 EPRA16DAV3 EPRA18DAV3 EPRA14DAW1 EPRA16DAW1 EPRA18DAW1			
Casing	Colour			Traffic white (RAL9016) / Iron grey (RAL7011)			
	Material			Impact-resistant polypropylene			
Dimensions	Device	Height	mm	1891		1896	
		Width	mm	590		785	
		Depth	mm	615		785	
	Unit packaged	Height	mm	2026		2031	
		Width	mm	800			
		Depth	mm	900			
Weight	Device		kg	73	75	90	96
	Unit packaged		kg	88	90	105	111
Packaging	Material			Plastic film / Wood (pallet) / Corrugated board			
	Weight		kg	11			
Storage tank	Total storage capacity		l	294		477	
	Material			polypropylene			
	Maximum water temperature		°C	85			
	Insulation	Material		HFC-free polyurethane foam			
		Heat loss	kWh/ 24 h	1.5(1)		1.7(1)	
	Energy efficiency class			B			
	Psbsol		W/K	1.43		1.59	
	Heat loss in standby mode		W	64		72	
	Total storage capacity		l	294		477	
	Vbu (solar, BUH)		l	290		464	
Heat exchanger	Number			2	3	2	3
	Storage tank charging	Number		1			
		Material		Stainless steel (1.4404)			
		Surface area	m^2	4.05		3.35	3.54
		Volume	l	19.5		16.4	17.4
		Operating pressure	bar	3.0			
	Domestic hot water	Surface area	m^2	5.60		5.80	5.90
		Volume	l	27.1		28.2	28.1
		Operating pressure	bar	6.0			
		Number		1			
		Material		Stainless steel (1.4404)			
	Bivalent heat exchanger for ext. heat generator	Surface area	m^2	-	0.74	-	1.69
		Volume	l	-	3.9	-	10.2
		Operating pressure	bar	-	6.0	-	6.0
		Number		-	1	-	1
		Material		-	Stainless steel (1.4404)	-	Stainless steel (1.4404)
Pump	Type			Grundfos UPMXL 20-125 CHBL PWM RT			
	Control			PWM			
	IP class			IPX2D			
	Power input		W	180			

(1) Heat loss according to EN 12897

9 Technical data

Basic data					ETS(X/H) 16P30DA	ETS(X/H)B 16P30DA	ETS(X/H) 16P50DA	ETS(X/H)B 16P50DA
Operating range	Heating	Water side	Min.	°C	15			
			Max.	°C	70			
	Indoor installation	Surroundings	Min.	°C TK	5			
			Max.	°C TK	40			
	Cooling (only for ETSX types)	Surroundings	Min.	°C TK	10			
			Max.	°C TK	43			
		Water side	Min.	°C	5			
			Max.	°C	22			
	Hot water	Surroundings	Min.	°C TK	-28			
			Max.	°C TK	35			
		Water side	Min.	°C	10			
			Max. (backup heater)	°C	75			
			Max.	°C	63			
Drinking water connection	Material				Brass (CW617N)			
	Size	Cold water inlet/Hot water outlet		inches	G 1" (external thread)			
Pipe connections	Ext. heat generator (bivalent)			inches	-	G 1" (external thread)	-	G 1" (external thread)
Noise power level			Rated	dB(A)	45.6			
Thermal power	Hot water volume without reheating at a draw-off rate of 12 l/min			l	153(1)/252(2)/321(3)		318(1)/494(2)/564(3)	282(1)/444(2)/516(3)
	Hot water volume without reheating at a draw-off rate of 8 l/min			l	184(1)/282(2)/352(3)		364(1)/540(2)/612(3)	324(1)/492(2)/560(3)
Water circuit	Diameter of pipe connections			inches	G 1" (external thread)			
	Material				Brass (CW617N)			
	Safety valve			bar	3.0			
	Pressure gauge				Digital			
	Emptying/filling valve				Yes			
	Stop valve				Yes			
	Vent valve				Yes			
	Max. heating pressure			bar	3.0			
PED	Category				Art. 4.3			
General	Supplier/manufacturer details	Name or brand			Daikin Europe N.V.			
		Name and address			Daikin Europe N.V. Zandvoordestraat 300, 8400 Oostende, Belgium			
Control systems	Class of temperature control				II			
	Contribution to seasonal efficiency of space heating			%	2.0			
	Infrared remote control				No			
	Cable remote control				RoCon+			

(1) T_{KW} = 10 °C / T_{WW} = 40 °C / T_{SP} = 50 °C
(2) T_{KW} = 10 °C / T_{WW} = 40 °C / T_{SP} = 60 °C
(3) T_{KW} = 10 °C / T_{WW} = 40 °C / T_{SP} = 65 °C

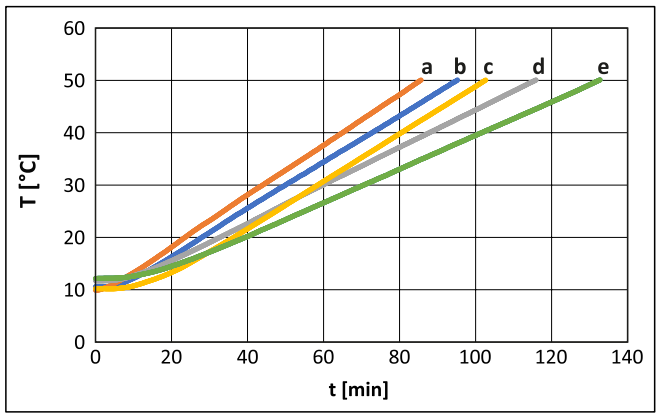
Electrical data					ETS(X/H) 16P30DA	ETS(X/H)B 16P30DA	ETS(X/H) 16P50DA	ETS(X/H)B 16P50DA
Voltage supply	Phase				1~			
	Frequency			Hz	50			
	Voltage			V	230			
	Voltage range		Min.	%	10			
			Max.	%	10			
IP class					IPX0A			
Backup heater	Voltage supply	Designation			3 V/9 W			
		Phase			1~/3~			
		Frequency		Hz	50			
Electrical power consumption			Max.	W	161			
			Stand by	W	13			

9.7 Combination table

		
		ETSH16P30D ETSHB16P30D ETSX16P30D ETSXB16P30D ETSH16P50D ETSHB16P50D ETSX16P50D ETSXB16P50D
	EPRA14DAV3	P
	EPRA16DAV3	P
	EPRA18DAV3	P
	EPRA14DAW1	P
	EPRA16DAW1	P
	EPRA18DAW1	P

9.8 Performance tables

Hot water capacity

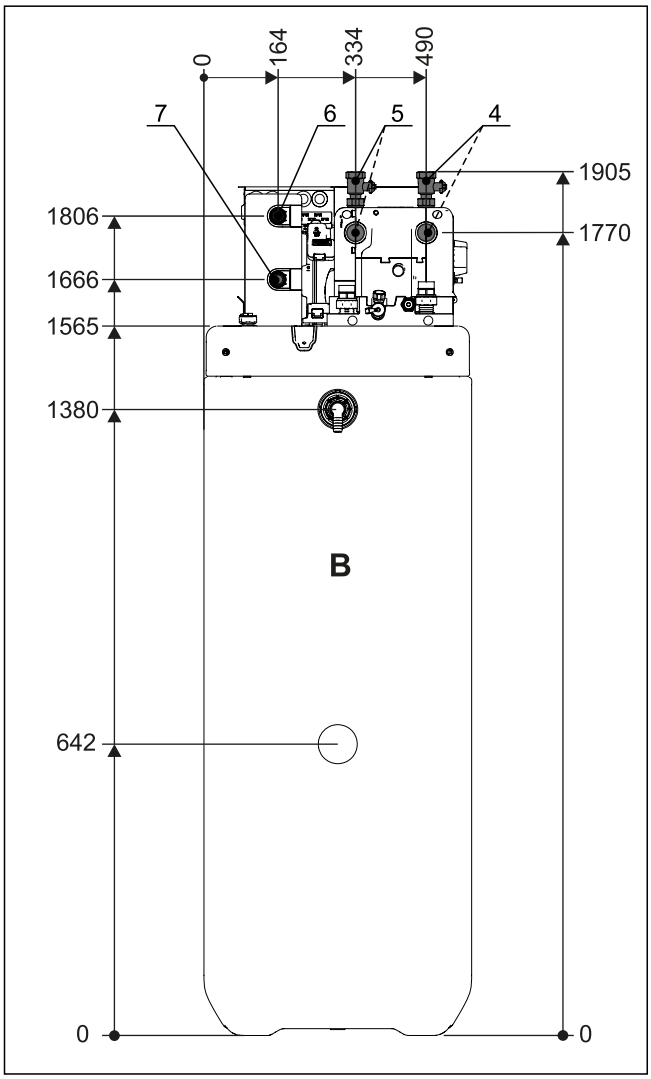


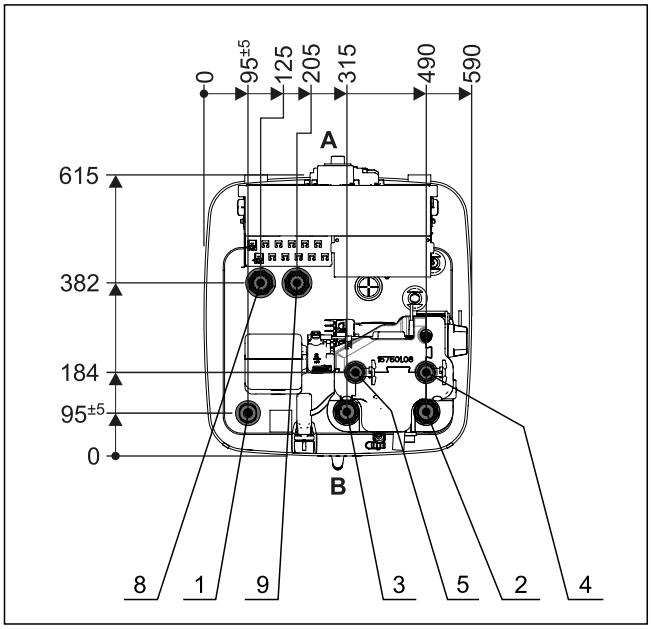
a ETS(X/H)(B)16P30DA – EPRA*DAW1
b ETS(X/H)(B)16P30DA – EPRA*DAV3
c ETS(X/H)B16P50DA – EPRA*DAW1
d ETS(X/H)B16P50DA – EPRA*DAV3
e ETS(X/H)16P50DA – EPRA*
t [min] Time
T [°C] Storage temperature

9.9 Dimensions

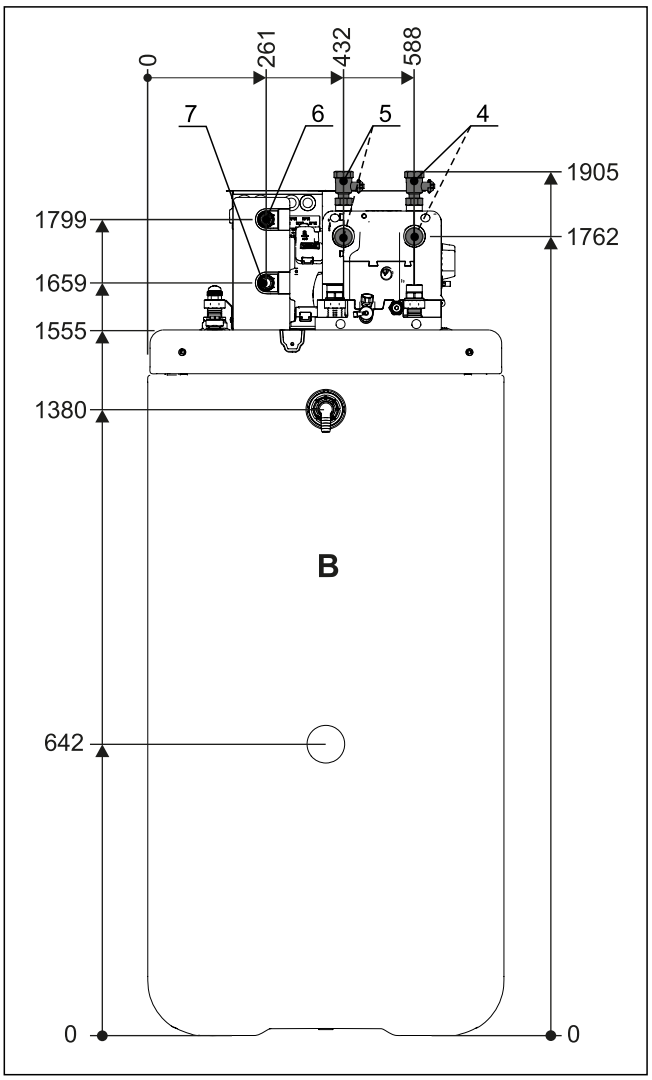
9.9.1 Device

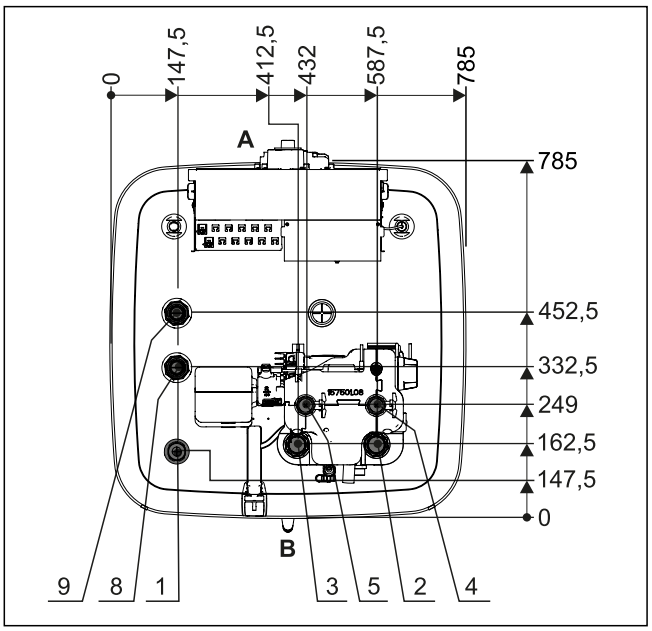
ETS(X/H)B16P30D





ETS(X/H)B16P50D

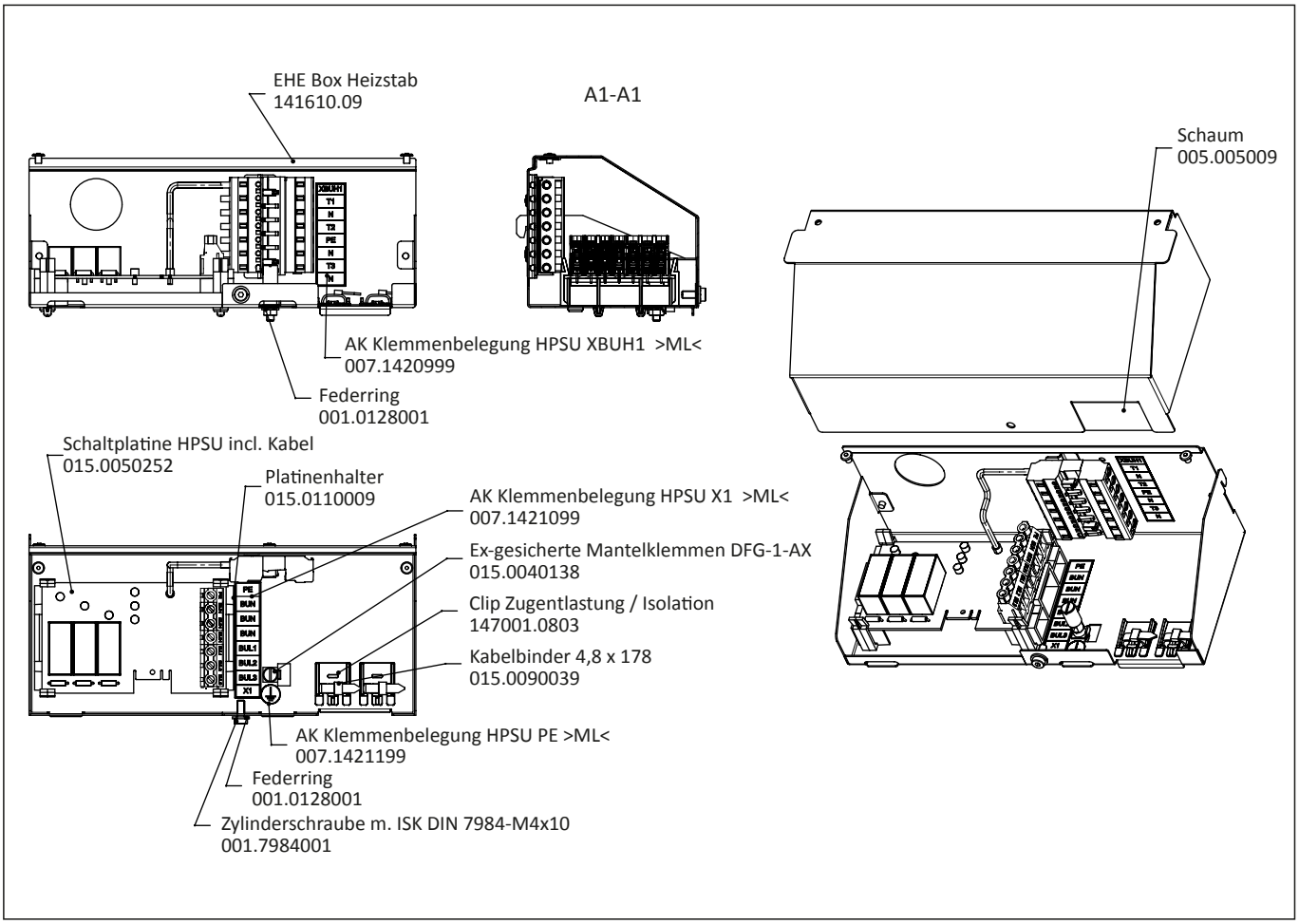




Item	Designation	Item	Designation
1	Solar inflow	7	Outdoor unit water inlet connection
2	Cold water	8	Bivalent feed (type ETS(X/H)B only)
3	Hot water	9	Bivalent return (type ETS(X/H)B only)

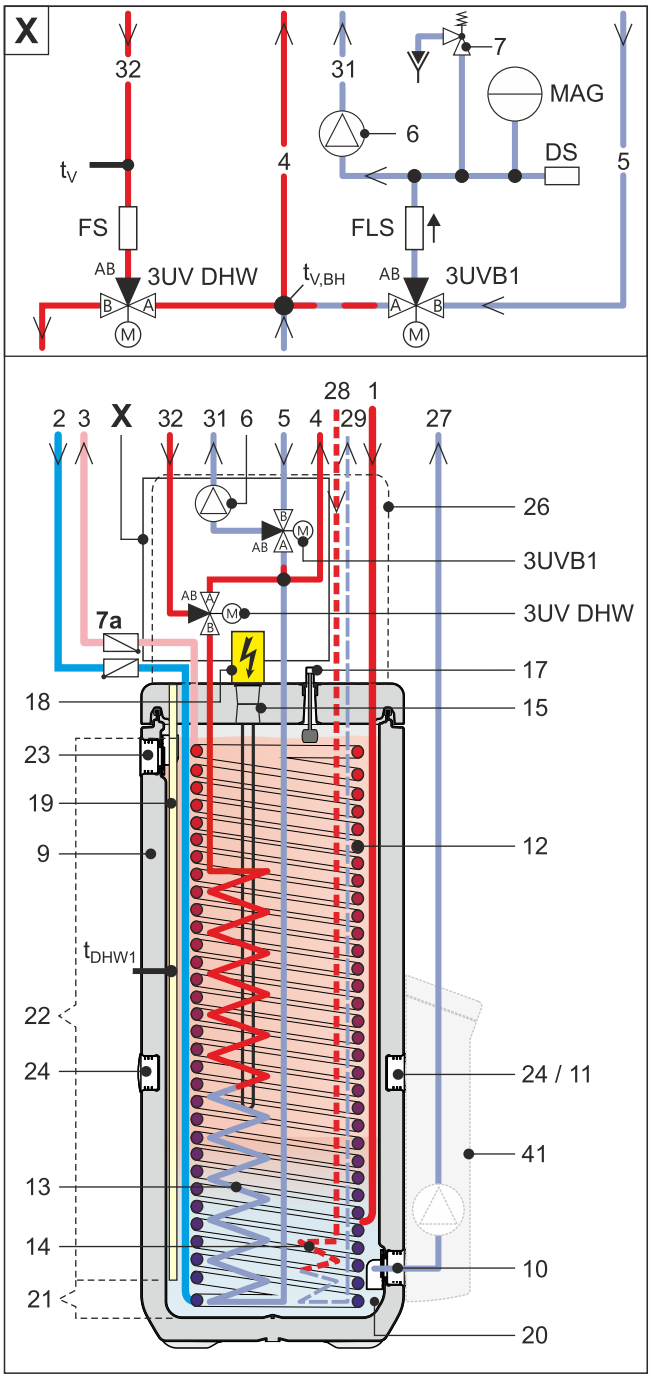
Item	Designation	Item	Designation
4	Heating flow		
5	Heating return flow	A	front
6	Outdoor unit water outlet connection	B	rear

9.9.2 Connection set for external heat generators (optional)

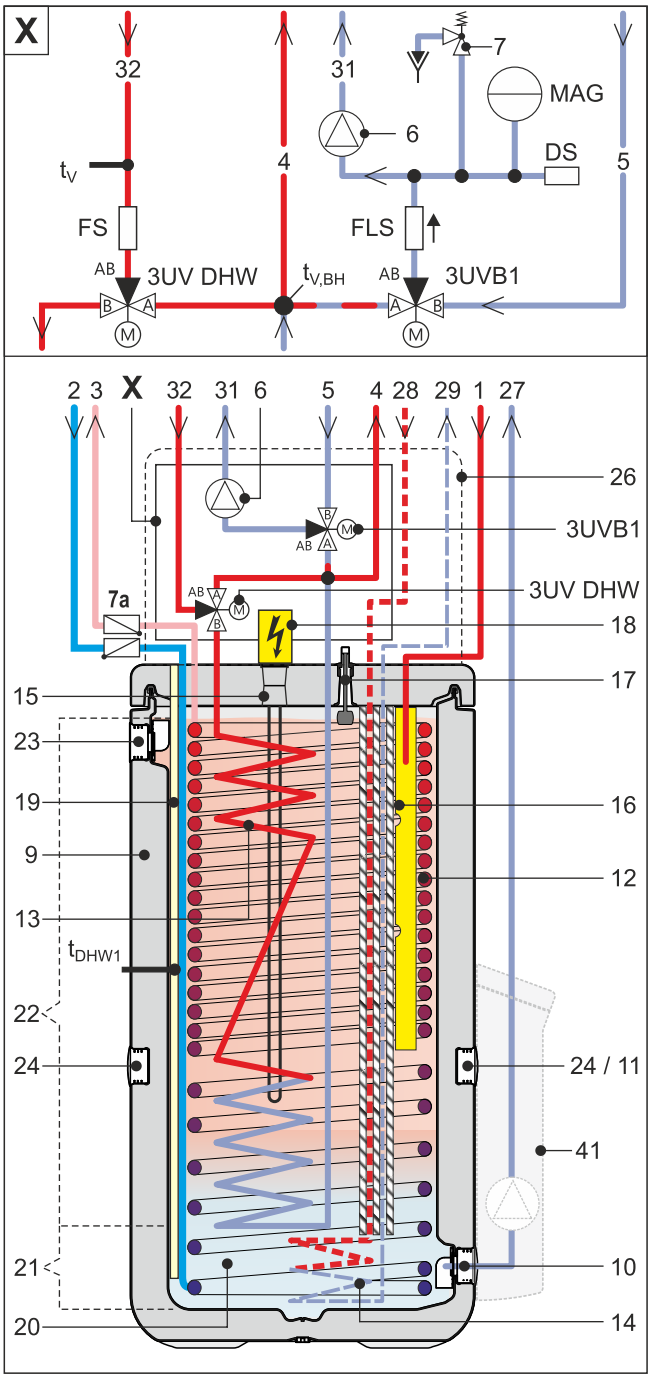


9.10 Piping diagram

ETS(X/H)(B)16P30D



ETS(X/H)(B)16P50D

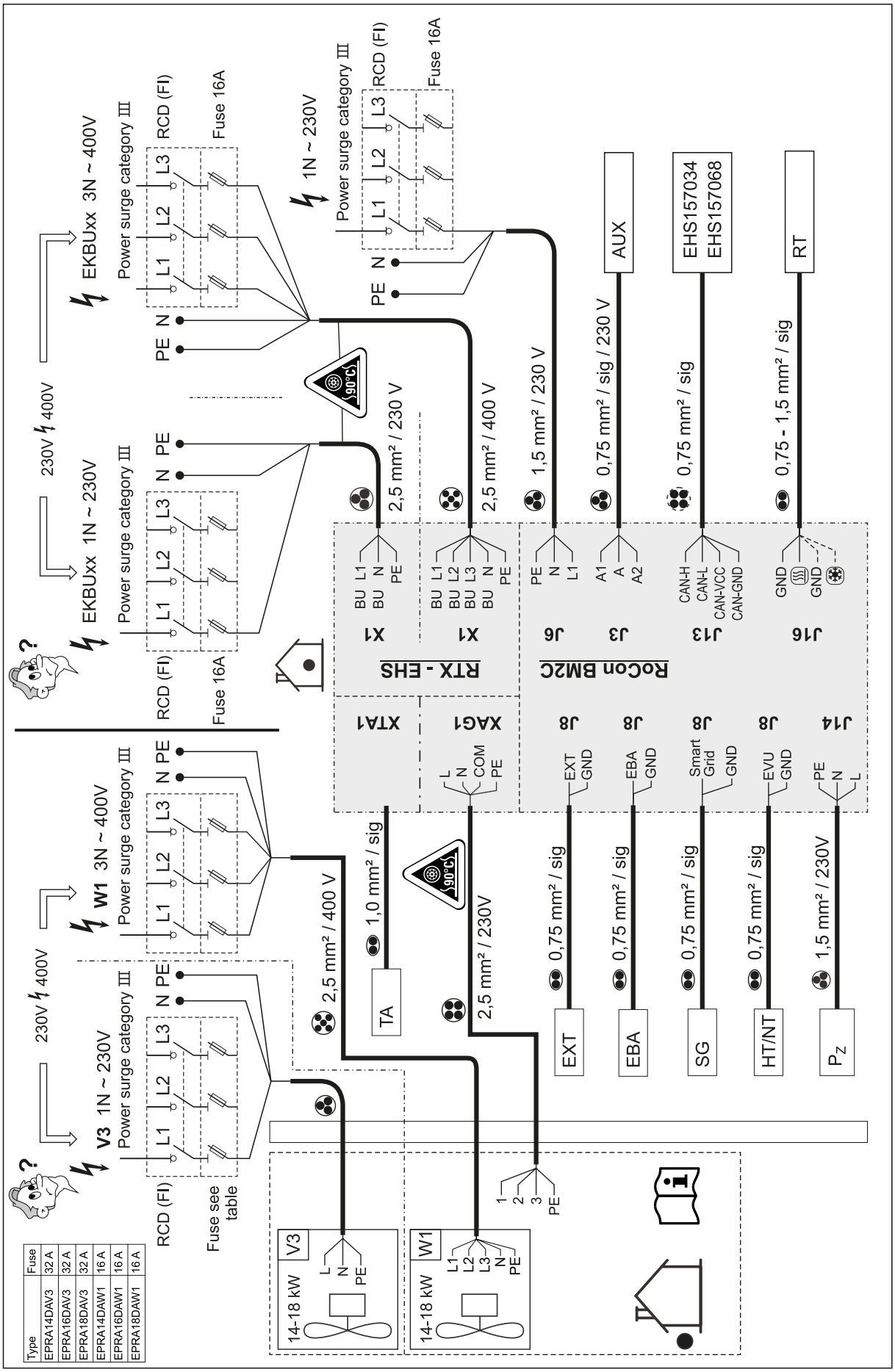


Item	Designation	Item	Designation
1	Solar inflow	25	Type plate
2	Cold water connection	26	Protective cover
3	Hot water	27	Solar return flow
4	Heating flow	28	Bivalent feed (type ETS(X/H)B only)
5	Heating return flow	29	Bivalent return (type ETS(X/H)B only)
6	Circulation pump	30	Manual vent valve
7	Pressure relief valve	31	Outdoor unit water inlet connection
7a	Circulation stop valve (accessory)	32	Outdoor unit water outlet connection
8	Automatic vent valve	33	Status display

Item	Designation	Item	Designation
9	Storage tank (polypropylene, double-walled jacket with PUR hard foam heat insulation)	34	Ball valve (heating circuit)
10	Filling and draining connection or solar return flow connection	35	Combined filling and draining valve (heating circuit)
11	Mount for solar controller or handle	37 t_{DHW1}	Storage tank temperature sensor
12	Heat exchanger (stainless steel) for domestic hot water heating	38	Diaphragm expansion vessel connection
13	Heat exchanger (stainless steel) for storage tank charging or heating support	39	Controller housing
14	Biv heat exchanger (stainless steel) for charging with external heat generator (e.g. pressurised solar system)	41	EKSRPS4 Optional: Solar control and pump unit

Item	Designation	Item	Designation
15	Connection for optional electrical backup heater EKBUxx	3UVB 1	3-way switch valve (internal heat generator circuit)
16	Solar inflow layering pipe	3UV DHW	3-way switch valve (hot water/heating)
17	Fill level indicator (tank water)	DS	Pressure sensor
18	Optional: electric backup heater (EKBUxx)	FLS	FlowSensor
19	Sensor pocket for tank temperature sensor t_{DHW1}	t_V	Inflow temperature sensor
20	Pressure-free storage water	$t_{V, BH}$	Backup heater inflow temperature sensor
21	Solar zone	RoCon + B1	Controller control panel
22	Hot water zone	MAG	Diaphragm expansion vessel
23	Safety overflow connection	FS	Flow switch
24	Mount for handle		

9.11 External connection diagrams



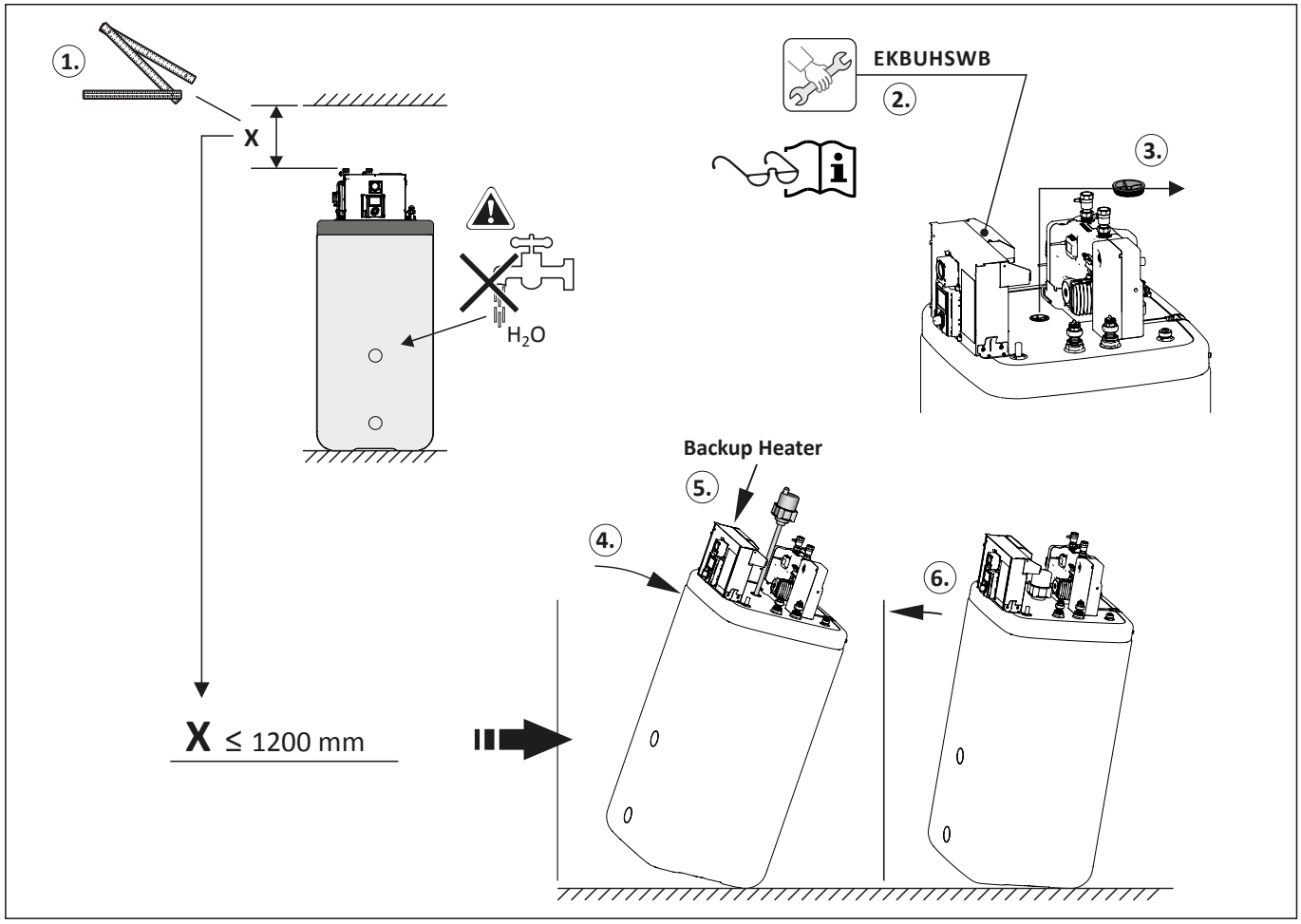
9.12 Installation

9.12.1 Backup heater installation

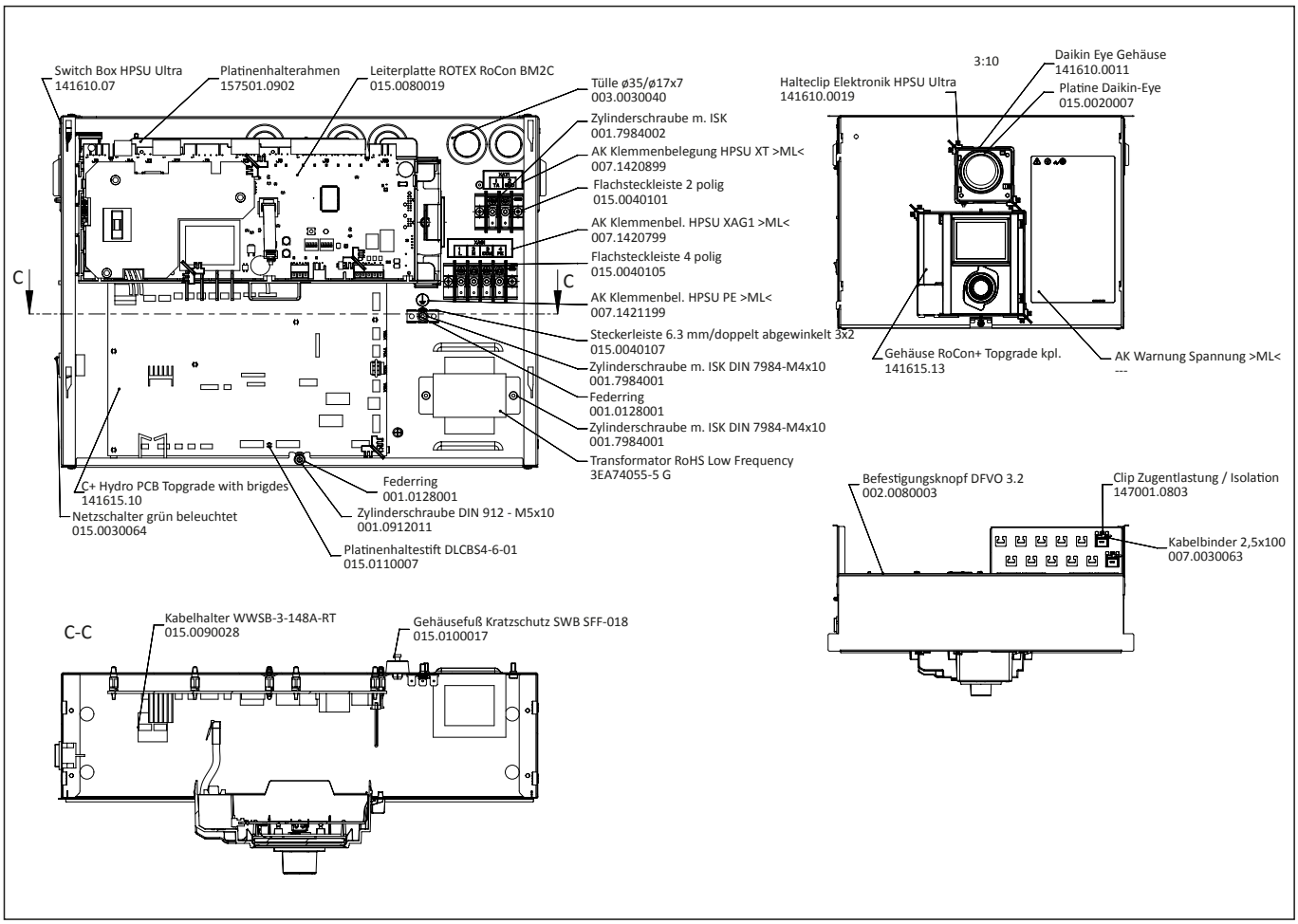
Recommended minimum distance:

From the wall: (rear) ≥100 mm, (sides) ≥500 mm

From the ceiling: ≥ 1200 mm, at least 480 mm.

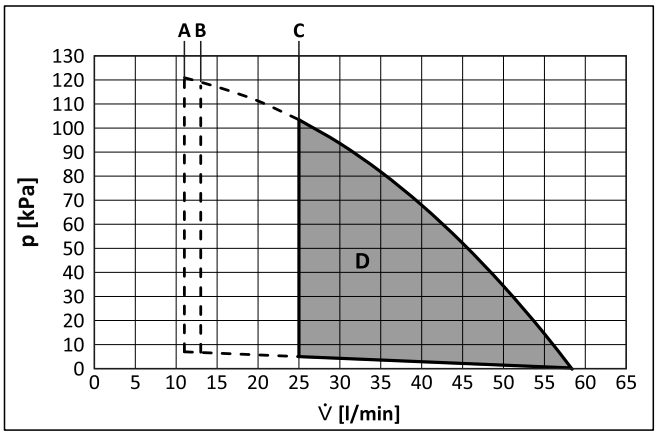


9.12.2 Controller housing



9.13 Hydraulic capacity

Static pressure drop – unit



A Minimum flow rate during normal operation
B Minimum flow rate in backup heater operation
C Minimum flow rate during defrost
D Operating range
V̇ [l/min] Flow Rate
p [kPa] External static pressure

The operating range is only extended to lower flow rates if the unit is only operated with the outdoor heat pump unit.

(Not at start-up, no backup heater operation, no defrost.)

See dotted line

Instructions:

1 Selecting a flow rate outside the operating range may damage or lead to malfunctioning of the unit.

2 The water quality must comply with EU Directive 98/83 EC.

10 Notes

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