Installation and maintenance instructions

Daikin Altherma 3 ECH_2O

EHSX(B)04P30D EHSX(B)04P50D EHSH(B)04P30D	EHSX(B)08P30D EHSX(B)08P50D EHSH(B)08P30D EHSH(B)08P50D

Installation and maintenance instructions
Heat pump (indoor unit) with integrated heat accumulator

English

11/2018

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 (such as set-up, servicing, connection and initial commissioning) must only be carried out by persons who are authorised who are authorised and who 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 must 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 therefrom. **Children** must not play with the device. Cleaning and **user maintenance** must not be carried out by **children** without supervision.
- Make up the power supply in accordance with IEC 60335-1, via a separator device which exhibits contact separation in all poles with a contact opening distance that provide full disconnection in accordance with overvoltage category III.
- All the 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.
  Check that a suitable electrical circuit is being used.
  Inadequate capacity of the power circuit or improperly executed connections can cause electrocution or fire.
- The customer must install a pressure relief device with rated over-pressure 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. 4.3).
- Water may drip out of the drain line of the pressure relief device. The drain opening must be left free 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. 9.1 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 starting 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.

This manual provides all the necessary information for installation, commissioning and maintenance, as well as basic information on operation and settings. Please see the attached documents for a detailed description of operation and control.

All heating parameters needed for smooth operation are already factory-set. Please refer to other relevant documents for information on setting the control.

Relevant documents

- Indoor unit:
  - Installation instructions
  - Commissioning checklist
  - Heat pump operating manual
- RoCon+ HP:
  - Installation instructions
  - Operating instructions
- Outdoor unit: Installation instructions
- Room station EHS157034 and mixer module EHS157068: Operating instructions
- Other optional accessories and optional system components: Associated installation and operating instructions

The guides are included in the scope of supply for the individual devices.

1.1.2 Meaning of warnings and symbols

Warnings in this manual are classified according into 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 burning or scalding

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

HP convector

Comply with the stipulated tightening torque (see chap. Chap. 10.4)

p=0 Only applies to devices with unpressurised solar system connection (DrainBack).

+p 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 for which the sequential order must be maintained 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 (such as set-up, servicing, connection and initial commissioning) must only be carried out by persons who are authorised who are authorised and who 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.
- Switch off the external main switch before starting any work on the indoor unit and secure against being switched on inadvertently.
- Do not leave any tools or other objects below the hood of the unit 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.

			
		EHSX04P30D EHSX04P50D EHSXB04P30D EHSXB04P50D EHSH04P30D EHSHB04P30D	EHSX08P30D EHSX08P50D EHSXB08P30D EHSXB08P50D EHSH08P30D EHSH08P50D EHSHB08P30D EHSHB08P50D
	ERGA04DAV3	P	-
	ERGA06DAV3	-	P
	ERGA08DAV3	-	P
	ERGA04DAV3A	P	-
	ERGA06DAV3A	-	P
	ERGA08DAV3A	-	P

Tab. 1-3 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 to walls and other objects (Chap. 4.1).
- Observe the special installation requirements of the R32 refrigerant (see Chap. 4.3.1).

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 the destruction of the DrainBack solar heating system.
- The indoor unit must not be operated in rooms with ambient temperatures of more than 40 °C.

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 (230 V, 50 Hz) 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 the heating water

Avoid damage caused by deposits and corrosion: Comply with the applicable engineering regulations on prevention of corrosion products and deposits (VDI 2035, BDH/ZVSHK technical information "Scale formation").

Minimum requirements regarding the quality of filling and supplementary 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-values (heating water): 6.5 - 8.5

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 (TRWI).
  - and, in addition, the country-specific legislation.

When operating the indoor unit with additional heat source, the storage tank temperature may exceed 65 °C, above all when solar energy is used.

- 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 (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 the with the specified quantity of coolant and the type of coolant specified.
- only operate if the protective cover is installed.

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

2 Handover to operator and warranty

2.1 Instruct the owner

- Before you hand over the heating system, explain to the owner how he/she can operate and check the heating system.
- Hand over the technical documentation (at least the operating instructions and operating manual) to the operator and advise him that these documents must be made available at all times and be stored in the immediate vicinity of the device.
- Document the handover by filling out the installation and instruction forms together with the owner and sign them.

2.2 Warranty conditions

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

There is only an entitlement to warranty services when it can be certified that the annual maintenance work according to Chap. 7 has been regularly completed.

3 Product description

3.1 Design and components

Outside of the device

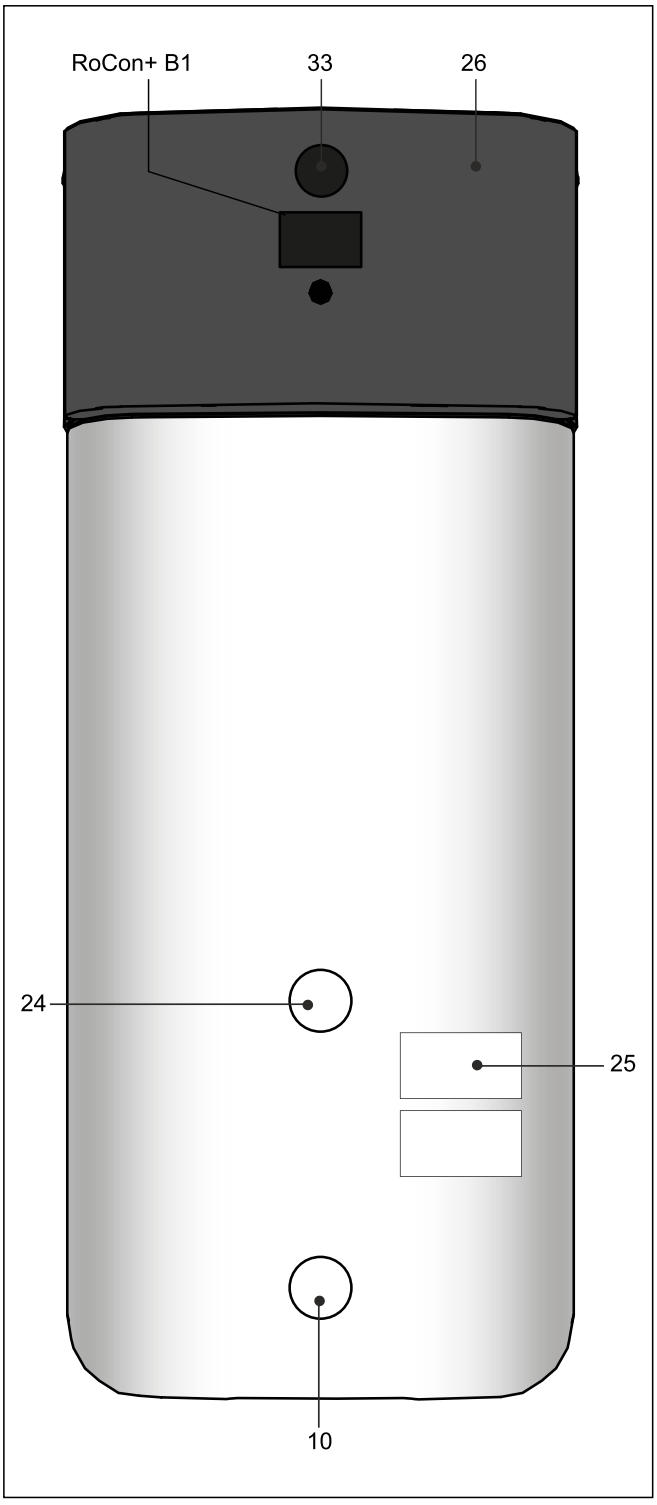


Fig. 3-1 Design and components - Outside of the device[1]

Upper side of the device

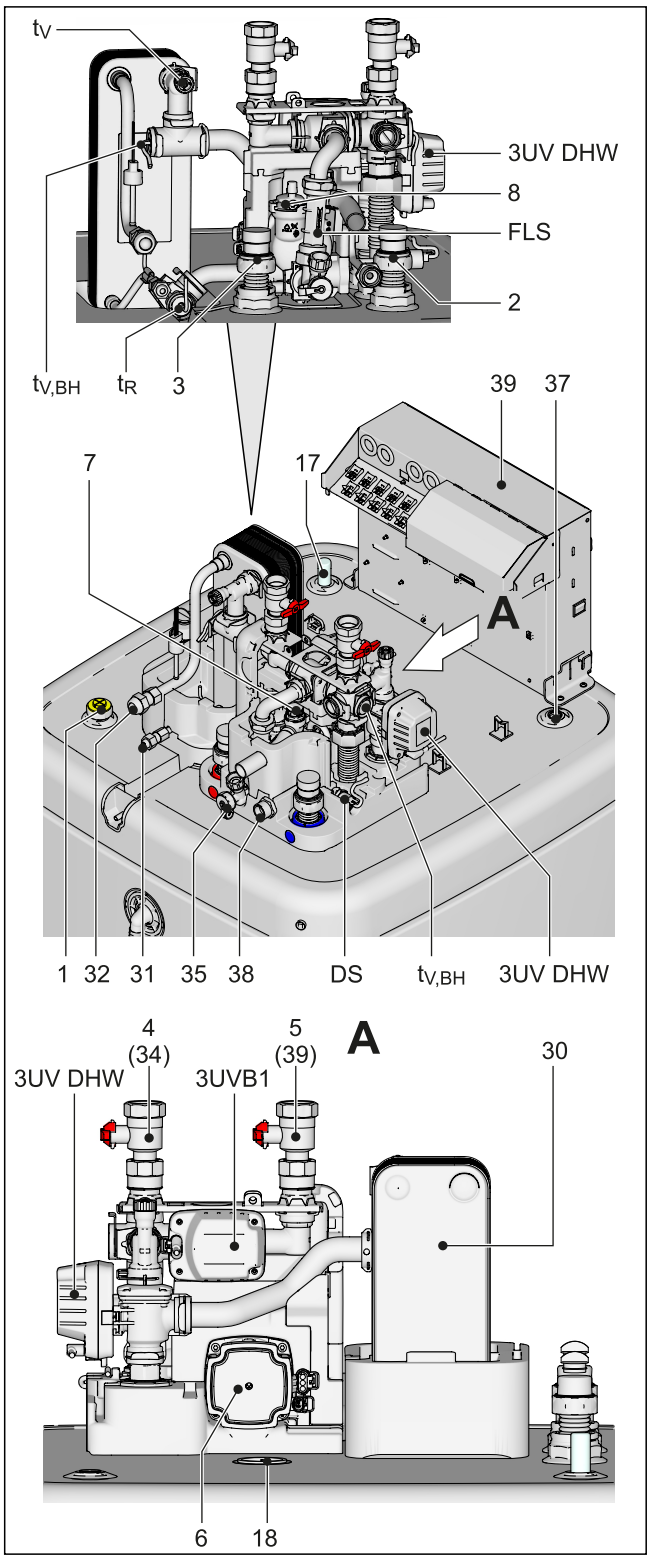


Fig. 3-2 Design and components - Top of the device[1]

[1] For legend, see Tab. 3-1

Internal structure…04P30D/…08P30D

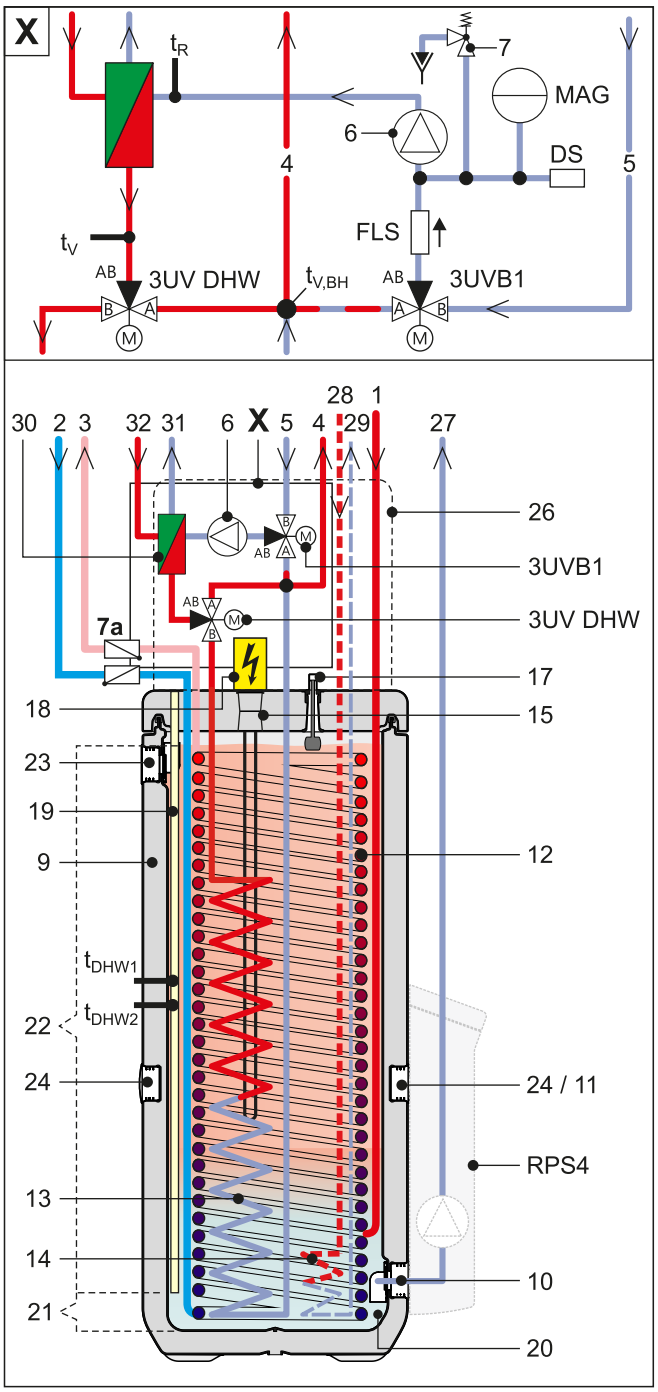


Fig. 3-3 Design and components – Internal structure ...04P30D/...08P30D (Biv)[1]

Internal structure …04P50D / …08P50D

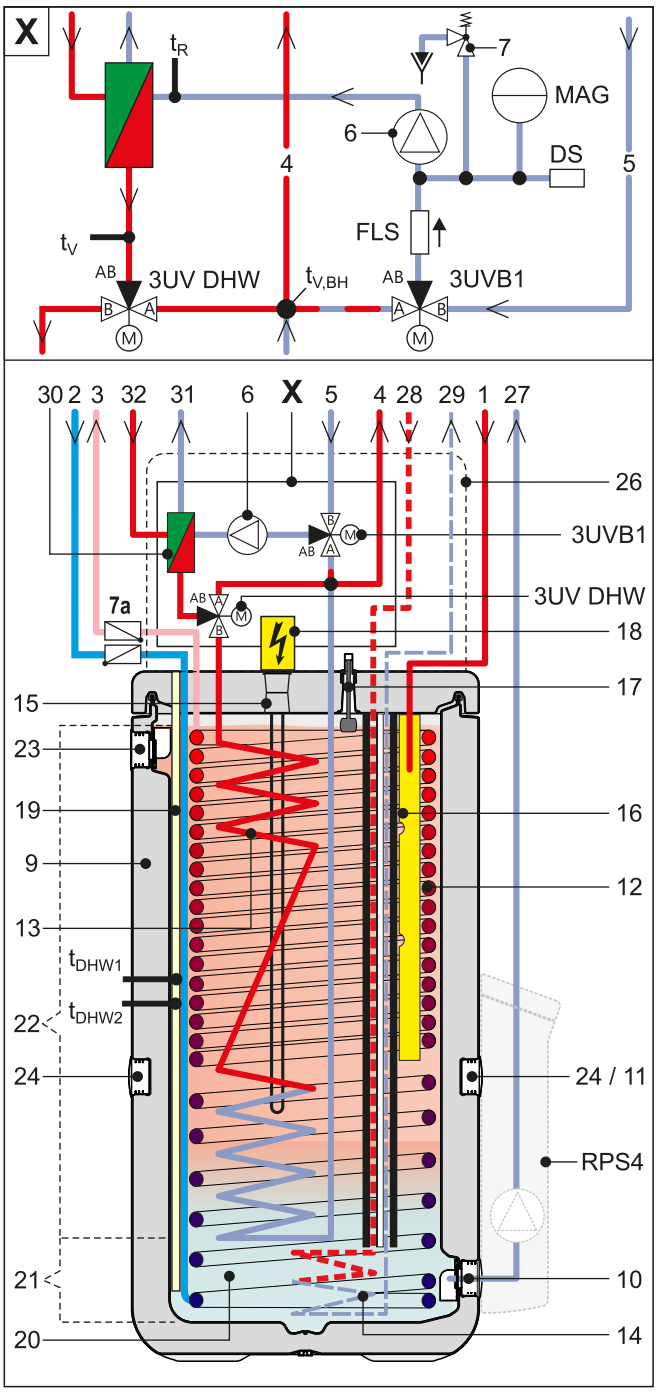


Fig. 3-4 Design and components – Internal structure ...04P50D / ...08P50D (Biv)[1]

[1] For legend, see Tab. 3-1

Item	Designation	Item	Designation
1	Solar - inflow	25	Type plate
2	Cold water connection	26	Protective cover
3	Domestic hot water	27	Solar - return flow
4	Heating inflow	28	Biv - inflow
5	Heating return flow	29	Biv - return flow
6	Circulation pump	30	Plate heat exchanger
7	Pressure relief valve	31	Connection for refrigerant fluid line
7a	Non-return valve (accessory)	32	Connection for refrigerant gas line
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}, t_{DHW2}	Storage tank temperature sensor
12	Heat exchanger (stainless steel) for domestic hot water heating	38	Connection for diaphragm expansion vessel
13	Heat exchanger (stainless steel) for storage tank charging or heating support	39	Control system housing
14	Biv heat exchanger (stainless steel) for charging with external heat generator (e.g. pressurised solar system)	3UVB 1	3-way switch valve (internal heat generator circuit)
15	Connection for optional electrical backup heater EKBUxx	3UV DHW	3-way switch valve (hot water/heating)
16	Solar - inflow layering pipe	DS	Pressure sensor
17	Fill level indicator (tank water)	FLS	FlowSensor
18	Optional: electric backup heater (EKBUxx)	t_R	Return flow temperature sensor
19	Submersible sensor sleeve for storage tank temperature sensor t_{DHW1} and t_{DHW2}	t_V	Inflow temperature sensor
20	Pressure-free storage tank water	$t_{V, BH}$	Backup heater inflow temperature sensor
21	Solar zone	RoCon + B1	Controller control panel
22	Hot water zone	EKS-RPS4	Optional: Solar control and pump unit
23	Safety overflow connection	MAG	Diaphragm expansion vessel
24	Mount for handle		

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

3.2 Function of the 3-way switch valves

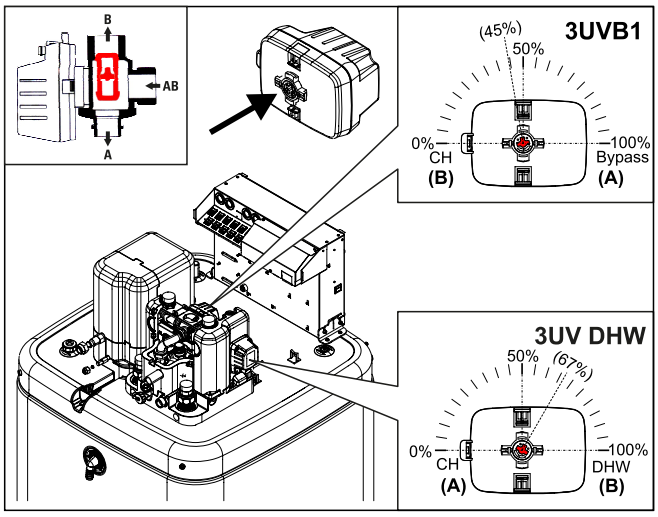


Fig. 3-5 3-way switch valve function

4 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.

4.1 Dimensions and connection dimensions

Dimensions …04P30D/…08P30D

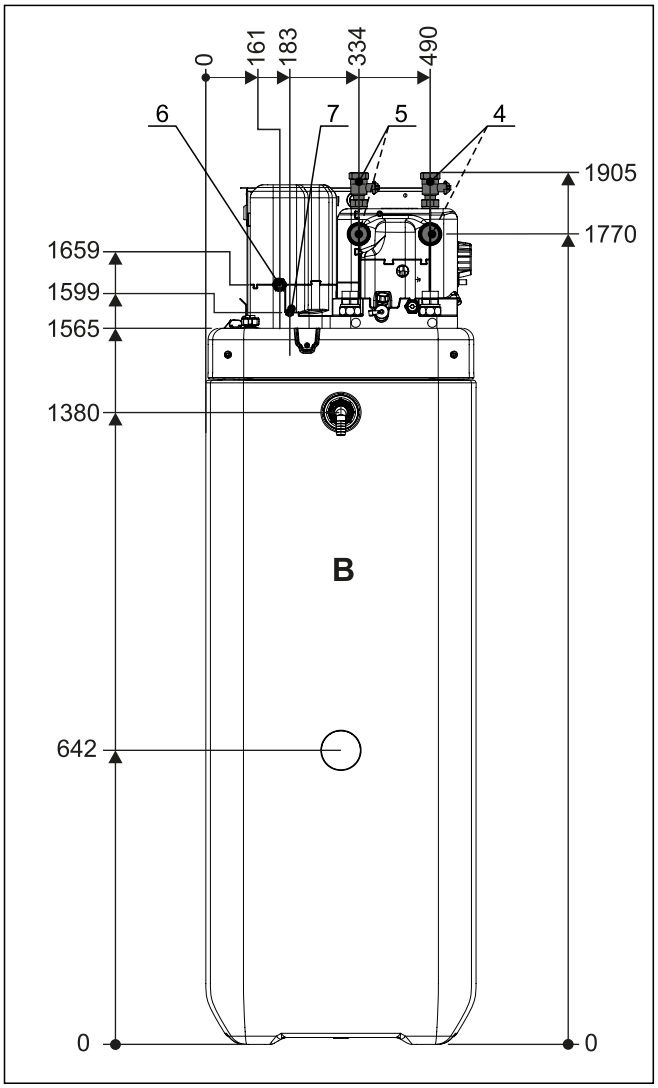


Fig. 4-1 Dimensions, side view - …04P30D/…08P30D

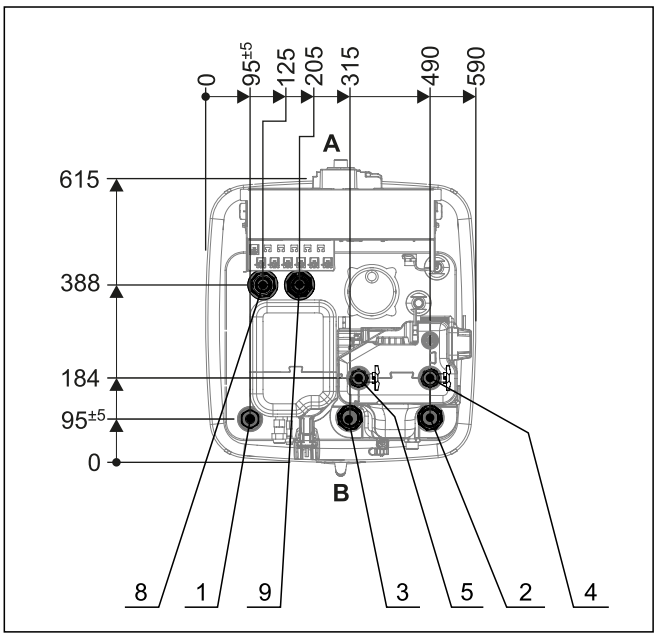


Fig. 4-2 Dimensions, top of the device - Type …04P30D/…08P30D

Dimensions …04P50D/…08P50D

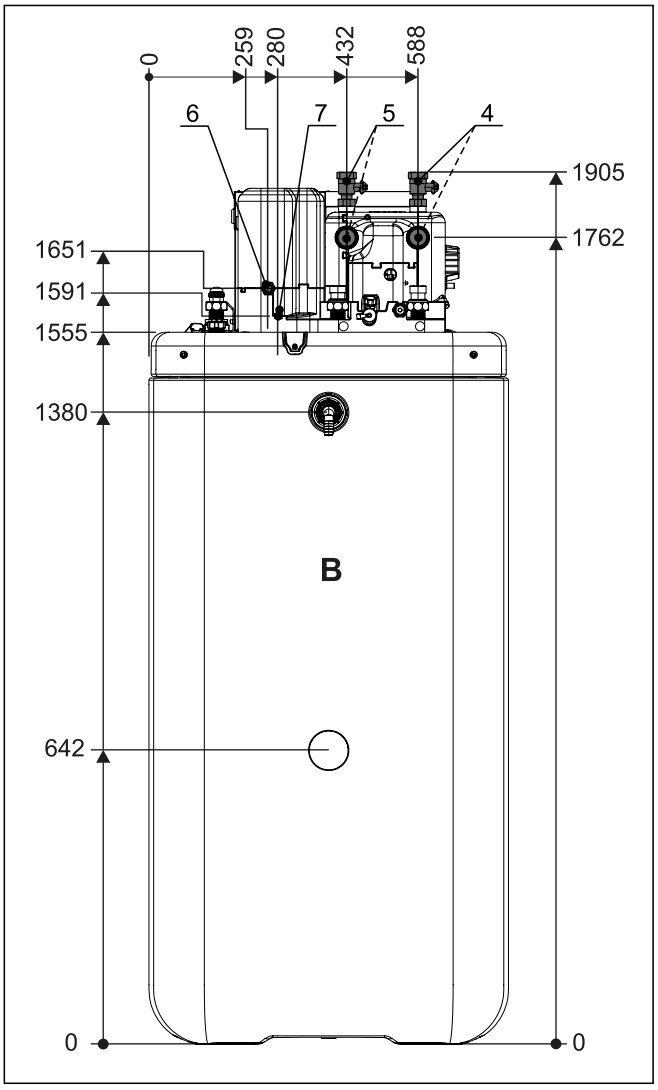


Fig. 4-3 Dimensions, side view - Type …04P50D/…08P50D

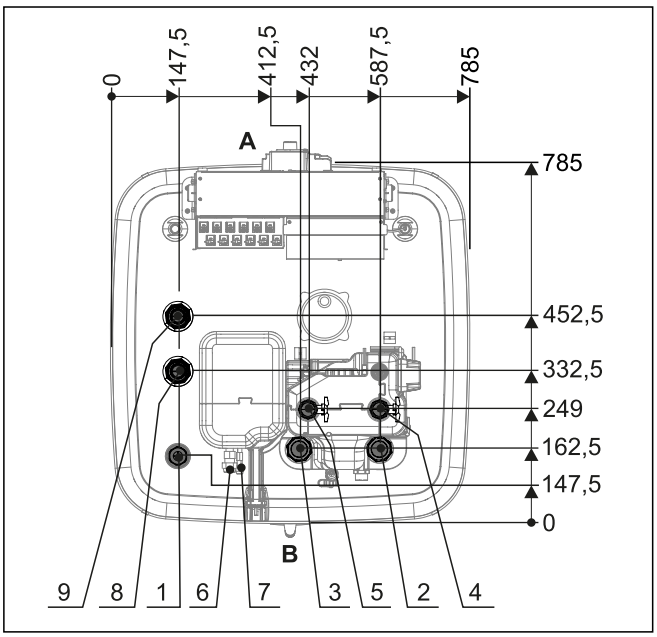


Fig. 4-4 Dimensions, top of the device - Type …04P50D/… 08P50D

Item	Designation
1	Solar - inflow
2	Cold water
3	Domestic hot water
4	Heating inflow
5	Heating return flow
6	Connection for refrigerant gas line
7	Connection for refrigerant fluid line
8	Biv – inflow (…Biv type only)
9	Biv – return flow (…Biv type only)
A	front
B	rear

Tab. 4-1

4.2 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 transporting it.

Scope of delivery

- Indoor unit (pre-mounted),
- Bag of accessories (see Fig. 4-5),
- Document pack.

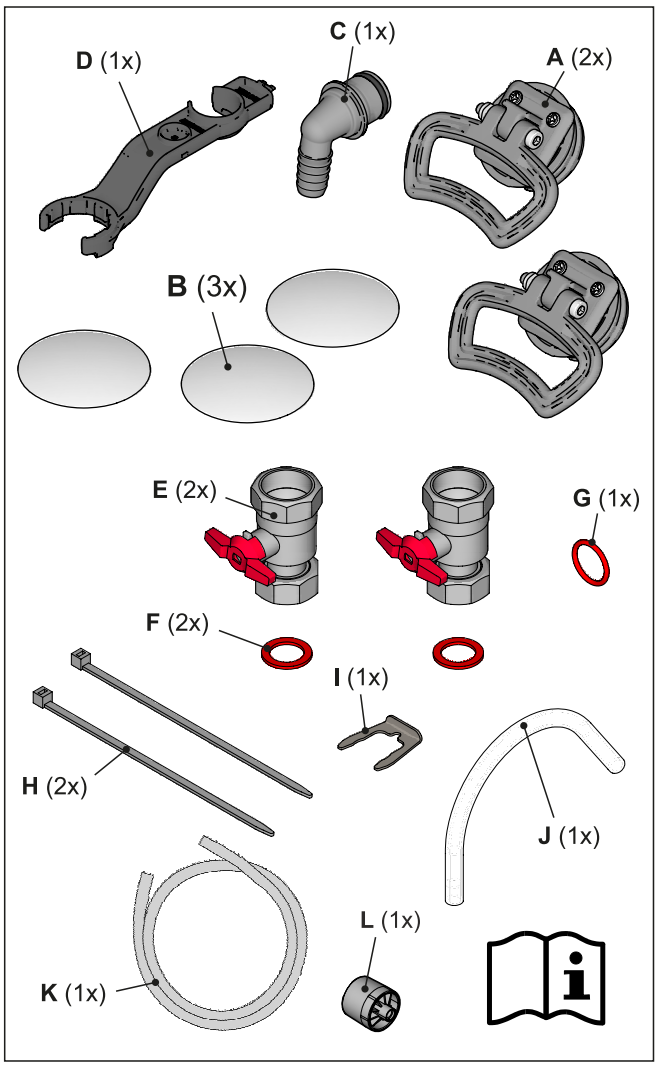


Fig. 4-5 Contents of bag of accessories

Item	Designation	Item	Designation
A	Handles (only required for transport)	G	O-ring
B	cover panel	H	Cable tie
C	Hose connecting piece for safety overflow	I	Plug bracket
D	Assembly wrench	J	Venting hose
E	Ball valve	K	Drain hose cover
F	Flat gasket	L	Controller rotary switch

Tab. 4-2

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

4.3 Installing the heat pump

4.3.1 Selecting the installation site

CAUTION

If the total refrigerant charge in the system is ≥ 1.84 kg, it is essential to comply with additional requirements for minimum footprint and minimum ventilation openings. ObserveChap. 10.5.

Information on the total refrigerant charge can be found on the type plate of the outdoor unit. Please follow the installation instructions.

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 a sufficient **ground load-bearing capacity** of **1050 kg/m²** plus safety factor. Install a pedestal if necessary.
- Observe the installation dimensions (see Chap. 4.1).

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:
To the wall: (back) ≥ 100 mm, (sides) ≥ 500 mm
To the ceiling: ≥ 1200 mm, at least 480 mm.

Distances from the outdoor unit:
When selecting the installation location, the information in the table Tab. 4-3must be taken into account.

Maximum refrigerant line length between the indoor and outdoor unit	30 m
Minimum refrigerant line length between the indoor and outdoor unit	3 m
Maximum height difference between the indoor and outdoor unit	20 m

Tab. 4-3

4.3.2 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. 4.3.1.

Installation

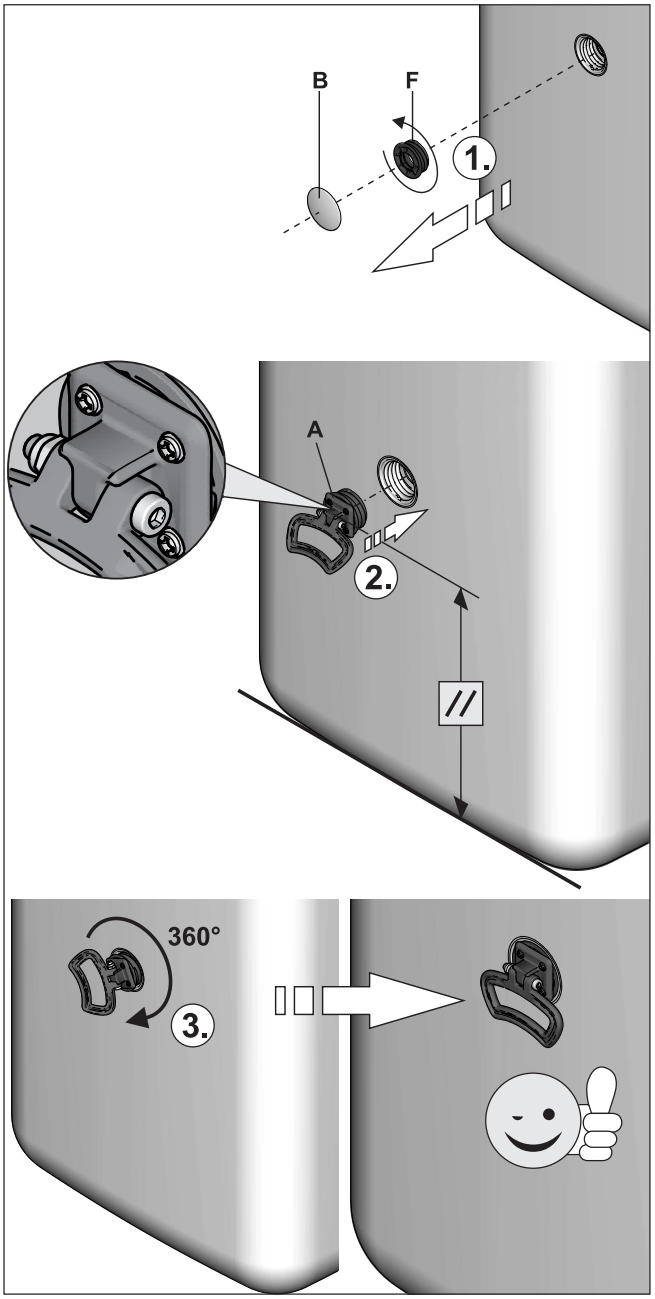


Fig. 4-6 Installing the handles

Item	Designation
A	Handle
B	cover panel
F	Threaded piece

Tab. 4-4

1 Remove packing and dispose of it in an environment-friendly manner.

2 Pull off the cover screens from the storage tank (Fig. 4-6, item B) and unscrew the threaded fittings (Fig. 4-6, item F) from the openings at which the handles are to be fitted.

3 Screw the handles (Fig. 4-6, 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.

- When setting up the unit in a cabinet, behind panels or in other restricted conditions, ensure sufficient ventilation (e.g. using ventilation gratings). If the total refrigerant charge in the system is ≥ 1.84 kg, further requirements of the ventilation openings must be met (see Chap. 10.5).

4.4 Preparing the device for installation

4.4.1 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.).

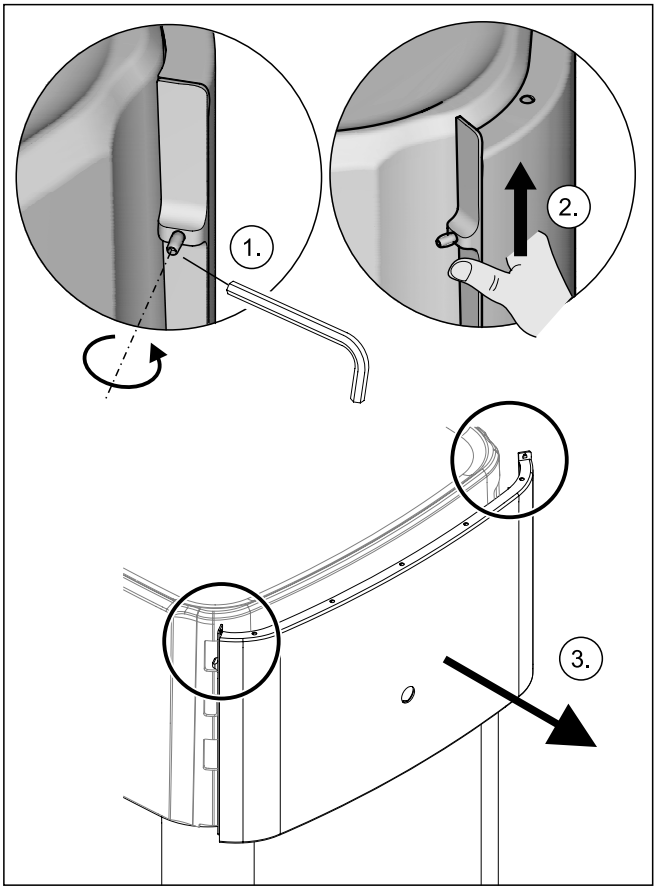


Fig. 4-7 Remove the front screen

4 **After completing the installation**: Place the front screen straight directly above the rotary switch of the RoCon+ HP. Press on the top and bottom until the front screen is securely engaged again.

4.4.2 Remove the protective cover

1 Undo the screws (1.).

2 Unhook the protective cover from the rearward facing holding burls (2.), lift at the back (3.) and remove to the front (4.).

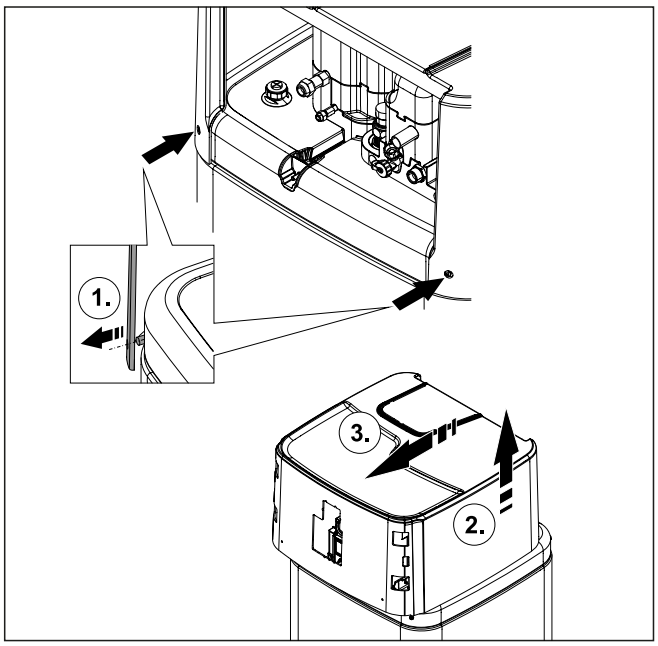


Fig. 4-8 Remove the protective cover

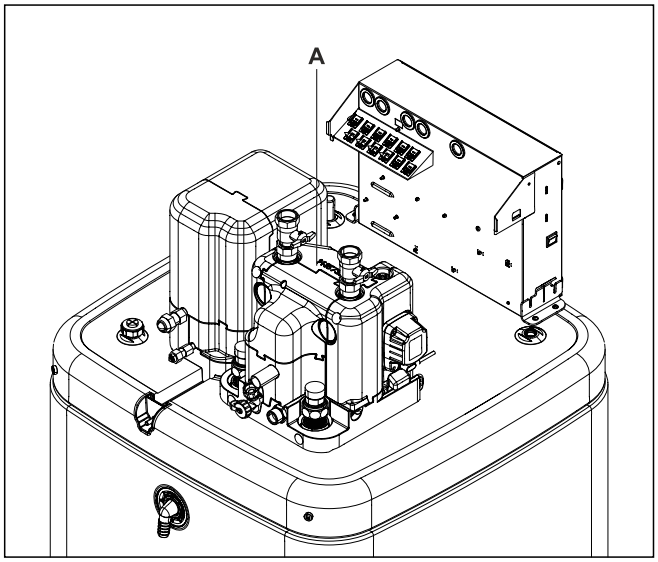


Fig. 4-9 Without protective cover

4.4.3 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.

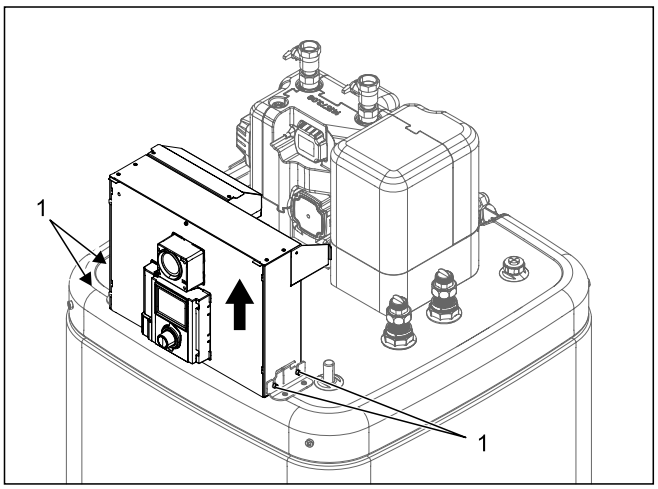


Fig. 4-10 Moving the controller housing to the service position

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

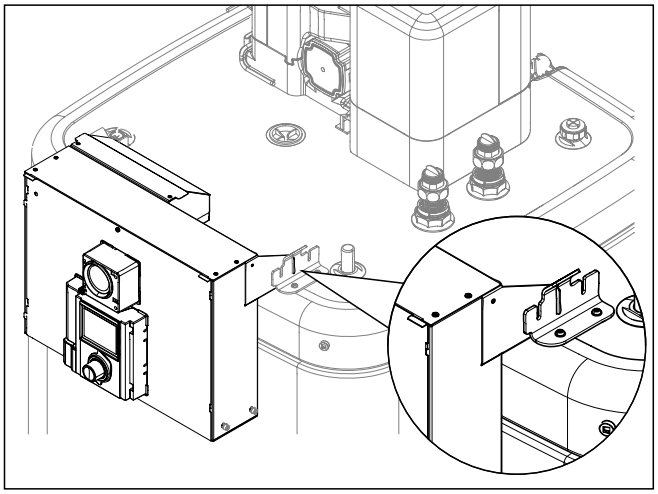


Fig. 4-11 Controller housing in the service position

4.4.4 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.

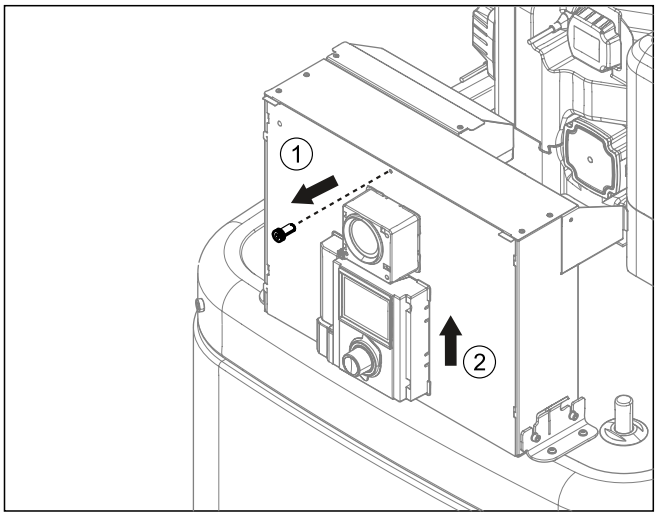


Fig. 4-12 Open the controller housing

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

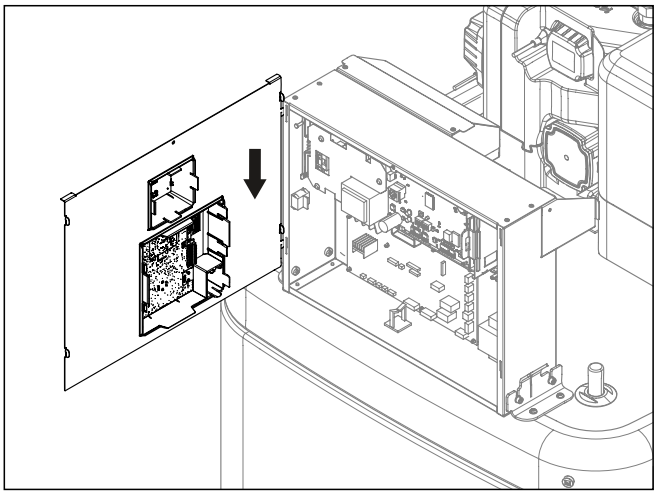


Fig. 4-13 Hooking in the cover

4.4.5 Removing the bottom thermal insulation

CAUTION

The thermal insulation (Fig. 4-9, item A) 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).

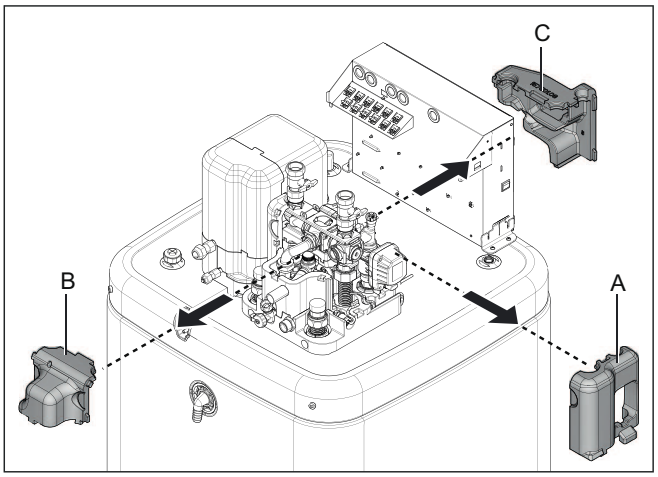


Fig. 4-14 Removing the top thermal insulation

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).

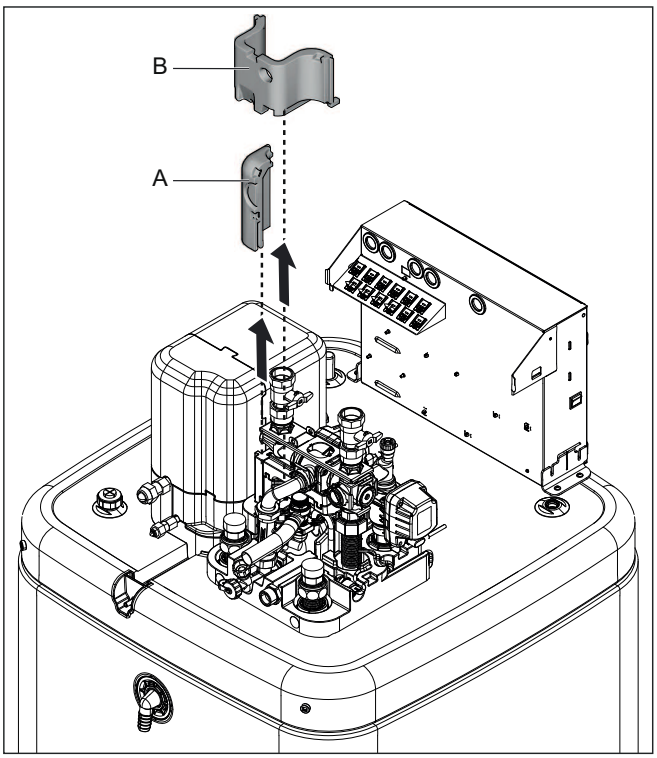


Fig. 4-15 Removing the bottom thermal insulation

INFORMATION

The thermal insulation is installed in reverse order.

4.4.6 Opening the vent valve

1 Removing the thermal insulation (see Chap. 4.4.5).

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

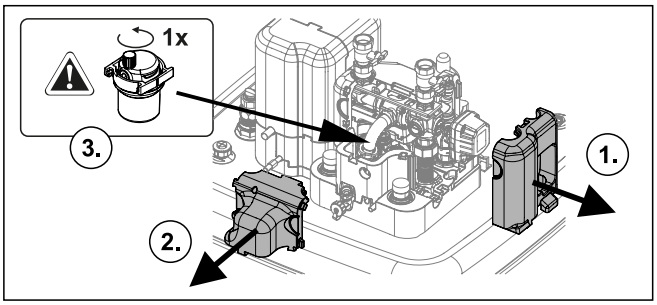


Fig. 4-16 Opening the vent valve

4.4.7 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. 4-18).
- 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).

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.

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. 4.4.2).

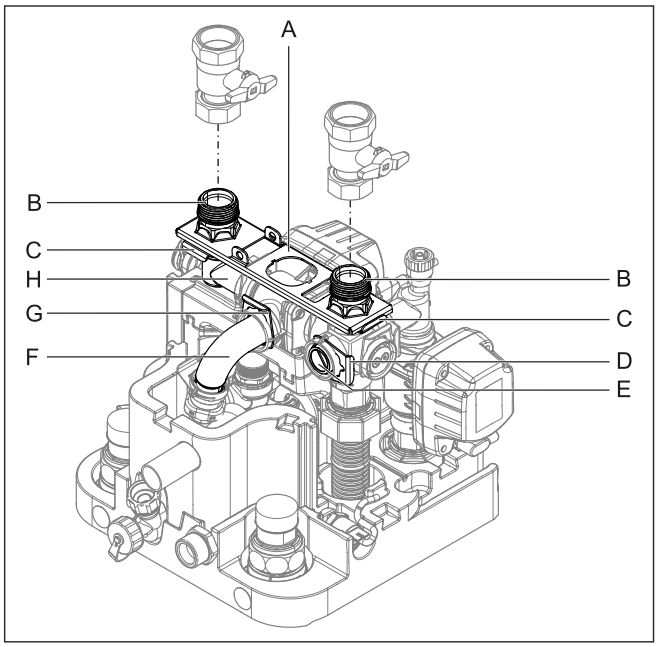


Fig. 4-17 Aligning the heating inflow and return flow upwards

2 Pull the two plug brackets off the connection couplings (Fig. 4-17, item C).

3 Pull off the two connection couplings (Fig. 4-17, item B).

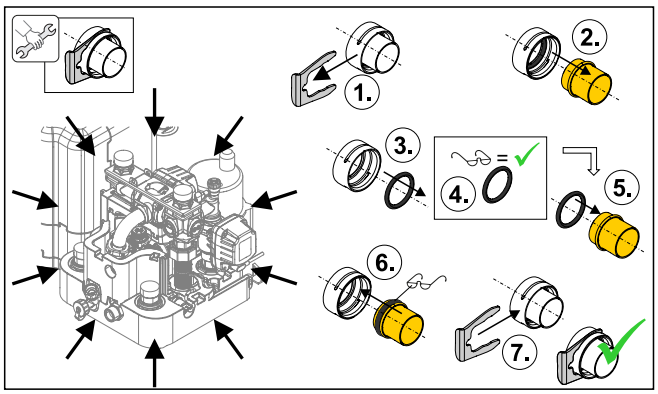


Fig. 4-18 Hydraulic system plug connectors

4 Remove the retaining plate (Fig. 4-17, item A).

5 Pull off the sealing plug bracket (Fig. 4-17, item D).

6 Pull out the sealing plug (Fig. 4-17, item E).

7 Turn the elbow (Fig. 4-17, item H) 90° to the rear.

8 Pull the plug bracket off the manifold (Fig. 4-17, item G).

9 Carefully pull the manifold (Fig. 4-17, item F) so far backwards out of its horizontal mounting that the retaining plate (Fig. 4-19, item A) can be pushed vertically in between.

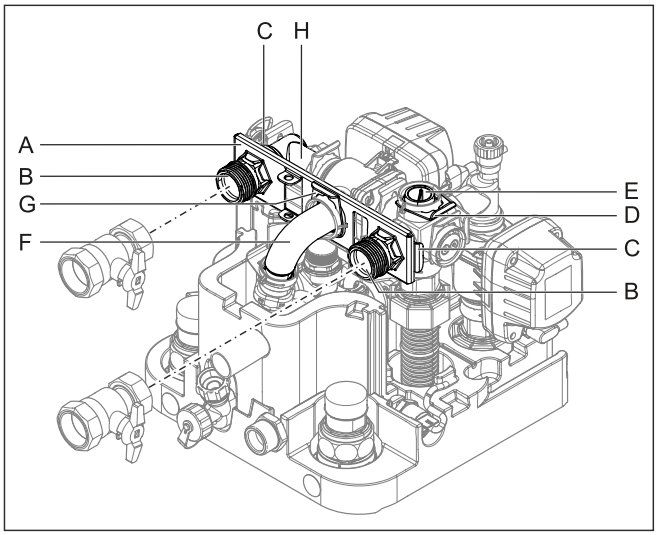


Fig. 4-19 Heating inflow and return flow connections aligned to the rear

10 Slide the retaining plate between the manifold and its horizontal mounting and insert the manifold (Fig. 4-19, item F) back into its mounting through the middle hole of the retaining plate.

11 Secure the manifold with plug bracket (Fig. 4-19, item G) in its mounting again.

12 Insert the two connection couplings (Fig. 4-19, item B) into the lateral mountings through the retaining plate.

13 Secure the two connection couplings with plug bracket (Fig. 4-19, item C) in their mountings.

14 Insert the sealing plug (Fig. 4-19, item E) into the upper mounting.

15 Secure the sealing plug with plug bracket (Fig. 4-19, item D).

16 Cut out side openings in the thermal insulation (Fig. 4-20, item A) using a suitable tool.

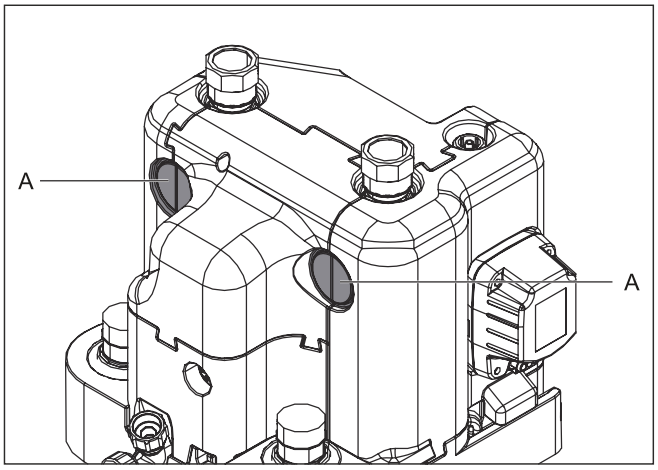


Fig. 4-20 Cut-out in thermal insulation

4.4.8 Making the hood opening

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

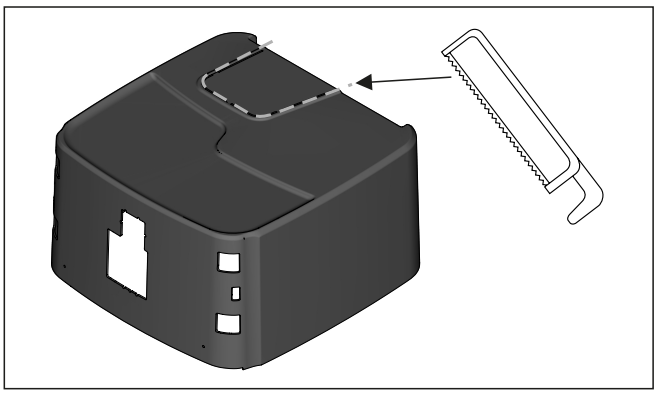


Fig. 4-21 Making the hood opening

4.4.9 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.

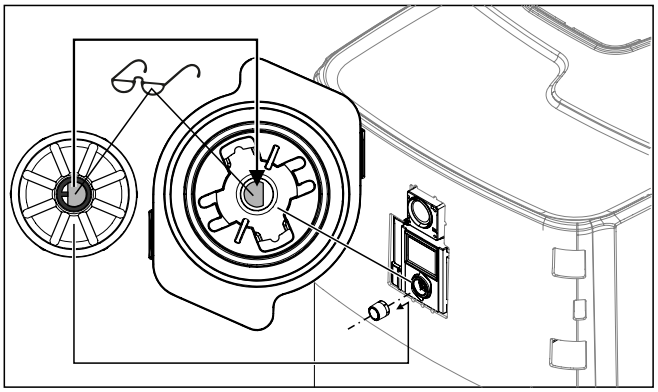


Fig. 4-22 Putting on the rotary switch

4.5 Installing optional accessories

4.5.1 Installation of the 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.

4.5.2 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.

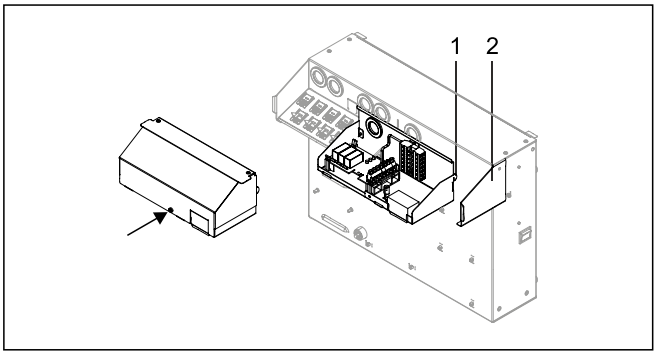


Fig. 4-23 Fitting the connection set

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

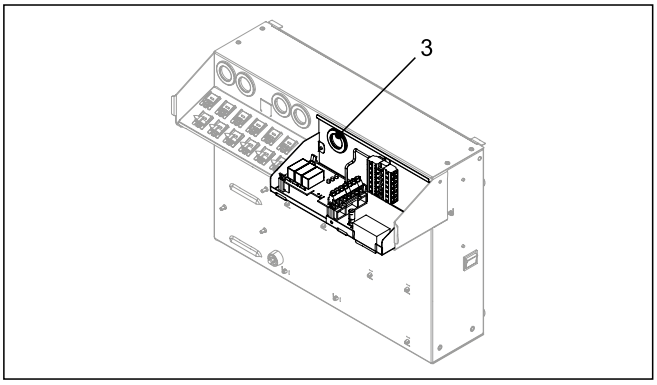


Fig. 4-24 Cable gland

5 Guide the cable of the Ultra EHS printed circuit board through the cable grommet and connect it to the RoCon BM2C (see Fig. 4-38).

6 After the installation and the electrical connections (see Water connectionor Chap. 4.7) have been completed, replace the cover and close it with the screw.

4.5.3 Installation of the DB connection kit

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

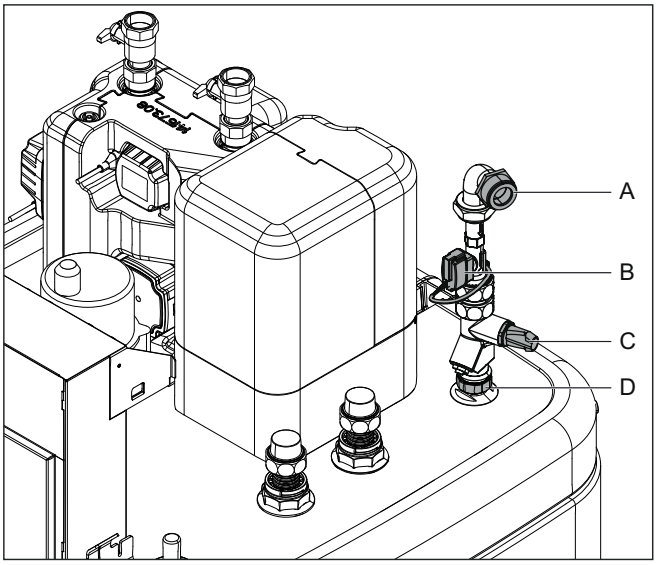


Fig. 4-25 DB connection kit

Item	Designation
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

Tab. 4-5

4.5.4 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 inflow and return flow lines.

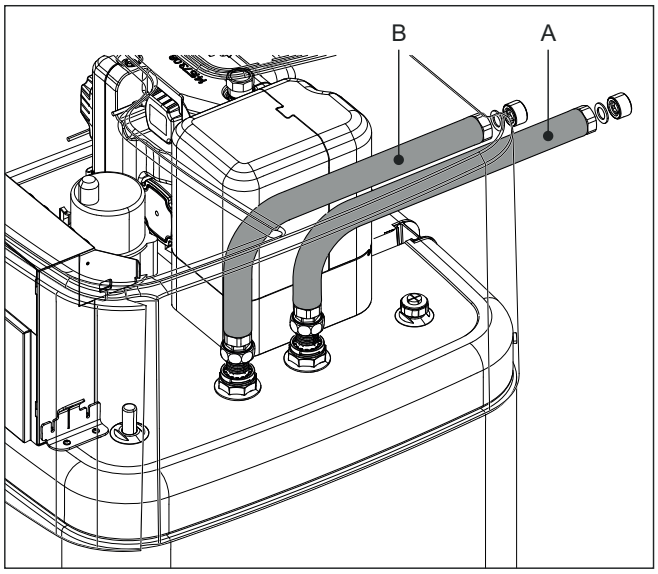


Fig. 4-26 P connection kit for Biv device types

Item	Designation
A	Connection for inflow (red)
B	Connection for return flow (blue)

4.6 Water connection

Important information

CAUTION

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**.

- 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.).

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. 4.1, 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 heating unit 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 Requirements for the heating water. Corrosion products (particles) thus created may clog pumps and valves and cause malfunctions.

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

- 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. 6.1.

4.6.1 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.

- Install a 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 pressure gauge so that it is easy to see when filling.

1 Check the cold water connection pressure (maximum 6 bar).
   - If a higher pressure is present in the domestic water pipe, a pressure reducer will need to be installed.
2 Fix the hydraulic block in place with a screwdriver.

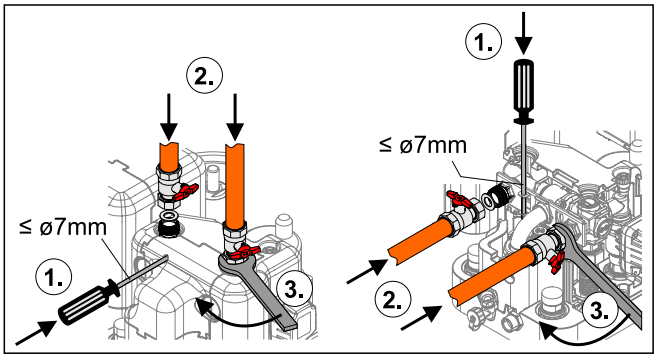


Fig. 4-27 Fix the hydraulic block in place when connecting to the top (left) or to the rear (right)

3 Establish hydraulic connections to the indoor unit.
   - Refer to Chap. 4.1 for the position of the heater connections.
   - Observe specified tightening torque (see Chap. 10.4)
   - Install the line in such a way that the protective cover is simple to put on after assembly.
   - Connect the water for filling or refilling the heating system as specified by EN 1717/EN 61770 to avoid contamination of drinking water by return flow.
4 **For rearward facing connections**: Support hydraulic lines suitably according to the spatial conditions.

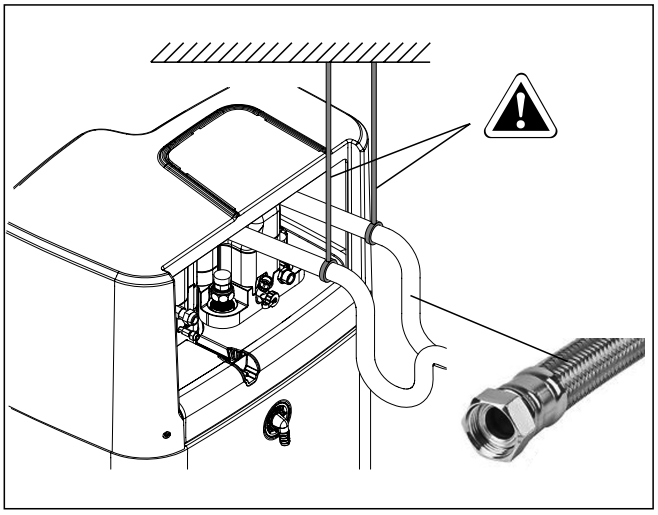


Fig. 4-28 Connection to the rear: Support hydraulic lines

5 Connect the blow-off line to the safety over-pressure valve and diaphragm expansion vessel in accordance with EN 12828.
   - Any steam or heating water which may escape must be drained by a suitable blow-off line with constant gradient in a frost-protected, safe and observable manner.
   - Install the line in such a way that the protective cover is simple to put on after assembly.
   - Check the seat of the drain hose on the safety pressure relief valve. If necessary, connect and install a separate hose.
6 Connecting a diaphragm expansion vessel.
   - 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).

7 Carefully insulate pipework against heat loss and to avoid condensation (insulation thickness at least 20 mm).
   – **Water shortage protection:** The pressure and temperature monitoring of the controller safely shuts off and locks the indoor unit 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

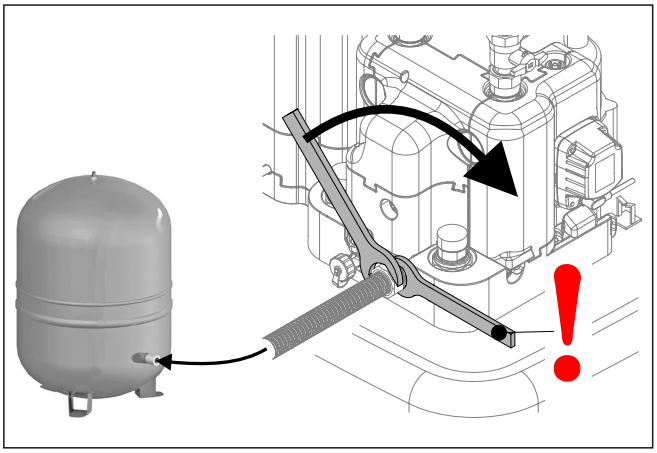


Fig. 4-29 Connecting a diaphragm expansion vessel

4.6.2 Connecting the drain

1 Connect the drain hose to the hose connecting piece for the safety overflow (Fig. 3-1, 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.

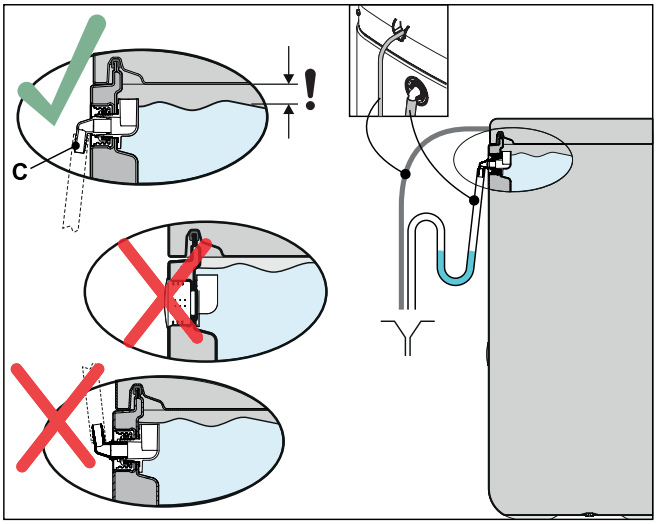


Fig. 4-30 Connection of the overflow hose

4.7 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.

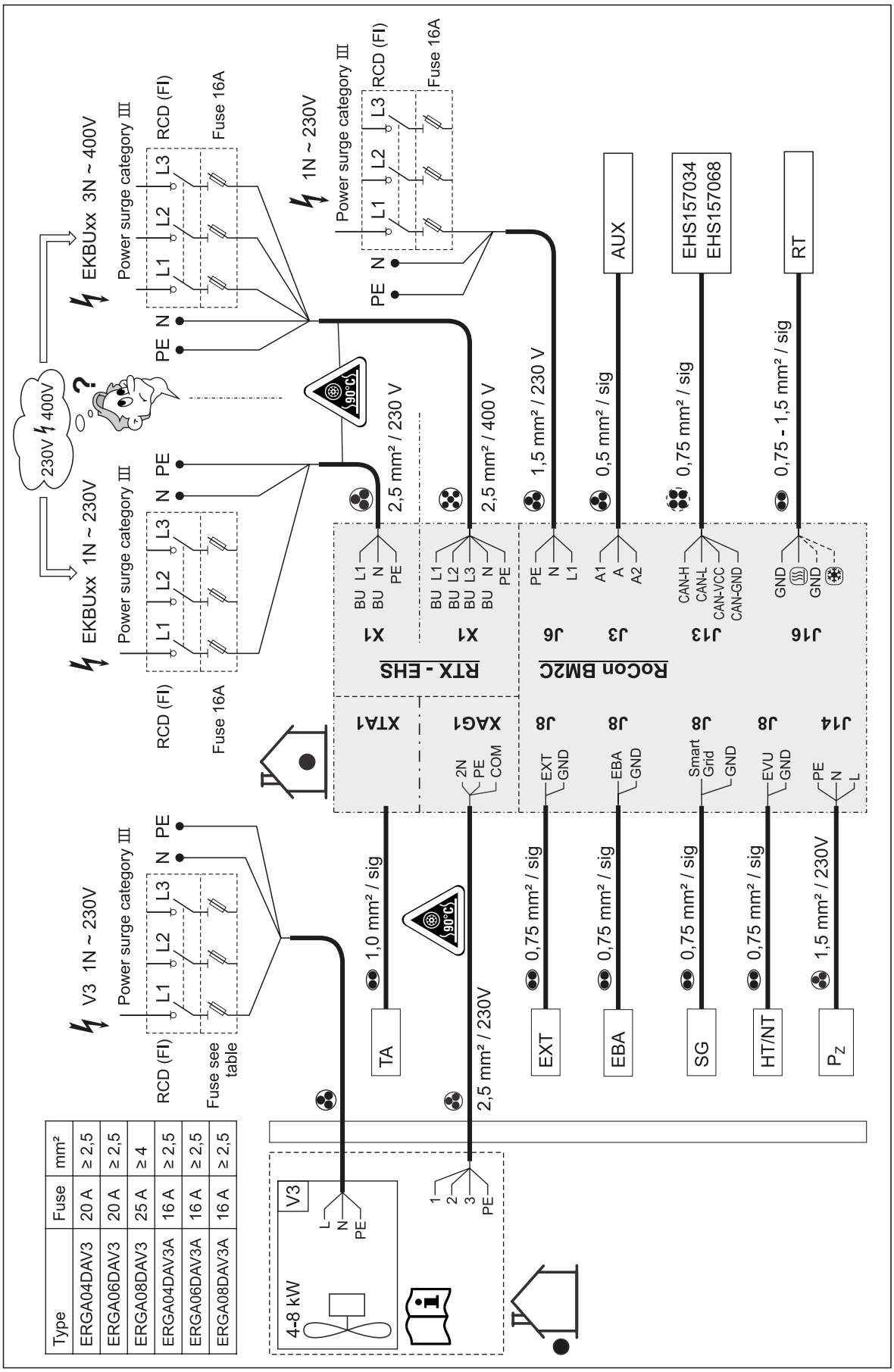
- For the following connections, only use cables with a long-term use temperature ≥ 90 °C: Heat pump outdoor unit and optional: Electric backup heater (EKBUxx)

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 shall bear responsibility for any resulting damage.

4.7.1 Overall connection diagram



Type	Fuse	mm²
ERGA04DAV3	20 A	≥ 2,5
ERGA06DAV3	20 A	≥ 2,5
ERGA08DAV3	25 A	≥ 4
ERGA04DAV3A	16 A	≥ 2,5
ERGA06DAV3A	16 A	≥ 2,5
ERGA08DAV3A	16 A	≥ 2,5

Fig. 4-31 Overall connection diagram - for the electrical connection during the device installation (for the legend and pin assignment of the printed circuit board, see Chap. 10.6)

4.7.2 Position of the printed circuit boards and terminal strips

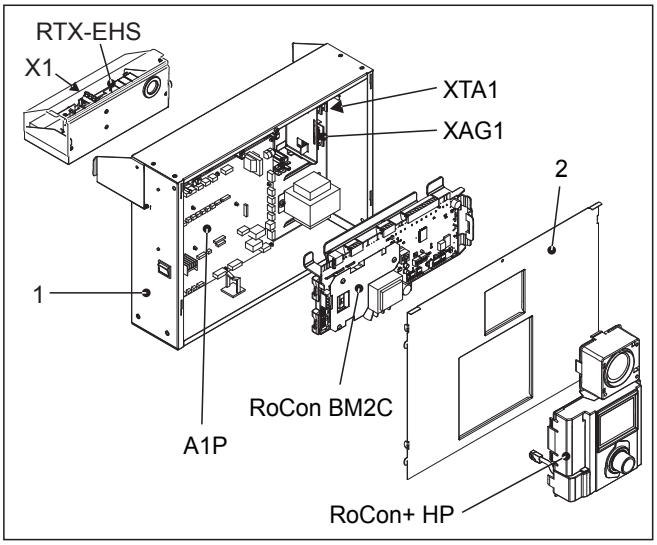


Fig. 4-32 Position of the printed circuit boards and terminal strips (for the legend, see Chap. 10.6)

4.7.3 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.

4.7.4 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. 4.4.4).

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.

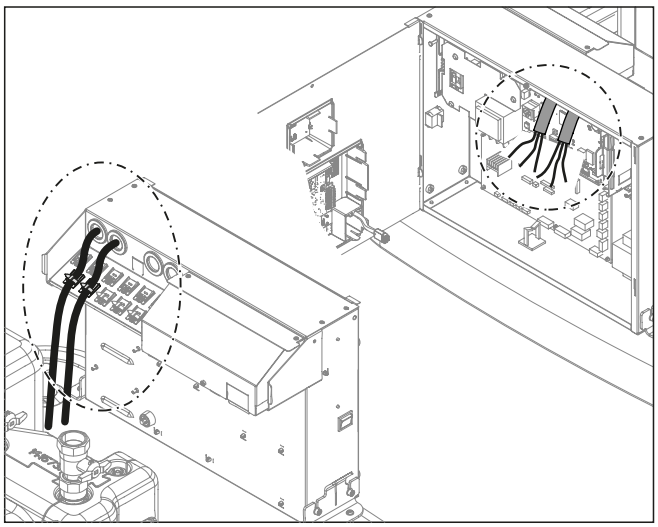


Fig. 4-33 Cable gland

6 Make electrical connections according to Chap. 4.7.1 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. 4-34).

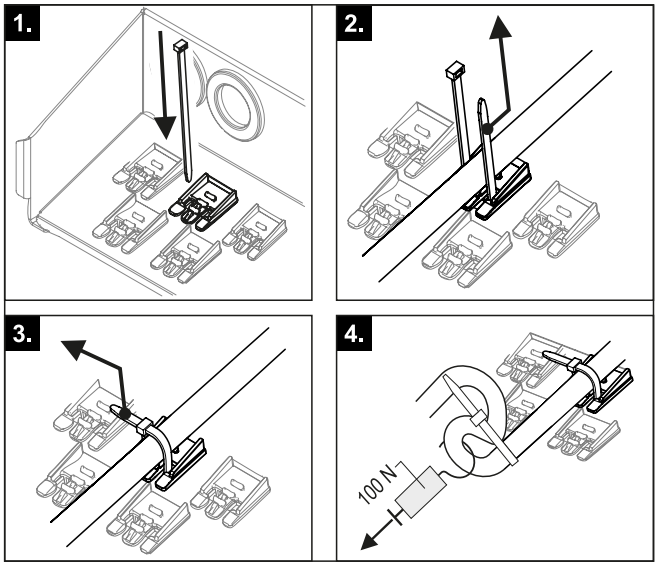


Fig. 4-34 Establishing and checking the strain relief

8 Check the holding force of the strain relief (step 4, Fig. 4-34).

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

4.7.5 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. 4.7.4.

2 Connect the heat pump outdoor unit to terminal strip XAG1 (see Fig. 4-35).

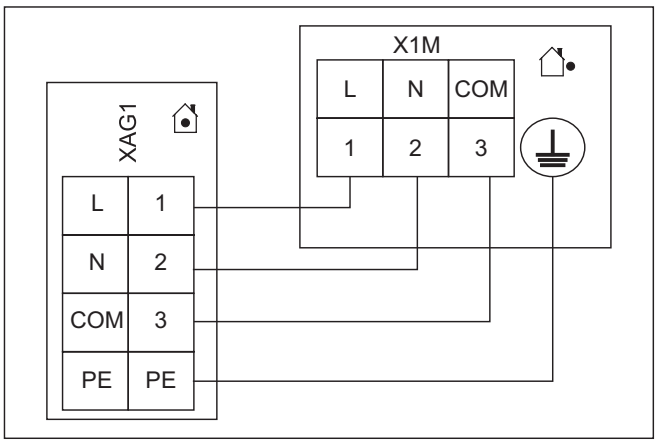


Fig. 4-35 Connecting the heat pump outdoor unit

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.

4.7.6 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) at the coldest side of the building (North or North-East). Ensure that the location is not near to 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 humidity ingress).

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 mm²**).

2 Lay the sensor line to the indoor unit.

3 Follow the installation steps in Chap. 4.7.4.

4 Connect the sensor line to terminal strip XTA1 (see Chap. 4.7.2).

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

4.7.7 External switching contact

Connecting an external switching contact (Fig. 4-36) enables the operating mode of the indoor unit to be switched over.

The current operating mode is switched by a changing resistance value (Tab. 4-7). 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. "48h Emergency Operation") are activated, the input is not evaluated.

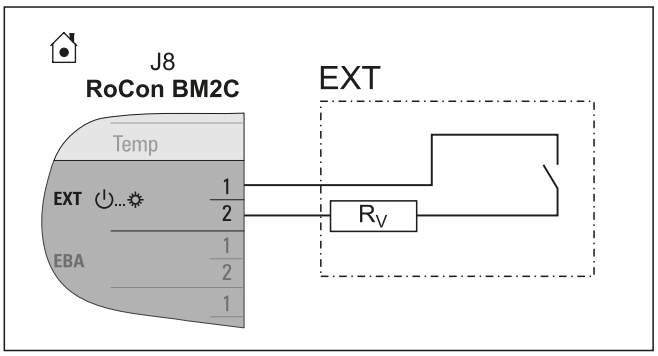


Fig. 4-36 EXT switching contact connection

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

Tab. 4-7 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.

4.7.8 EBA (external requirement request)

By connecting the EBA switching contact to the indoor unit (Fig. 4-37) 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.

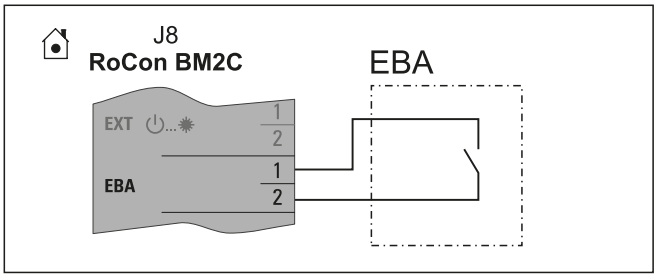


Fig. 4-37 EBA switching contact connection

4.7.9 Connecting an external heat generator

INFORMATION

To connect an external heat generator, the connection set for external heat generators must be installed. (see Chap. 4.5).

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. 4.5).

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
- +p for …Biv 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. 6).

The external heat generator request is connected via a relay on printed circuit board RTX-EHS (see Fig. 4-38). 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. of external 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. of external 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. 4.7.13)
- 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 printed circuit board must not be used simultaneously for connecting mains voltage (~230 V) and SELV ("Safety Extra Low Voltage").

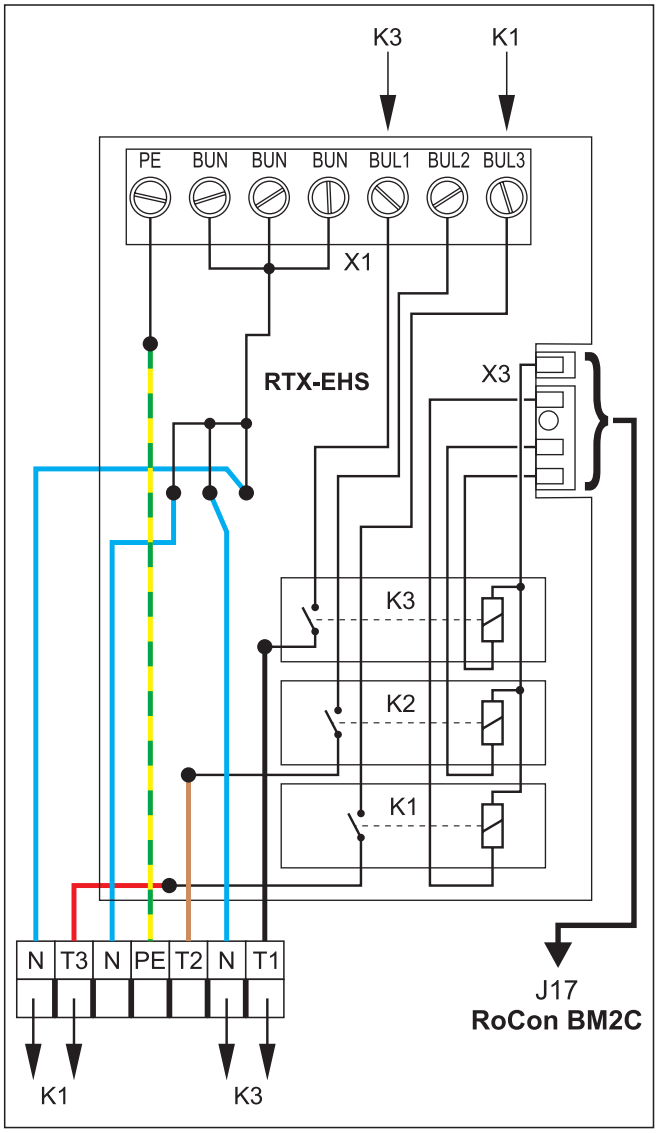


Fig. 4-38 Connection on the RTX-EHS printed circuit board

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. 4.5).

3 Make suitable connections on the RTX-EHS printed circuit board of the connection set (see Fig. 4-38).

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. 4.7.4).

4.7.10 Connecting the room thermostat

INFORMATION

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

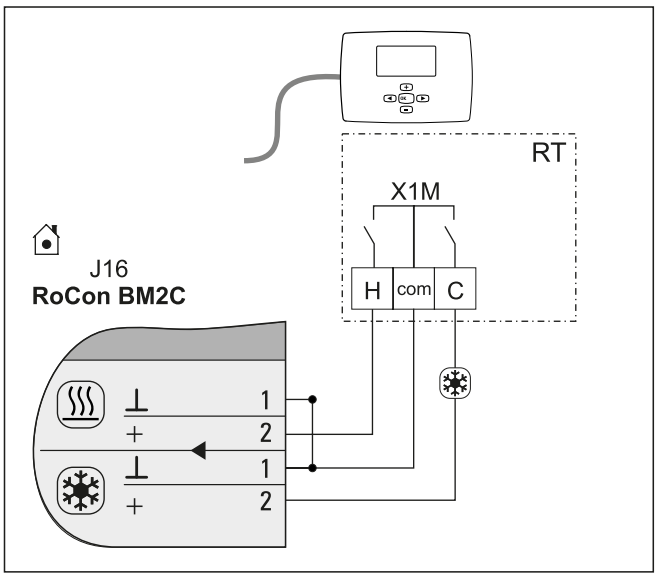


Fig. 4-39 Connection with wired room thermostat (RT = Daikin EKRTW)

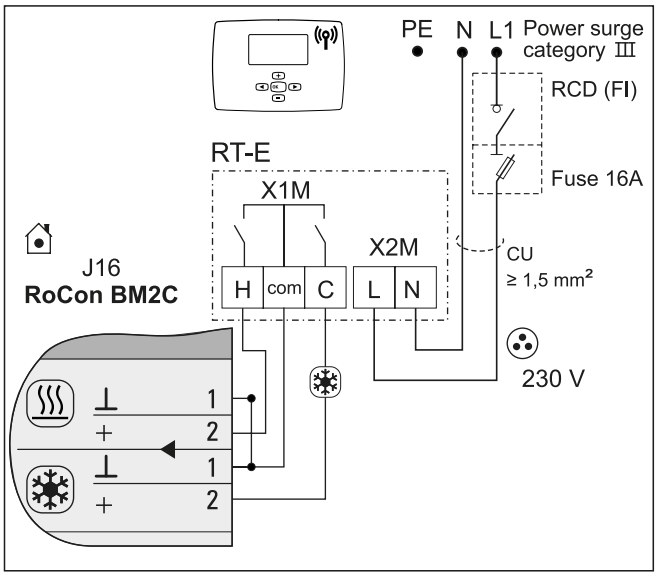


Fig. 4-40 Connection with radio-controlled room thermostat (RT-E = Daikin EKRTR)

4.7.11 Connection of optional RoCon system components

The optional RoCon devices must be connected to the indoor unit via a 4-wire CAN bus line (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 mm^2. 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.

Room controller EHS157034

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.

Mixer module EHS157068

The mixer module EHS157068 can be connected to the indoor unit (J13 circuit board 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.

Internet gateway EHS157056

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.

4.7.12 Connecting the HP convector

INFORMATION

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

- Electrical connection of the HP convector with the following accessories according to Fig. 4-41 as a switchover contact (heating/cooling).
- If necessary, install and connect a 2-way valve (2UV) (HPC-RP 14 20 13) in the HP convector. Set its controller so that the 2-way valve (2UV) closes when no request is available from this device.

INFORMATION

The operating mode (Heating/Cooling) can only be changed on the indoor unit.

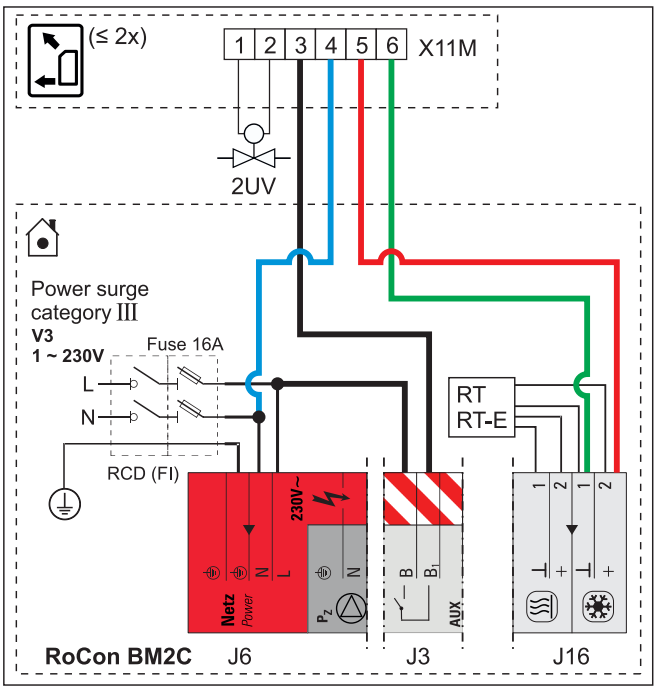


Fig. 4-41 Connection of the HP convector (max. 2) to the indoor unit

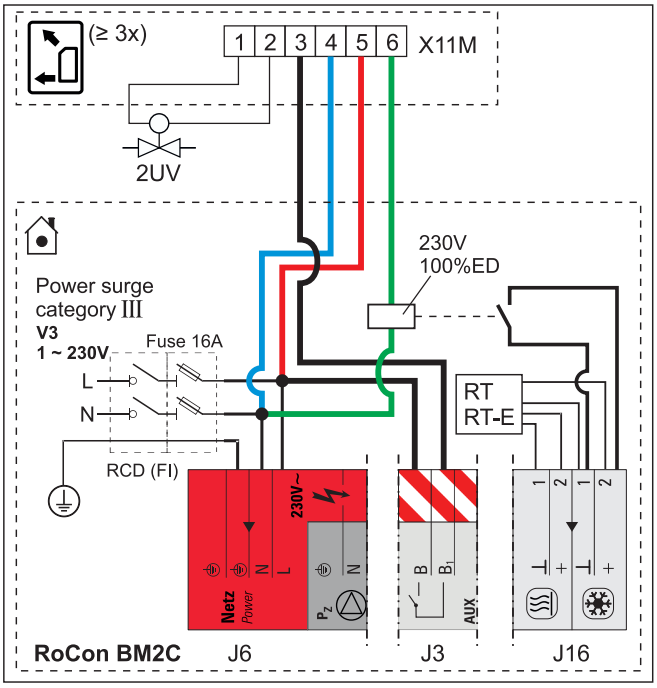


Fig. 4-42 Connection of the HP convector (max. 3) to the indoor unit

4.7.13 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).

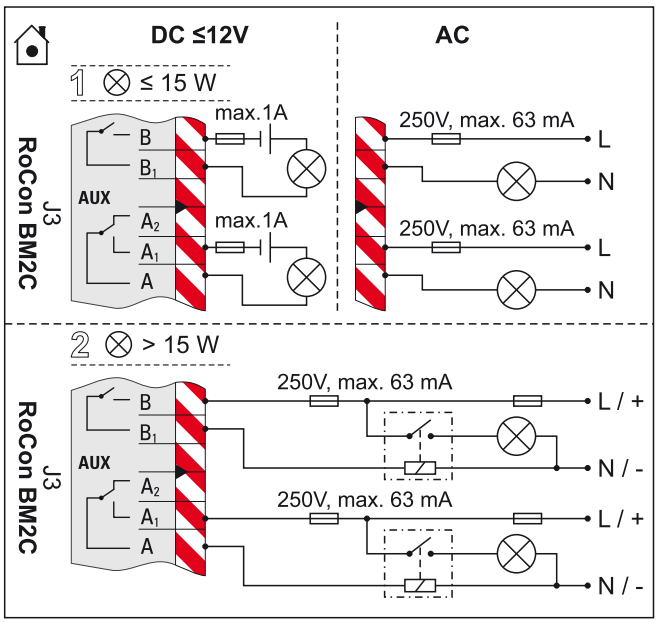


Fig. 4-43 Connection of switching contact (AUX output)

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. 6.

INFORMATION

If an A2 or G-plus condensing boiler is connected, the [AUX switching function] parameter and [AUX delay time] parameter 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.

4.7.14 Off-peak mains connection (HT/NT)

If the outdoor unit is connected to a low rate mains connection, the S2S potential-free switching contact of the receiver (which evaluates the low rate input signal output by the electricity supply company) must be connected to the J8 connector, EVU connection on the RoCon BM2C printed circuit board (see Fig. 4-44).

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 electricity supply 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 electricity supply 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.

[HT/NT contact] = 1 [HT/NT contact] = 0

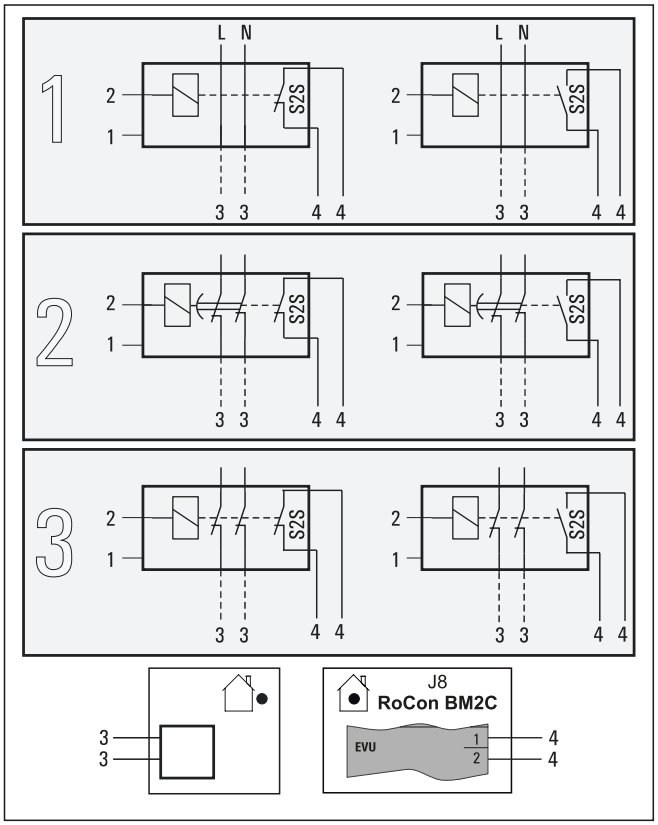


Fig. 4-44 Connection of the H/NT switch contact

Item	Designation
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 instructions for the heat pump outdoor unit)
4	Potential-free switching contact for heat pump indoor unit

Tab. 4-9

4.7.15 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 printed circuit board (see Fig. 4-45).

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

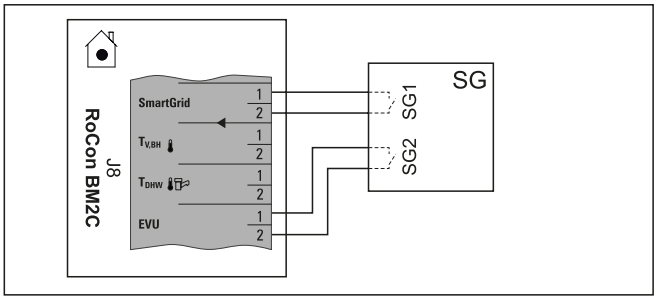


Fig. 4-45 Connecting the Smart Grid

4.8 Connection for refrigerant

INFORMATION

Follow the installation instructions for the outdoor unit.

4.8.1 Laying refrigerant lines

CAUTION

The use of refrigerant lines that have already been used can lead to damage to the unit.

- Do not reuse a refrigerant line that has been used with another refrigerant. Replace or carefully clean the refrigerant line.

- Check if an oil trap bend for the refrigerant line is necessary.
  - Required if the indoor unit is not installed at ground level to the external heat pump unit (Fig. 4-46, HO ≥ 10 m).
  - At least one oil trap bend must be installed for every 10 m of height difference (Fig. 4-46, H = distance from oil trap bend to oil trap bend).
  - An oil trap bend is only required in the gas line.
- Install lines with bending unit and an adequate clearance to electrical lines.
- Only solder with light nitrogen flow (hard soldering only).
- Do not apply thermal insulation to connection points until after commissioning (for purposes of leakage search).
- Make flared connections and connect to the devices (observe tightening torque, see Chap. 10.4).

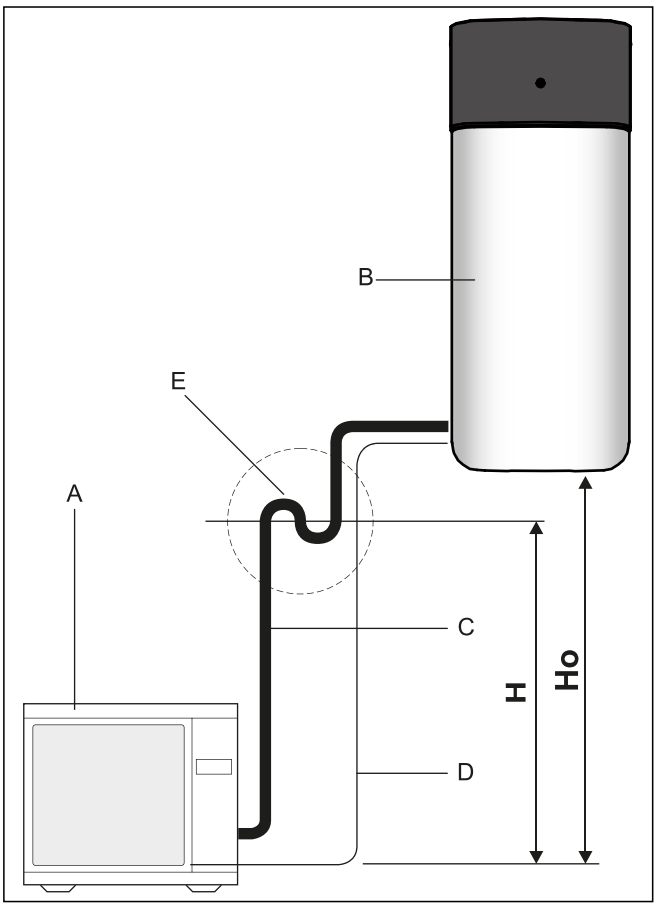


Fig. 4-46 Oil trap bend for refrigerant line

Item	Designation
A	Heat pump outdoor unit
B	Indoor unit
C	Gas line
D	Liquid line
E	Oil trap bend
H	Height to 1st oil trap (max. 10 m)
H_O	Height difference between heat pump outdoor unit and heat pump indoor unit

Tab. 4-10 Legend for Fig. 4-46

4.8.2 Pressure test and filling the refrigerant circuit

WARNING

The overall heat pump system contains refrigerants with fluorinated greenhouse gases that are harmful to the environment when released.

Refrigerant type: R32

GWP* value: 675

*GWP = Global Warming Potential

- Enter the total filling quantity of refrigerant on the label supplied on the external heat pump unit (for notes, see Installation instructions for the heat pump outdoor unit).
- Never allow refrigerant to escape into the atmosphere - always extract and recycle with a suitable recycling device.

1 Perform pressure test with nitrogen.
   - Use nitrogen 4.0 or higher.
   - Maximum 40 bar.
2 After the leak search is complete, completely drain.
3 Vacuum lines.
   - Pressure to be reached: 1 mbar absolute.
   - Time: Minimum 1 h
4 Check whether additional refrigerant is needed for primer filling; fill if necessary.
5 Open the stop valves on the exterior unit completely until the stop. Slightly tighten.
6 Reinstall the valve caps.
7 Check that the storage tank temperature sensors are inserted to a depth of t_{DHW1} 80 cm and t_{DHW2} 60 cm.

4.9 Filling the system

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

4.9.1 Checking the water quality and adjusting the pressure gauge

1 Comply with the instructions for the water connection (see Water connection) and for the water quality.
2 Adjust the mechanical pressure gauge (mounted on site in accordance with Connecting hydraulic lines 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).

4.9.2 Filling hot water heat exchangers

1 Open the shutoff 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.

4.9.3 Filling the storage tank

see Chap. 7.2.1.

4.9.4 Filling the heating system

see Chap. 7.2.2.

5 Start-up

WARNING

An improperly started-up indoor unit can endanger human life and health and affect its function.

- The commissioning of the indoor unit may only be carried out by heating specialists authorised and trained by the gas or energy supply company.

CAUTION

If the indoor unit is not started up properly, it could lead to material or environmental damage.

- Observe the information concerning water quality in accordance with Chap. 1.2.5.
- During operation of the system, the water pressure must be checked at regular intervals on the building-side manometer (green range) or by querying the controller (see accompanying controller manual). If necessary, correct the pressure by topping up with water.

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.

Incorrect commissioning voids the manufacturer's guarantee for the device. If you have questions, please contact our Technical Customer Service.

5.1 Initial commissioning

Once the indoor unit has been installed and fully connected, it must be adapted once to the installation environment by expert personnel (configuration).

After this configuration is complete, the system is ready for operation and the operator can make additional individual settings on it.

The heating technician must instruct the user, draw up the start-up log and complete the operating manual.

The settings of optional components such as a room thermostat or solar system must be carried out on the respective components.

5.1.1 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. 7.2.2).
- The storage tank is filled up to the overflow (see Chap. 7.2.1).
- Optional accessories have been installed and connected up.
- The heating system's control valves are open.

5.1.2 Starting the unit and start-up

INFORMATION

Please observe the operating instructions of the RoCon+ HP controller.

INFORMATION

If the storage tank temperature falls below specific minimum values, the safety settings of the indoor unit prevent the heat pump from being operated at low outside temperatures

- Outside temperature < -2 °C, minimum storage tank temperature = 30 °C

- Outside temperature < 12 °C, minimum storage tank temperature = 23 °C

Without backup heater:

The storage tank water must be heated to the required minimum storage tank temperature with an external heater booster.

With backup heater (EKBUxx**):**

At an outside temperature of < 12 °C and a storage tank temperature of < 35 °C, the backup heater (EKBUxx) is automatically switched on to heat the storage tank water to at least 35 °C.

- To accelerate the heating process with backup heater, temporarily set the [Config. of external heat source] parameter = "1" and the [Ext. hot water power] parameter to the maximum value of the backup heater [→ Main menu → Settings → Ext. source].
- In the [User] menu, select and switch on the [1x Hot Water] parameter. After heating, switch the parameter off again [→ Main menu → User → 1x load].

5.1.3 Bleeding the hydraulic system

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

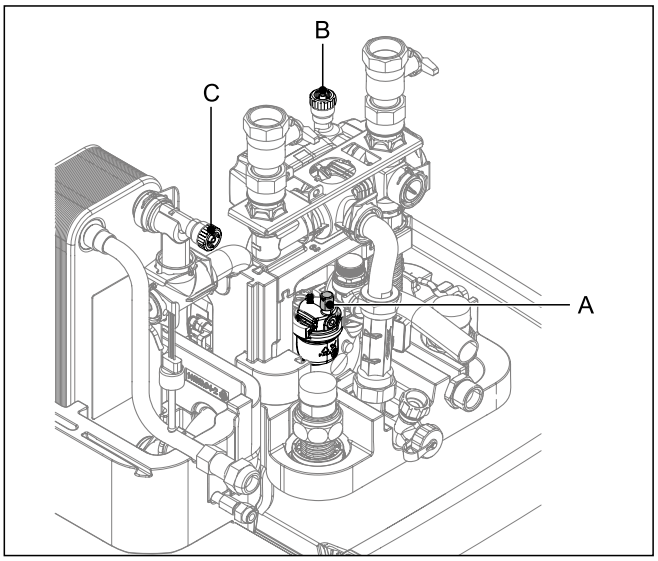


Fig. 5-1 Automatic vent valve

- Provide the manual vent valve (item B) with a hose and direct it away from the unit. Open the valve until water emerges.
- Fit the second manual vent valve (item C) with a hose and open it until water emerges.
- 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.

During the ventilation function, any air present can escape via the automatic vent valve and the hydraulic circuit connected to the indoor unit is evacuated.

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.

- Check the water pressure and replenish water if necessary (see Chap. 7.2.2).
- Repeat the ventilation, checking and replenishing process until:
  - it is completely vented.
  - there is sufficient water pressure.

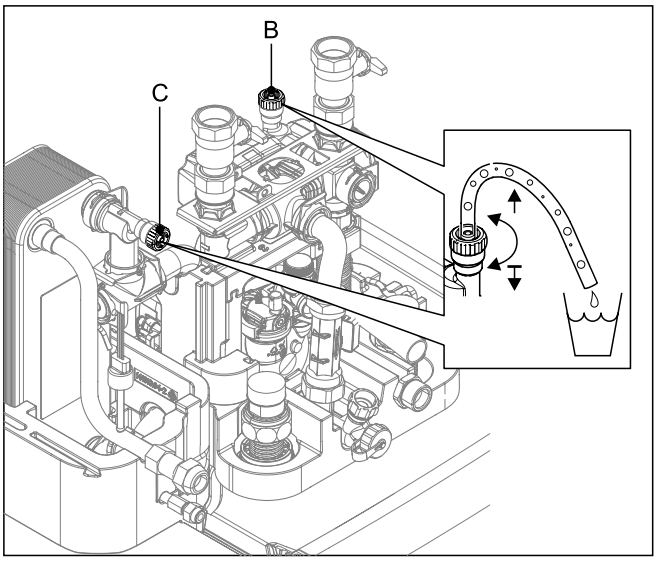


Fig. 5-2 Manual vent valves

5.1.4 Checking the minimum flow

The minimum flow must be checked with the heating circuit closed.

INFORMATION

If the minimum flow is too low, an error message may appear and the heating system may shut down.

If the minimum flow rate is not sufficient, there may be air in the circulation pump or the valve drive of the 3-way switching valves (3UVB1 / 3UV DHW) is defective.

- Vent the circulation pump.
- Check the function of the valve drives; replace the valve drive if necessary.

- Close the valves and adjuster drives of all connected heat distribution circuits.
- Set the "Heating" operating mode of the indoor unit controller [→ Main menu → Operating mode].
- Read the [Current volume flow] information parameter [→ Main menu → Information → Values].
  - The flow rate must be at least 480 l/h (see Controller operating instructions).

INFORMATION

The indoor unit controller constantly monitors the flow rate of the internal heat generator circuit. Different minimum flow rate values are required depending on the active operating mode:

"Heating" operating mode: 480 l/h

"Cooling" operating mode: 660 l/h

Automatic thawing function (Defrost) active: 780 l/h

If an error message regarding an inadequate minimum flow is displayed at a flow rate of more than 480 l/h, check the actual flow rate in the active operating mode and eliminate possible fault causes.

5.1.5 Setting the screed program parameter (only as 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 control unit continues to work in the previously set operating mode. If not configured beforehand, the following finishing work is necessary.

1 On connection without room station EHS157034:
   – Set the heating characteristic curve or required inflow temperature.

2 On connection with room station EHS157034:
   – Activate the room station.
   – Set the heating characteristic curve or required inflow temperature. If necessary, activate the [Room Influence] parameter [→ Main menu → Configuration → Heating] and set the target room temperature.

5.1.6 Commissioning checklist

Commissioning checklist/Check off measures carried out ☑			Chapter	
1.	Supply indoor unit and outdoor unit (if present) with voltage	These instructions	Chap. 4.7	☐
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. 5.1.3	☐
	▪ Checking the minimum flow		Chap. 5.1.4	☐
5.	Activate the "Heating" operating mode Observe the waiting time (up to 5 min) ▪ For outside temperatures below -2 °C and a storage temperature below 30 °C ▪ For outside temperatures below 12 °C and a storage tank temperature below 23 °C ▪ In this case, the storage tank is heated with the help of the backup heater.	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	☐

5.2 Re-commissioning

5.2.1 Requirements

CAUTION

Commissioning in frosty conditions can result in damage to the entire heating system.

- Commissioning at temperatures below 0 °C only if a water temperature of at least 5 °C is guaranteed in the heating system and the storage tank.
- We recommend not to operate the installation in extremely frosty conditions.

- 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. 7.2.2).
- The storage tank is filled up to the overflow (see Chap. 7.2.1).

5.2.2 Start-up

INFORMATION

If the storage tank temperature falls below specific minimum values, the safety settings of the indoor unit prevent the heat pump from being operated at low outside temperatures

- Outside temperature < -2 °C, minimum storage tank temperature = 30 °C

- Outside temperature < 12 °C, minimum storage tank temperature = 23 °C

Without backup heater:

The storage tank water must be heated to the required minimum storage tank temperature with an external heater booster.

With backup heater (EKBUxx**):**

At an outside temperature of < 12 °C and a storage tank temperature of < 35 °C, the backup heater (EKBUxx) is automatically switched on to heat the storage tank water to at least 35 °C.

- To accelerate the heating process with backup heater, temporarily set the [Config. of external heat source] parameter = "1" and the [Ext. hot water power] parameter to the maximum value of the backup heater [→ Main menu → Settings → Ext. source].
- In the [User] menu, select and switch on the [1x Hot Water] parameter. After heating, switch the parameter off again [→ Main menu → User → 1x load].

1 Check the cold water connection and, where necessary, fill the potable water heat exchanger.

2 Switch on the power supply to the indoor unit.

3 Wait for the start phase.

4 After the start phase in heating mode has completed, evacuate the heating system, check the installation pressure and adjust if necessary (max. 3 bar, see Chap. 7.2.2).

5 Carry out a visual inspection for leaks on all connection points internally. Seal any leaks that occur in a professional manner.

6 Set the controller to the required operating mode.

7 If a solar system is connected, commission it according to the enclosed instructions. After shutting off the solar system, again check the fill level in the buffer storage tank.

6 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 non-return 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 non-return valves must be installed in the building for components connected to the heat exchanger for pressurised solar system charging.

6.1 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 inflow
4	Heating return flow
5	Mixer circuit
6	Circulation (optional)
7	Check valve, return valve
7a	Non-return 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)
EKBUxx	Backup heater
C	Refrigerant compressor
CW	Cold water
DHW	Domestic hot water
DSR1	Pressurised solar system +p
E	Expansion valve
$H_1, H_2 \ldots H_m$	Heating circuits
MAG	Diaphragm expansion vessel
MIX	3-way mixer with drive motor
MK1	Mixer group with high-efficiency pump
MK2	Mixer group with high-efficiency pump (PWM-regulated)
P	High-efficiency pump
P_{Mi}	Mixer circuit pump
P_S	Solar operating pump +p
P_Z	Circulation pump
RDS2	Pressure station +p
RoCon+ HP	Indoor unit controller
EHS157068	Mixer valve 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

Item	Meaning
t_K	Solaris trap temperature sensor
t_R	Solaris return flow temperature sensor
T_S	Solaris storage cylinder temp. sensor
V	Fan (vaporiser)
VS	Scalding protection VTA32

Tab. 6-1

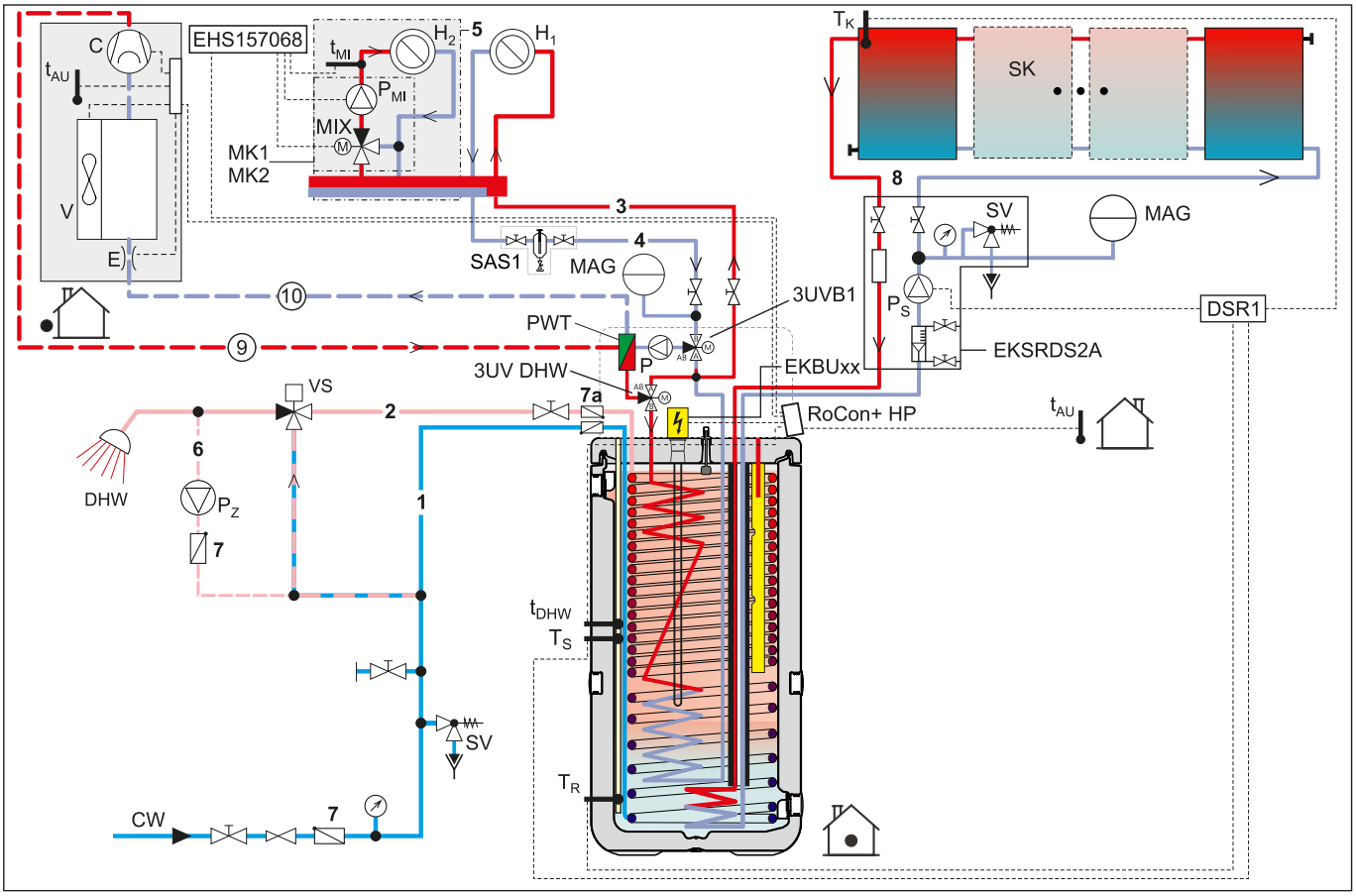


Fig. 6-1 Hydraulic diagram (Biv types) with pressurised solar system

7 Inspection and maintenance

7.1 General overview of inspection and maintenance

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

WARNING

The overall heat pump system contains refrigerants with fluorinated greenhouse gases that are harmful to the environment when released.

Refrigerant type: R32

GWP* value: 675

*GWP = Global Warming Potential

- Enter the total filling quantity of refrigerant on the label supplied on the external heat pump unit (for notes, see Installation instructions for the heat pump outdoor unit).
- Never allow refrigerant to escape into the atmosphere - always extract and recycle with a suitable recycling device.

INFORMATION

Have the 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.

Legal requirements

According to F-Gases Directive (EC) No. 842/2006 Article 3, replaced on 01/01/2015 by (EC) No. 517/2014 Articles 3 and 4, operators (or owners) must regularly maintain their fixed refrigeration systems, check for leaks and have any leaks rectified immediately.

All installation, maintenance and repair work on the refrigerant circuit must be documented, e.g. in the operating manual.

The operator has the following obligations for our heat pump systems:

INFORMATION

The European legal inspection period applies to heat pumps with a total filling quantity of the system with refrigerant of 3 kg or from 01/01/2017 with a total filling quantity of 5 t CO_2 equivalent.

However, we recommend concluding a maintenance contract including documentation of the work carried out in the operating manual to safeguard warranty claims, even for systems for which there is no legal obligation to check for leaks.

- With a total filling quantity of refrigerant of 3 kg - 30 kg or from 6 kg in hermetic systems and from 01/01/2017 with a total filling quantity of refrigerant of 5-50 t CO_2 equivalent or from 10 t CO_2 equivalent in hermetic systems:
  - Inspections by certified personnel at intervals of no more than 12 months and documentation of the work carried out in accordance with the valid regulation. This documentation must be kept for at least 5 years.

INFORMATION

Persons who hold a certificate of qualification for work on stationary refrigeration systems (heat pumps) and air conditioning systems for the European area in accordance with the F-Gas Certification Regulation (EU) 2015/2067 are certified.

- Up to 3 kg or 5 t CO_2 equivalent Total refrigerant charge: Category II certificate of competence
- From 3 kg or 5 t CO_2 equivalent Total refrigerant charge: Category I certificate of competence

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 who 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

The gaseous refrigerant is heavier than air. In pits or in badly ventilated rooms, it can collect in high concentrations. Breathing in high concentrations of gaseous refrigerant leads to feelings of faintness and suffocation. Toxic gases can be formed if gaseous refrigerants come into contact with open fire or hot objects.

- When working on the refrigerant circuit, ensure that the workplace is well vented.
- If necessary, before starting work, evacuate the refrigerant system completely.
- Never carry out work on the refrigerant circuit in closed rooms or work pits.
- Do not let refrigerant come into contact with open fire, embers or hot objects.
- Never allow refrigerant to escape into the atmosphere (forms high concentrations).
- After removing the service pipes from the filling connections, carry out a leakproof test on the refrigeration system. Refrigerant can escape through leaks.

WARNING

At normal atmospheric pressure and ambient temperatures, liquid refrigerant vaporises so suddenly that on contact with skin or eyes it can cause the tissue to freeze (danger of going blind).

- Always wear safety goggles and protective gloves.
- Never allow refrigerant to escape into the atmosphere (high pressure at the point of the leak).
- When removing the service pipes from the filling connections, never hold the connections in the direction of your body. Residual refrigerant could escape.

WARNING

Temperatures of up to 90 °C can occur during operation under the protective cover of the indoor unit. 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 an 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 complete

1 Removing the cover and thermal insulation (see Chap. 4.4.2).

2 Check the function of the indoor unit and all installed accessory components (backup heater, solar system) by checking the temperature display and switching 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 check 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. 7.2.1), 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. 7.2.2).

12 Check and clean the filter/sludge separator.

13 Check the minimum flow (see Chap. 5.1.4).

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. 4.4.2).

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 record of maintenance in the operating manual of the indoor unit provided.

7.2 Inspection and maintenance tasks

Cleaning the protective cover and storage tank

- The low-maintenance plastic only needs to be cleaned with soft cloths and mild detergent.
- Do not use any cleaners with aggressive solvents (damage to the plastic surface may occur).

7.2.1 Filling, topping up 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.

INFORMATION

If the storage tank temperature falls below specific minimum values, the safety settings of the indoor unit prevent the heat pump from being operated at low outside temperatures

- Outside temperature < -2 °C, minimum storage tank temperature = 30 °C

- Outside temperature < 12 °C, minimum storage tank temperature = 23 °C

Without backup heater:

The storage tank water must be heated to the required minimum storage tank temperature with an external heater booster.

With backup heater (EKBUxx**):**

At an outside temperature of < 12 °C and a storage tank temperature of < 35 °C, the backup heater (EKBUxx) is automatically switched on to heat the storage tank water to at least 35 °C.

- To accelerate the heating process with backup heater, temporarily set the [Config. of external heat source] parameter = "1" and the [Ext. hot water power] parameter to the maximum value of the backup heater [→ Main menu → Settings → Ext. source].
- In the [User] menu, select and switch on the [1x Hot Water] parameter. After heating, switch the parameter off again [→ Main menu → User → 1x load].

Without installed p=0 solar system

1 Connect the **filling hose** with non-return valve (1/2") **to** the **"Solar - inflow" connection** (Fig. 7-1, item 1).

2 Fill the storage tank of the indoor unit **until water escapes at** the **overflow connection** (Fig. 7-1, item 23)**.**

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 at** the **overflow connection** (Fig. 7-1, item 23).

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

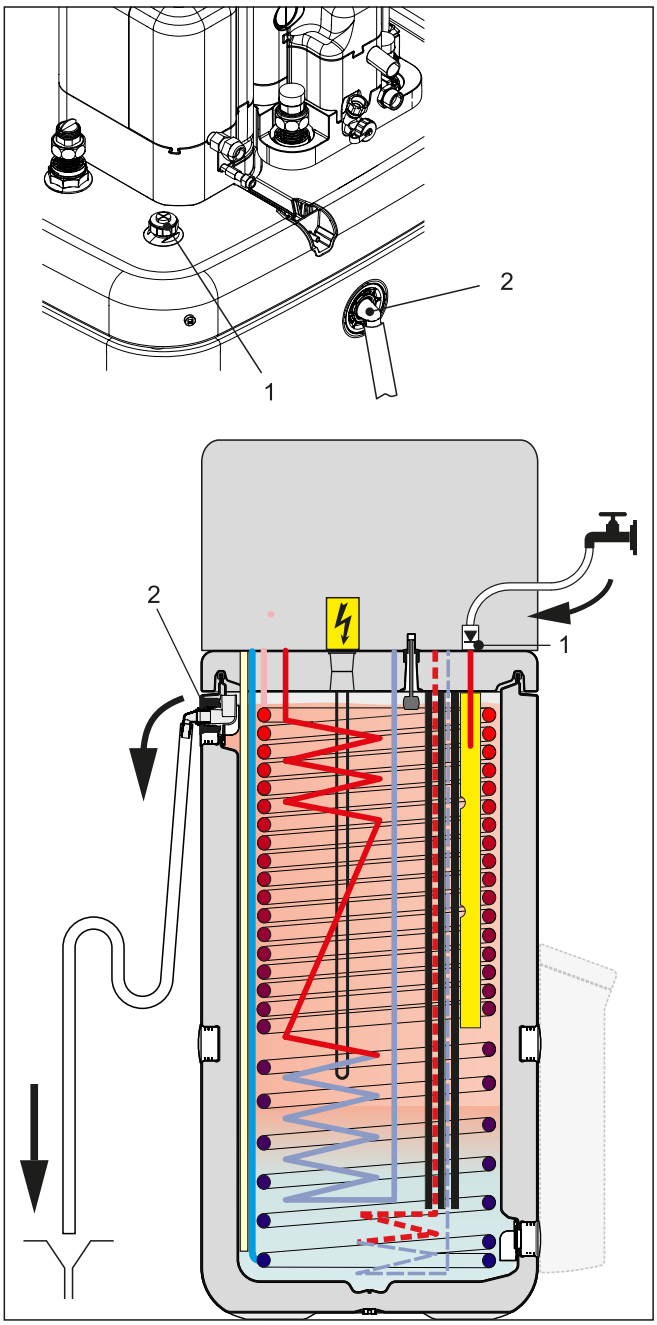


Fig. 7-1 Filling the buffer tank - without connected DrainBack solar system

Item	Designation
1	p=0 Solar - inflow
23	Safety overflow

Tab. 7-1

7.2.2 Filling, topping up 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 Water connection) and water quality (see).

1 Connect the filling hose (Fig. 7-2, 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. 7-2, 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. 7-2, item 4) on the feed pipe.

4 Open the combined filling and draining valve (Fig. 7-2, 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. 7-2, 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 controller RoCon+ HP 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. 7-2, item 2) if necessary.

11 Vent the entire heating system as described in Chap. 5.1.3 (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. 7-2, item 2) if necessary.

13 Disconnect the filling hose (Fig. 7-2, item 1) with non-return valve from the combined filling and draining valve (Fig. 7-2, item 2).

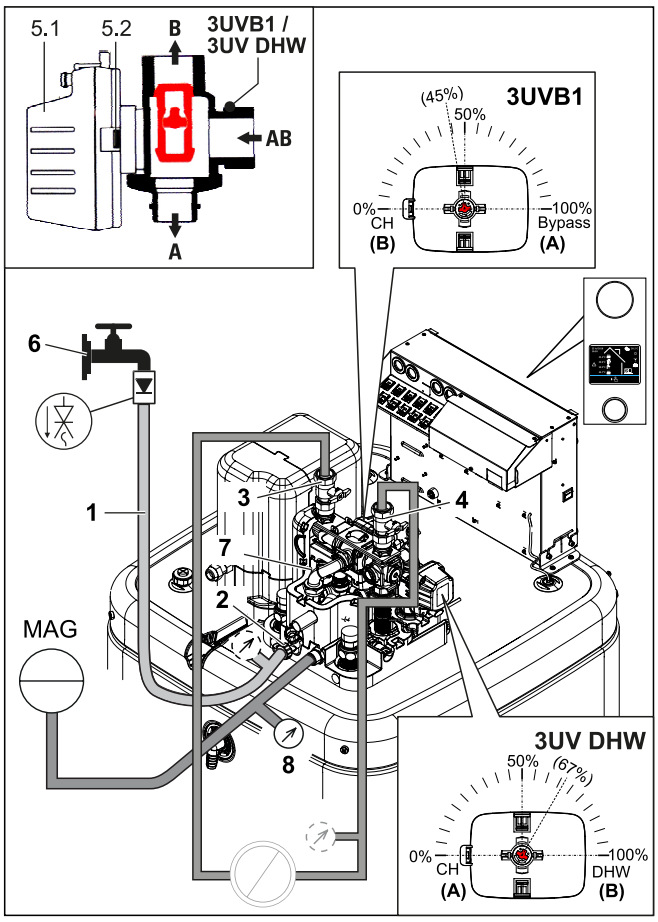


Fig. 7-2 Filling the heating circuit

Item	Designation
1	Filling hose with non-return valve (and pressure gauge[(2)])
2	Combined filling and draining valve
3	Heater ball cock - inflow
4	Heater ball cock - return flow
5.1	Valve drive
5.2	Unlocking key of the drive lock
6	Water tap
7	Automatic vent valve
8	Manometer
3UV DHW	3-way switch valve
3UVB1	3-way mixer valve
MAG	Diaphragm expansion vessel

Tab. 7-2 Legend for Fig. 7-2

[(2)] if not already installed in the heating system

8 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.

8.1 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.

8.2 Overview of possible malfunctions

Malfunction	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 the "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 the "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 low rate 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 low rate 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.

Malfunction	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 heating water. ▪ Check that the resistance in the water circuit is not too high for the pump (see Chap. 10).
	Target value range is too low.	In [→ Main menu → Configuration → Heating]: ▪ Increase the [Heat-Slope] parameter. ▪ Increase the [HZU max. temperature] parameter. ▪ Increase the [Max. feed temperature] parameter.
	Weather-compensated inflow temperature control active.	▪ Check the [Heating operation limit] parameter, [Heat-Slope] 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. of external heat source] and [Ext. power level 1] and [Ext. power level 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. 7.2.2).
	Domestic hot water preparation is taking too much of the output of the heat pump.	▪ Check the settings of the [Config. of external heat source] parameter [→ Main menu → Settings → Ext. source]. ▪ Check the settings of the [Ext. hot water power] parameter [→ Main menu → Settings → Ext. source].
Hot water does not warm up	Domestic hot water preparation shut off (e.g. switching time program is in the economy phase, parameters for domestic 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 domestic hot water preparation 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. of external heat source] and [Ext. power level 1] and [Ext. power level 2] parameters [→ Main menu → Settings → Ext. source].

8 Faults and malfunctions

Malfunction	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 heating water. ▪ Check that the resistance in the water circuit is not too high for the pump (see Chap. 10).
	"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 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.

	Refrigerant quantity in the heating system too low or too high.	▪ Determine causes of too low or too high refrigerant quantity in the refrigerant circuit.
		  ▪ If the refrigerant quantity is too low, check the refrigerant circuit for leaks, repair and add refrigerant.
		  ▪ If the refrigerant quantity is too high, recycle the refrigerant and refill the system with the correct quantity.

Malfunction	Possible cause	Possible solution
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. 8-1 Possible malfunctions

8.3 Fault codes

Code	Component/Designation	Error	Possible fault rectification
E75	Inflow temperature sensor $t_{V, BH}$	Inflow temperature sensor error	Inflow temperature sensor defective. ▪ Check, replace.
E76	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 [Tank temperature sensor] setting.
E81	RoCon BM2C printed circuit board	Communication fault	Parameter storage in the EEPROM corrupted. ▪ Contact a service technician.
E88	RoCon BM2C printed circuit board		Parameter storage in the external flash memory corrupted. ▪ Contact a service technician.
E91	Connected CAN modules		CAN module bus ID duplicated, set unique data bus address.
E128	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.
E129	Pressure sensor DS	Pressure sensor error	Pressure sensor DS defective. ▪ Check, replace.

Code	Component/Designation	Error	Possible fault rectification
E198	FLS flow sensor, 3-way switch valve 3UVB1	Flow measurement not plausible	Error occurs when 3UVB1 3-way switch 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: ▪ "Heating" operating mode: 600 l/h ▪ "Cooling" operating mode: 840 l/h ▪ Automatic thawing function active: 1020 l/h ▪ 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 switch valve drive defective. ▪ Check, replace.
E200	Electrical components	Communication fault	Communication between the RoCon BM2C and A1P printed circuit board lost. ▪ Wiring or connections, poor contact. ▪ Check, replace
E8005	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.
E8006	Pressure sensor DS	Pressure drop in heating system too high	Pressure drop too fast. ▪ Check the heating system for leaks. ▪ Pressure sensor DS defective. ▪ Check, replace.
E8007	Pressure sensor DS	Water pressure in heating system too high	Water pressure has exceeded the permissible maximum value. ▪ Too much water in the heating system. ▪ Drain water. ▪ Pressure sensor DS defective. ▪ Check, replace.
E8100	Electrical components	Communication	Initialisation after heat pump start failed. Printed circuit board A1P defective. ▪ Check, replace.
E9000		Temporary internal message	Not relevant for proper system operation.
E9001	Return flow temperature sensor t_{R2}	Return flow temperature sensor error	Sensor or connecting cable defective. ▪ Check, replace.
E9002	Feed temperature sensor t_{V1} or $t_{V, BH}$	Inflow temperature sensor error	Sensor or connecting cable defective. ▪ Check, replace.
E9003	Frost protection function fault	Plate heat exchanger (PWT)	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 fault code E9004 / 7H. ▪ Failure of the frost protection function for the plate heat exchanger because there is a lack of refrigerant in the system. See fault code E9015 / E4.

Code	Component/Designation	Error	Possible fault rectification
E9004	FLS flow sensor	Flow rate error	Water flow 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 3-way switching valve 3UVB1: Compare the actual position of 3UVB1 with the indicated position [→ Main menu → Information → Overview → BPV]. ▪ Does this fault occur during defrosting in room heating or domestic hot water preparation operating mode? With optional backup heater: check its power supply and fuses. ▪ Check the fuses (pump fuse (FU1) on the A1P printed circuit board and PCB fuse (F1) on the RoCon BM2C printed circuit board). ▪ Check the FLS flow sensor for soiling and function; clean, replace if necessary. ▪ Frost damage on the plate heat exchanger (outdoor unit)
E9005	Inflow temperature sensor $t_{V, BH}$	Inflow temperature $t_{V, BH}$ > 75 °C	Feed temperature of backup heater ($t_{V, BH}$) is too high. ▪ Inflow temperature sensor providing incorrect values. Temperature sensor or connecting cable defective. ▪ Check, replace. ▪ Contact problem, A1P jumper on X3A.
E9006	Inflow temperature sensor $t_{V, BH}$	Inflow temperature $t_{V, BH}$ > 65 °C	
E9007	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.
E9008	Temperature sensor (refrigerant fluid side) t_{L2}	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.
E9009	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.
E9010	Jumper on A1P circuit board		Jumper missing on the "X21A" connection socket of the A1P circuit board. ▪ Install the jumper.
E9011	FLS flow sensor	Flow sensor error	FLS flow sensor defective. ▪ Replace the FLS flow sensor.
E9012	Refrigerant temperature sensor	Refrigerant temperature sensor error	Measured value outside the permissible value range. Sensor or connecting cable defective. ▪ Check, replace.
E9013	Heat pump outdoor unit main circuit board	AG circuit board defective	▪ Main circuit board in the heat pump outdoor unit defective. ▪ Fan motor defective. ▪ Check, replace.

Code	Component/Designation	Error	Possible fault rectification
E9014	High-pressure switch S1PH in the refrigerant system	$P_{refrigerant}$ 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.
E9015	Pressure sensor S1NPH in the heat pump outdoor unit	$P_{refrigerant}$ 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.
E9016	Electronic overload protection in the refrigerant compressor	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.
E9017	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.
E9018	Electronic expansion valve	Expansion valve	The electronic expansion valve in the heat pump outdoor unit is defective, replace.
E9019	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.
E9020	Outlet temperature sensor (hot gas sensor) R2T on the heat pump outdoor unit refrigerant compressor too high	$T_{Evaporator}$ high	▪ Outlet temperature sensor R2T on the refrigerant compressor or connecting cable defective. ▪ Refrigerant compressor defective. ▪ Check, replace.

Code	Component/Designation	Error	Possible fault rectification
E9021	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.
E9022	Outside temperature sensor R1T in the heat pump outdoor unit	AT sensor error	Sensor or connecting cable defective. ▪ Check, replace.
E9023	Storage tank temperature sensor t_{DHW1} or t_{DHW2}	Hot water sensor error	
E9024	Pressure sensor S1NPH in the heat pump outdoor unit	Pressure sensor	
E9025	Outlet temperature sensor R2T in the heat pump outdoor unit	Return flow temperature sensor error	
E9026	Intake temperature sensor R3T in the heat pump outdoor unit	Intake pipe sensor error	
E9027	Temperature sensor of fin heat exchanger R5T in the heat pump outdoor unit	Aircoil sensor, defrost	
E9028	Temperature sensor of fin heat exchanger R4T in the heat pump outdoor unit (only in 11 -16 kW system)	Aircoil sensor, temp	
E9029	Fluid side temperature sensor R6T in the heat pump outdoor unit	AG cold sensor error	

Code	Component/Designation	Error	Possible fault rectification
E9030	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 outside 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 a service technician.
E9031	Electrical components overvoltage fault		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 fault 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 a service technician.
E9032	Electrical components		▪ Refrigerant compressor defective. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, replace. ▪ If necessary, contact a service technician.
E9033			▪ 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 a service technician.
E9034			Communication fault – 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 a service technician.
E9035	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 a service technician.

Code	Component/Designation	Error	Possible fault rectification
E9036	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 a service technician.
E9037	Output setting	Output setting for heat pump outdoor unit incorrect	▪ Contact a service technician.
E9038	Sensors and parameter settings in the heat pump outdoor unit	Refrigerant leak	Refrigerant loss. ▪ Refrigerant quantity too low. See fault code E9015 / E4. ▪ Blockage or leak in refrigerant line. ▪ Check, eliminate cause, top up refrigerant.
E9039		Undervoltage/overvoltage	Mains voltage outside the permissible range ▪ Sporadic fault shortly after a power failure. ▪ No fault elimination necessary. ▪ Inverter circuit board in the heat pump outdoor unit defective. ▪ Check, replace. ▪ If necessary, contact a service technician.
E9041	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.
E9042			Communication between the A1P printed circuit board and RoCon BM2C lost. ▪ See fault code E200.
E9043			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.
E9044			Configuration of the A1P printed circuit board does not match the heat pump outdoor unit ▪ Replace A1P printed circuit board. ▪ If necessary, contact a service technician.
E9045	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.

Code	Component/Designation	Error	Possible fault rectification
E9046	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.
E9047	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.
E9048	4-way valve	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 valve coil/wiring harness. ▪ Check the 4-way 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.

Code	Component/Designation	Error	Possible fault rectification
E9049	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.
E9050	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.
E9052	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.
E9053 E9054	Pressure sensor	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.

Code	Component/Designation	Error	Possible fault rectification
E9055	Room temperature sensor (optional)	Temperature sensor error	Sensor or connecting cable defective ▪ Check, replace
E9056	Outside temperature sensor (optional)	Temperature sensor error	Sensor or connecting cable defective ▪ Check, replace
E9057		Overpressure in refrigerant circuit; shutdown by high-pressure switch	Please contact your service partner
E9058	Controller housing in the outdoor unit	Temperature error	Please contact your service partner
E9059	Inverter in the outdoor unit	Temperature error	Please contact your service partner
E9060	Software	Floor screed program not ended correctly	▪ Check the screed program ▪ Restart the program if necessary
W8006	Pressure sensor DS	Pressure loss warning	Warning message: Maximum permissible pressure drop exceeded. Insufficient water in the heating system. ▪ Check the heating system for leaks, top up water.
W8007		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. ▪ [Max Pressure] parameter setting too low. ▪ Set the parameter if necessary. If the setting is correct, ▪ drain water to reduce system pressure.

Tab. 8-2 Fault codes

INFORMATION

Observe maximum temperature sensor tightening torque (see Chap. 10.4).

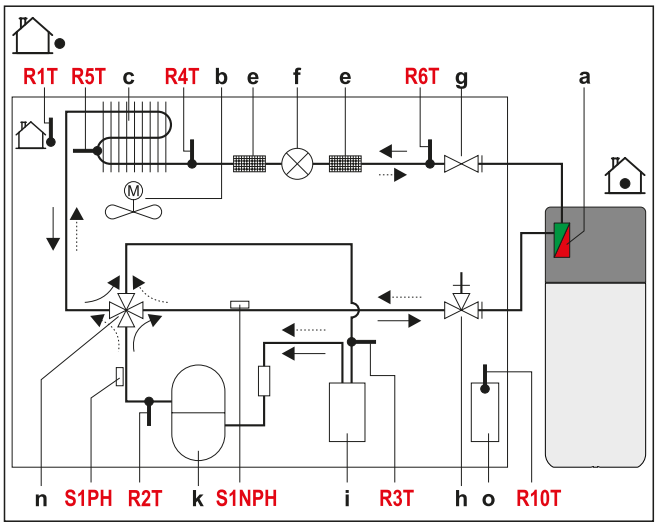


Fig. 8-1 Components in the heat pump circuit

Item	Designation	Item	Designation
a	Plate heat exchanger (condenser)	N	4-way switch valve (—> Heating, ····> Cooling)
b	Fan motor	O	Inverter circuit board
c	Fin heat exchanger (evaporator)	R1T	Outside temperature sensor
d		R2T	Outlet temperature sensor (refrigerant compressor)
e	Filter	R3T(3)	Inlet temperature sensor (refrigerant compressor)
f	Electronic expansion valve	R4T(3)	Temperature sensor of fin-cooled heat exchanger input
g	Service valve (fluid line)	R5T	Centre fin heat exchanger temperature sensor
h	Service valve with maintenance connection (gas line)	R6T(3)	Fluid line temperature sensor (t_{L2})
i	Accumulator	R10T(3)	Temperature sensor on inverter circuit board
K	Refrigerant compressor	S1PH	High-pressure switch

Tab. 8-3

(3) Only for 11-16 kW heat pump outdoor units.

8.4 Emergency operation

If the heat pump fails, the backup heater or another external heat generator can be used as an emergency heater. If [Emergency operation] 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 controller operating instructions).

9 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.

9.1 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 prolonged 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 discharge 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 indoor unit does not need to be drained because the heat insulation is excellent 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.

9.1.1 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. 9-1, 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. 9-1, 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.

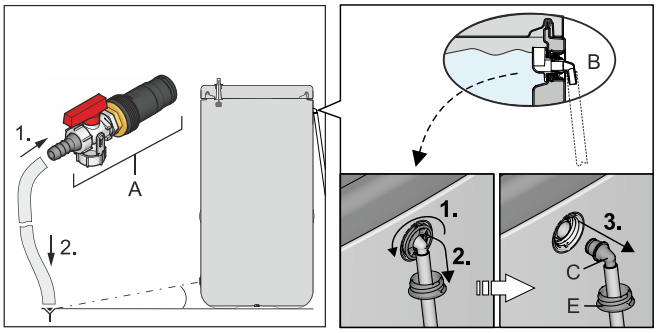


Fig. 9-1 Installing the drain hose; optional: Detaching the connecting piece from the safety overflow

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 bracket
D	Clamping piece	X	Valve insert

Tab. 9-1 Legend for Fig. 9-1 to Fig. 9-6

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. 9-2, item E) from the storage tank.

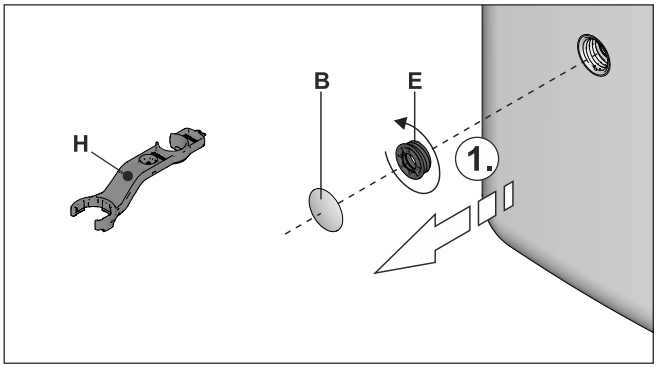


Fig. 9-2 Unscrewing the threaded piece

1 Insert the combined filling and draining filling connection in the threaded piece (Fig. 9-3, item E) and secure with the clamping piece (Fig. 9-3, item D).

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

3 Unscrew the threaded piece on the filling and draining connection (Fig. 9-4, item E), remove the sealing plug (Fig. 9-4, 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. 9-4) 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.

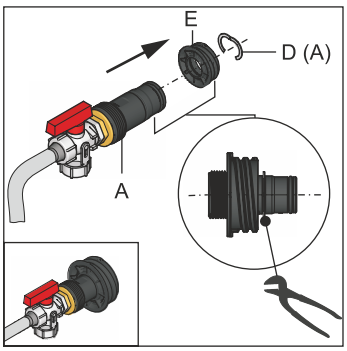


Fig. 9-3 Completing the combined filling and draining filling connection

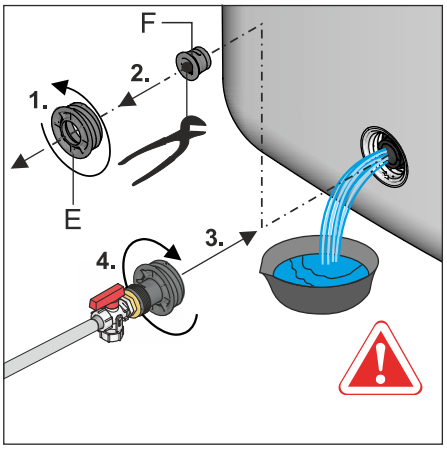


Fig. 9-4 Screwing the combined filling and draining filling connection into the filling and draining connection

4 Open the combined filling and draining valve on the **combined filling and draining 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. 9-6).

2 Place a suitable collecting tray and remove the blind plug from the connection bracket (Fig. 9-6).

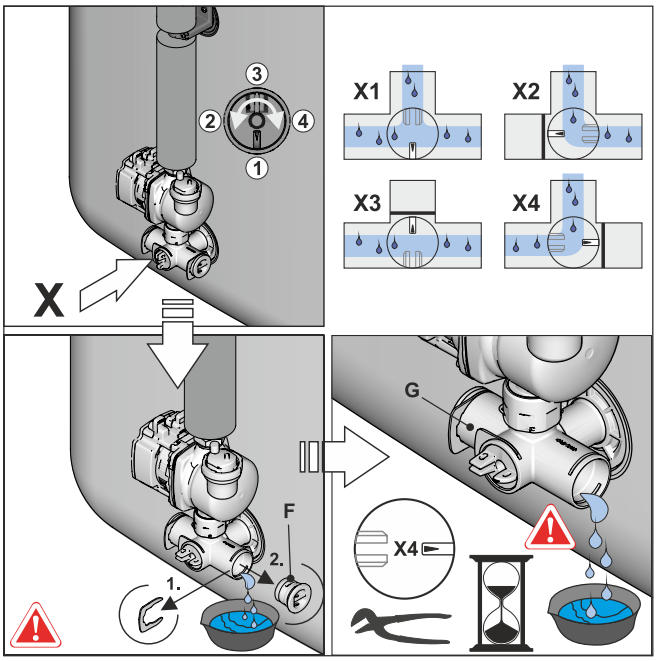


Fig. 9-5 Shut off the valve insert, remove the blind plug from the connection bracket

3 Insert the **combined filling and draining filling connection** in the connection bracket and secure with the holding clamp (Fig. 9-6).

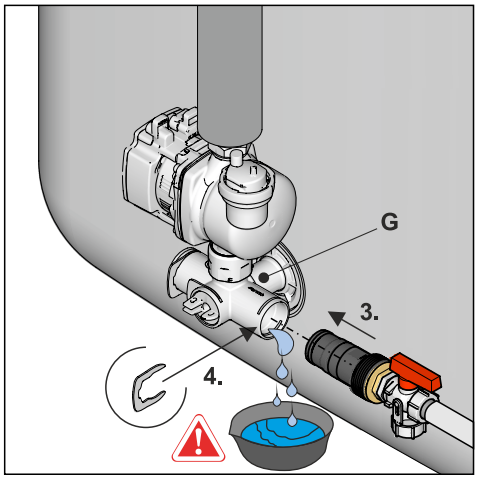


Fig. 9-6 Installing the combined filling and draining filling connection in the connection bracket

4 Open the combined filling and draining valve on the **combined filling and draining filling connection**.

5 Adjust the valve insert on the connection bracket so that the path to the drain hose is open (see also Fig. 9-5) and drain the water content of the storage tank.

9.1.2 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.

9.2 Final shutdown and disposal

CAUTION

Refrigerant leaking from the system causes long-term damage to the environment.

Mixing different kinds of refrigerant can result in hazardous toxic gases being released. Mixing with oils can lead to the soil being contaminated in case of leaking refrigerant.

- Never allow refrigerant to escape into the atmosphere - always extract and recycle with a suitable recycling device.
- Always recycle refrigerant, thus keeping it separated from oils and other additives.
- Only keep each type of refrigerant separate in suitable pressure vessels.
- Dispose of refrigerants, oils and additives properly and in accordance with the applicable national regulations of the country it is being used in.

For final shutdown of the indoor unit

1 taken out of service (see Chap. 9.1),

2 disconnected from all electrical, oil and water connections,

3 dismantled in accordance with the installation instructions 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.

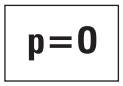
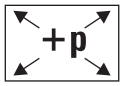
Proper disposal in compliance with the respective national regulations of the country of use is the responsibility of the user/owner.

- 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.

10 Technical data

10.1 Basic data

Type		EHSH04P30D EHSH08P30D EHSX04P30D EHSX08P30D	EHSHB04P30D EHSHB08P30D EHSXB04P30D EHSXB08P30D	EHSH08P50D EHSX04P50D EHSX08P50D	EHSHB08P50D EHSXB04P50D EHSXB08P50D
Parameters	**Unit**				
Dimensions (H x W x D)	cm	189.1 x 59.5 x 61.5		189.6 x 79 x 79	
Empty weight	kg	73	76	93	99
Water heating circulation pump					
Type	—	Grundfos UPM3K 25-75 CHBL			
Speed rates	—	Continuous (PWM)			
Voltage	V	230			
Frequency	Hz	50			
Protection type	—	IP 44			
Nominal output, maximum	W	58			
Heat exchanger (water/coolant)					
Type	—	Stainless steel plate heat exchanger			
Heat insulation	—	EPP			
Storage tank					
Total storage capacity	litres	294		477	
Maximum permissible storage water temperature	°C	85			
Heat consumption at stand-by and at 60 °C	kWh/24 h	1.5		1.7	
Drinking water heat exchanger (stainless steel 1.4404)					
Water capacity heat exchanger	litres	27.1		28.2	28.1
Domestic water heat exchanger surface	m^2	5.60		5.80	5.90
Max. operating pressure	bar	6.0			
Storage tank charging heat exchanger (stainless steel 1.4404)					
Water capacity heat exchanger	litres	12.4		11.9	12.1
Heat exchanger surface area	m^2	2.53		2.42	2.46
Pressurised solar heat exchanger (stainless steel 1.4404)					
Water capacity heat exchanger	litres	—	3.9	—	10.2
Heat exchanger surface area	m^2	—	0.70	—	1.69
Pipe connections					
Cold and hot water	inches	1" outer thread			
Heating inflow and return flow	inches	1" inner thread			
Solar connection 	inches	1" inner thread			
Solar connection 	inches	—	3/4" IG + 1" AG	—	3/4" IG + 1" AG
Refrigerant circuit					
Number of circuits	—	1			

10 Technical data

Refrigerant circuit pipe connections		
Number	—	2
Fluid line type	—	Flanged connection
Fluid line outer Ø	inches	1/4" male
Gas line type	—	Flanged connection
Gas line outer Ø	inches	5/8" male

Operating range		
Inflow temperature for room heating, room cooling function - heating (min/max)	°C	18 to 65
Inflow temperature for room heating, room cooling function - cooling (min/max)	°C	5 to 22
Domestic hot water preparation (with EKBUxx) - Heating (min/max)	°C	25 to 80

Noise level		
Audibility	dBA	39.1

Voltage supply		
Phases	—	1
Voltage	V	230
Voltage range	V	Voltage ±10%
Frequency	Hz	50

Mains connection[4]		
Heat pump outdoor unit	—	3G
Optional auxiliary heater (backup heater EKBUxx)	—	3G (1-phase) / 5G (3-phase)

10.2 Information on the type plate

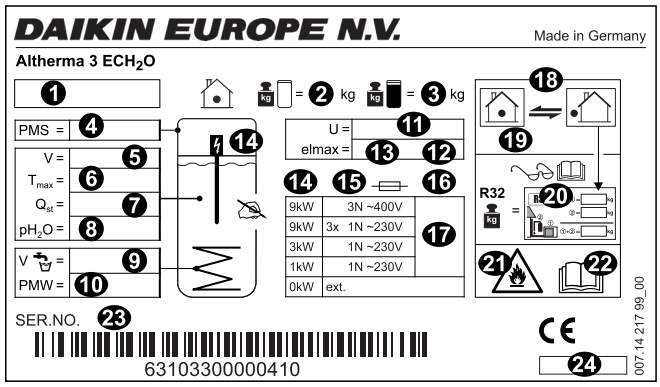


Fig. 10-1 Type plate

Item	Designation	Item	Designation
1	Device type	13	Electrical power consumption elmax
2	Empty weight	14	Backup-heater (optional)
3	Total filled weight	15	Backup heater protection class (optional)
4	Max. permissible operating pressure PMS (heating)	16	Backup heater fuse (optional)
5	Total storage capacity	17	Output/backup heater power supply (optional) To select; 0 kW: no/external heat source
6	Max. permissible operating temperature T_{max}	18	Refrigerant circuit

Item	Designation	Item	Designation
7	Standby heat expenditure in 24 hours at 60 °C (storage tank Q_{st}	19	Max. operating pressure (refrigerant circuit)
8	Operating pressure of storage water pH_2O	20	Total filling quantity of refrigerant (for instructions, see installation instructions for heat pump outdoor unit)
9	Nominal capacity of drinking water	21	Attention: Flammable refrigerant
10	Max. operating pressure PMW (plumbing)	22	For further information on the refrigerant: see instructions
11	Nominal voltage U	23	Serial number (specify in the event of complaints or inquiries)
12	Protection type	24	Date of production

[4] Number of individual lines in the connection cable including protective earth conductor. The cross-section of the individual lines is dependent on the current load, the length of the connection cable and the respective legal provisions.

10.3 Characteristic lines

10.3.1 Sensor characteristic lines

		Measured temperature in °C														
		-20	-10	0	10	20	30	40	50	60	70	80	90	100	110	120
		Sensor resistance in kOhm according to standard or manufacturer's indications														
t_{DHW1}, $t_{V, BH}$	NTC	98.66	56.25	33.21	20.24	12.71	8.20	5.42	3.66	2.53	1.78	1.28	0.93	0.69	0.52	0.36
t_R, t_V, t_{DHW2}, t_{DC}	NTC	-	-	65.61	39.9	25	16.09	10.62	7,176	4.96	3,497	2.512	1.838	1.369	-	-

Tab. 10-17 Temperature sensor

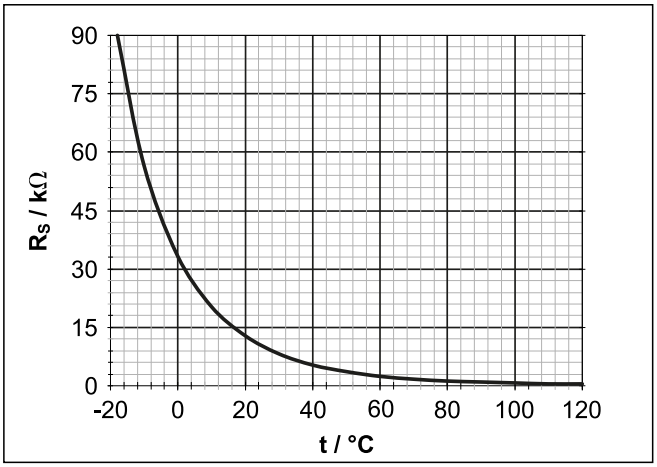


Fig. 10-2 Characteristic of temperature sensor t_{DHW1}, $t_{V,BH}$

Item	Designation
R_S	Sensor resistance (NTC)
t	Temperature
t_{DHW1}	Storage tank temperature sensor

Tab. 10-18 Legend for Fig. 10-2

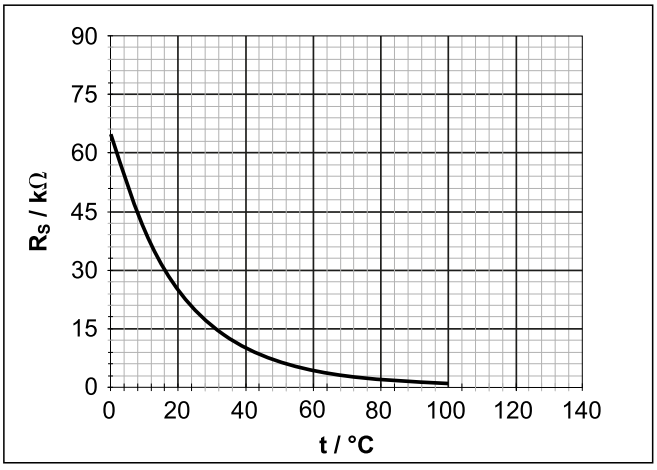


Fig. 10-3 Characteristic of temperature sensor t_R ,t_V, t_{DHW2}, t_{DC}

Item	Designation
R_S	Sensor resistance (NTC)
t	Temperature
t_R	Return flow temperature sensor

Tab. 10-19 Legend for Fig. 10-3

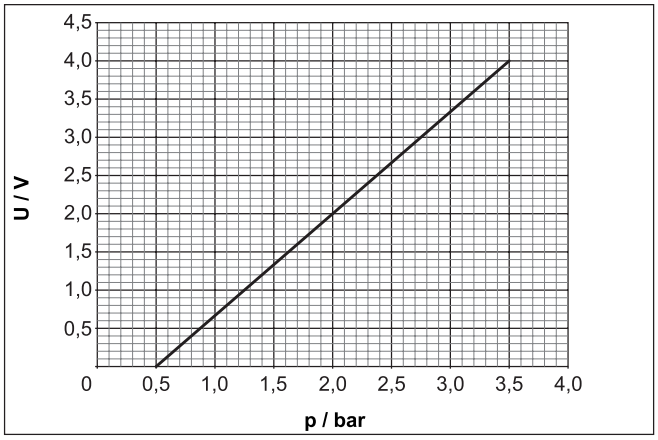


Fig. 10-4 Characteristic of the pressure sensor (DS)

Item	Designation
P	Water pressure
U	Voltage

Tab. 10-20 Legend for Fig. 10-4

10.3.2 Characteristic curves for pumps

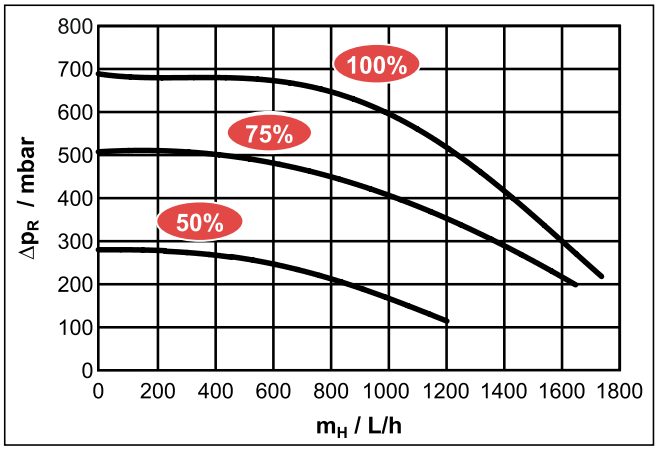


Fig. 10-5 Residual head of the internal heating circulation pump with heating support heat exchanger

Item	Designation
Δp_R	Residual head of internal heating circulation pump
m_H	Flow rate of heating system

Tab. 10-21 Legend for Fig. 10-5

10.4 Tightening torque

Component	Thread size	Tightening torque in Nm
Temperature sensor	all	Max. 10
Hydraulic line connections (water)	1"	25 – 30
Gas line connections (refrigerant)	5/8"	63 – 75
Fluid line connections (refrigerant)	1/4"	15 – 17
Fluid line connections (refrigerant)	3/8"	33 – 40
Backup heater	1.5"	Max. 10 (handtight)

Tab. 10-22 Tightening torque

10.5 Minimum floor area and ventilation openings

CAUTION

The use of refrigerant lines that have already been used can lead to damage to the unit.

- Do not reuse a refrigerant line that has been used with another refrigerant. Replace or carefully clean the refrigerant line.

- If the total refrigerant charge in the system is < 1.84 kg, there are no further requirements.
- f the total refrigerant charge in the system is ≥ 1.84 kg, other minimum floor space requirements must be met:

1 Compare the total refrigerant charge in the system (m_c) with the maximum refrigerant filling (m_{max}) permitted for the installation room (A_{room}), (see Tab. 10-23).
   - If $m_c \leq m_{max}$: The device can be installed in this room without any further requirements.
   - If $m_c > m_{max}$: Proceed with the following steps.
2 Compare the minimum floor area (A_{min}) with the floor area of the installation room (A_{room}) and the adjacent room (A_{room2}) (see Tab. 10-24).
   - If $A_{min} \leq A_{room} + A_{room2}$: Proceed with the following steps.
   - If $A_{min} > A_{room} + A_{room2}$: Contact your local dealer.
3 Calculate the refrigerant quantity (dm): dm = 1.9 – m_{max} (take m_{max} Tab. 10-23 from the A_{room} for the available size of the installation room)
4 For calculated dm, take the minimum area of the ventilation opening (VAmin) for natural ventilation between the installation room and the adjacent room Tab. 10-25.
5 The device can be installed if:
   – 2 ventilation openings are provided between the installation room and adjacent room (1 each at top and bottom)
   – Bottom opening: The lower opening must meet the requirements for the minimum area of the ventilation opening (VAmin). It must be as close to the ground as possible. If the ventilation opening starts on the floor, the height ≥ must be 20 mm. The bottom of the opening must be ≤ 100 mm above the floor. At least 50 % of the required minimum area of the ventilation opening (VAmin) must be < 200 mm from the floor. The entire area of the opening must be < 300 mm from the floor.
   – Upper opening: The area of the upper opening must be larger or the same size as the lower opening. The bottom of the upper opening must be at least 1.5 m above the top edge of the lower opening.
   – Ventilation openings to the outside are not considered suitable ventilation openings.

A_{room} (m^2)	Maximum refrigerant filling permitted in a room (m_{max}) (kg)
1	0.14*
2	0.28*
3	0.41*
4	0.55*
5	0.69*
6	0.83*
7	0.90*
8	0.97*
9	1.02*
10	1.08*
11	1.13*
12	1.18*
13	1.23*
14	1.28*
15	1.32*
16	1.37*
17	1.41*
18	1.45*
19	1.49*
20	1.53*
21	1.56*
22	1.60*
23	1.64*
24	1.67*
25	1.71*
26	1.74*
27	1.77*
28	1.81*
29	1.84
30	1.87
31	1.90

Tab. 10-23 Maximum refrigerant filling permitted in a room

- * Values are only required for step 3 (calculation of dm).

m_c (kg)	Minimum floor area A_{min} (m^2)
1.84	28.81
1.86	29.44
1.88	30.08
1.90	30.72

Tab. 10-24 Minimum floor area of indoor unit

dm (kg)	Minimum area of the ventilation opening (VA_{min}) (cm^2)
1.76	716
1.63	662
1.49	605
1.35	549
1.21	493

dm (kg)	Minimum area of the ventilation opening (VA_{min}) (cm^2)
1.07	437
1.00	419
0.93	406
0.88	392
0.82	377
0.77	362
0.72	345
0.67	328
0.62	312
0.58	294
0.53	276
0.49	258
0.45	241
0.41	223
0.37	204
0.34	186
0.30	168
0.26	149
0.23	131
0.19	112
0.16	93
0.13	75
0.09	56
0.06	38
0.03	19

Tab. 10-25 Minimum area of the ventilation opening

Example: Total refrigerant charge 1.84 kg, installation room 15 m²

1 From Tab. 10-23: m_c = 1.84 kg

➔ A_{min} = 29 m²

➔ Minimum room size requirement NOT fulfilled, ventilation opening required

2 Check with Tab. 10-24: A_{room} (installation room) + A_{room2} (adjacent room) >= A_{min}? If yes, proceed:

3 From Tab. 10-23: A_{room} = 15 m² -> m_{max} = 1.32 kg

4 dm = 1.9 kg - 1.32 kg = 0.58 kg

5 from Tab. 10-25: dm = 0.58 kg -> VA_{min} = 294 cm²

10.6 Electrical connection diagram

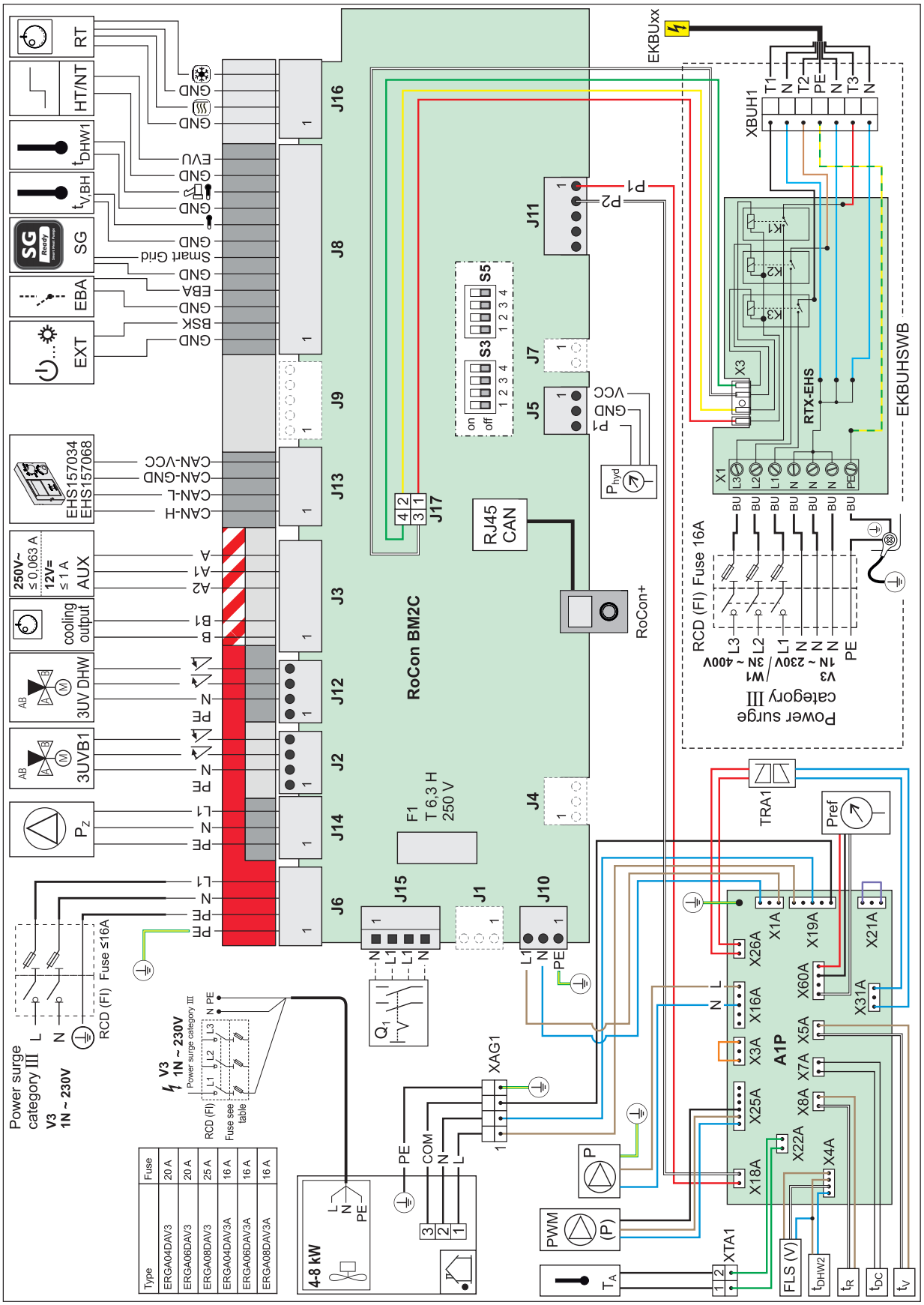


Fig. 10-6 Electrical connection diagram

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 circuit board (heat pump basic control)	X3	Plug connection for internal wiring to J17 (RoCon BM2C)
X26A	Plug connection to TRA1 (230 V)	FLS	Flow sensor
X31A	Plug connection to TRA1 (12 V)	HT/NT	Switching contact for low rate mains connection
X3A	Plug connection for internal wiring (bridging plug)	P	Heating circulation pump (connected inside the device)
X4A	Plug connection for FLS flow sensor and t_{DHW2}	P_Z	Circulation pump
X5A	Plug connection for t_V inflow temperature sensor	PWM	Pump connection (PWM signal)
X6A	Plug connection for $t_{V, BH}$ inflow temperature sensor	RJ45 CAN	Plug connection (RoCon BM2C) for internal wiring (for RoCon+ B1)
X7A	Plug connection for temperature sensor (refrigerant fluid) t_{DC}	RoCon+ B1	Controller control panel
X8A	Plug connection for return flow temperature sensor t_R	RoCon BM2C	Printed circuit board (basic controller module)
X16A	Plug connection for heating circulation pump	X16A	Plug connection for heating circulation pump P
X18A	Plug connection to J11 of RoCon BM2C	J2	Plug connection for 3UVB1
X19A	Plug connection to XAG1 + J10 of RoCon BM2C	J3	Plug connection AUX switching contacts and cooling output status output
X21A	Plug connection for internal wiring (bridging plug)	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 outside temperature sensor $t_{V,BH}$
F1	Fuse 250 V T 2 A (RoCon BM2C)		Plug connection for storage tank temperature sensor t_{DHW1}
SG	Switching contact for Smart Grid (intelligent mains connection)		Plug connection for HT/NT EVU switching contact
TRA1	Transformer	J10	Plug connection for internal wiring to X19A
t_A	Outside temperature sensor	J11	Plug connection for internal wiring to X18A (A1P)
t_{DHW1}	Storage tank temperature sensor 1 (RoCon BM2C)	J12	Plug connection for 3UV DHW
t_{DHW2}	Storage tank temperature sensor 2 (A1P)	J13	System bus plug connection (e.g. room station)
t_R	Return flow temperature sensor 2 (A1P)	J14	Circulation pump P_Z plug connection
t_{V1}	Inflow temperature sensor 1 (A1P)	J15	Plug connection for internal wiring (bridging plug)
$t_{V, BH}$	Backup heater inflow temperature sensor	J16	Room thermostat (EKRTR / EKRTW) plug connection
EHS157068	Mixer module	HT/NT	Switching contact for low rate mains connection
EHS157034	Room station	XAG1	Heat pump outdoor unit plug connection
cooling output	Status output for "Cooling" operating mode (floor heating control connection cooling output)	XBUH1	Backup heater plug connection (EKBUxx)
RT	Room thermostat (EKRTW)	X2M6	HPc-VK-1 connection cable clamp
RT-E	Receiver for wireless room thermostat (EKRTR)	X2M7	HPc-VK-1 connection cable clamp
RTX-EHS	Printed circuit board (backup heater)	X11M	Terminal strip in the HP convector

Tab. 10-26 Key names for connection and wiring diagrams

11 Notes

11 Notes

List of keywords

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