Installation and maintenance instructions

Indoor unit for air-water-heat pumps
Daikin Altherma integrated solar unit

Daikin Altherma
EHS(X/H)04P30A
EHS(X/H)B04P30A
EHS(X/H)08P30A
EHS(X/H)B08P30A
EHS(X/H)08P50A
EHS(X/H)B08P50A
EHS(X/H)16P50A
EHS(X/H)B16P50A

List of contents

1 Safety

1.1 Observing instructions

These instructions are a >> ***Translation of the original version*** << in your language.

Please read this manual carefully and thoroughly before proceeding with the installation or modification of the heating system.

These instructions are aimed at people who are authorised and who have successfully completed a qualifying technical or skilled manual training program for the particular work to be carried out and who have participated in a professional development seminar held by the appropriate responsible authority. This, in particular, includes heating specialists and climate control technicians who have experience, as a result of their technical training and their knowledge of the subject, of proper and appropriate installation and maintenance of heating, climate control and cooling installations and heat pumps.

This manual provides all the necessary information for installation, start-up and maintenance, as well as basic information on operation and settings. All parameters needed for trouble-free operation have been configured at the factory. Please go through the attached documents for a detailed description of operation and control.

Relevant documents

- Daikin Altherma EHS(X/H):
  - Operating instructions for the user/owner
  - Commissioning checklist
- Operating instructions for the RoCon HP control unit
- External unit for Daikin Altherma EHS(X/H); the associated installation and operating instructions.
- When connecting to a Daikin solar system; the associated installation and operating instructions.
- If a Daikin FWXV(15/20)AVEB is connected; the associated installation and operating instructions.
- In the case of connection to a control component offered as an accessory (room controller, mixer module etc.); the associated installation and operating instructions.

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

1.2 Warning signs and explanation of symbols

1.2.1 Meaning of the warnings

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

DANGER!

Draws attention to imminent danger.

Disregarding this warning can lead to serious injury or death.

WARNING!

Indicates a potentially dangerous situation.

Disregarding this warning can result in serious injury or death.

CAUTION!

Indicates a situation which may cause possible damage.

Disregarding this warning can lead to damage to property and the environment.

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 power

Risk of burning or scalding

Risk of environmental damage

Danger of local freezing up

Health impairing or irritant materials

Prescribed temperature for continuous use

Danger of explosion

1.2.2 Validity

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

Heat pump exterior unit ERLQ

Heat pump interior unit EHS(X/H)

FWXV(15/20)AVEB

Only valid for Daikin Altherma EHS(X/H) with cooling function (see also section 1.4)

Pay attention to the stipulated tightening torque (see chapter 9.3 "Tightening torque")

p=0 Only applicable for the unpressurised system (Drain Back)

+p Only applicable for the pressurised system

U1 Valid/available only if a room regulator is connected

M1 Valid/available only if a mixer module is connected

1.2.3 Handling instructions

- Instructions on actions are shown as a list. Actions of which the sequential order must be maintained are numbered.

➔ Results of actions are identified with an arrow.

Entry into a setting procedure

Exit from a setting procedure

1.3 Avoid danger

The Daikin Altherma EHS(X/H) is state-of-the-art and is built to meet all recognised technical requirements. However, improper use may result in serious physical injuries or death, as well as property damage.

To prevent such risks, install and operate Daikin Altherma EHS(X/H) only:
– as stipulated and in perfect condition,
– with an awareness of the safety and hazards involved.

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

WARNING!

This unit is not intended for use by persons (including children) with impaired physical, sensory or mental faculties or persons with insufficient experience and/or expertise unless supervised by a person responsible for ensuring their safety or are given instruction by this person on how to use the unit.

1.4 Intended use

The Daikin Altherma EHS(X/H) may only be used for preparation of warm water, as a room heating system, and depending on its design, as a room cooling system. The Daikin Altherma EHS(X/H) must be installed, connected and operated only according to the indications in this manual.

Only use of a suitable external unit approved by Daikin is permitted. The following combinations are permissible in this respect:

Internal unit		External unit
Heating and cooling (X)	**Heating only (H)**	
EHS**X**04P30A	EHS**H**04P30A	ERLQ004CAV3
EHS**XB**04P30A	EHS**HB**04P30A	
EHS**X**08P30A	EHS**H**08P30A	ERLQ006CAV3 ERLQ008CAV3
EHS**XB**08P30A	EHS**HB**08P30A	
EHS**X**08P50A	EHS**H**08P50A	
EHS**XB**08P50A	EHS**HB**08P50A	
EHS**X**16P50A	EHS**H**16P50A	ERLQ011CA(V3/W1)
EHS**XB**16P50A	EHS**HB**16P50A	ERLQ014CA(V3/W1) ERLQ016CA(V3/W1)

***B** - Additional heat exchanger for the bivalent connection*

Tab. 1 -1 Permissible combinations of Daikin exterior heat pump units and Daikin Altherma EHS(X/H) internal units

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

Use as intended also involves compliance with maintenance and inspection conditions. Spare parts must at least satisfy the technical requirements defined by the manufacturer. This is the case, for example, with original spare parts.

1.5 Instructions for operating safety

1.5.1 Before working on the hydraulic system

- Work on the Daikin Altherma EHS(X/H) (such as setup, servicing, connection and initial start-up) is only to 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 appropriate responsible authorities. This, in particular, includes heating specialists and climate control technicians who have experience, as a result of their technical training and their knowledge of the subject, of proper and appropriate installation and maintenance of heating, climate control and cooling installations and heat pumps.
- Switch off the external main switch before starting any work on the Daikin Altherma EHS(X/H) and secure it against unintentional switch-on.
- 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.
- Only original Daikin replacement parts may be used.

1.5.2 Electrical installation

- Electrical installation may be carried out only by electrical engineers and in compliance with the valid electro-technical guidelines as well as the regulations of the relevant energy supply company (EVU).
- Compare the mains voltage (~230 V, 50 Hz or ~400 V, 50 Hz) indicated on the type plate with the supply voltage before connecting to the mains.
- Before beginning work on live parts, disconnect all of the systems circuits from the power supply (switch off main switch, disconnect fuse) and secure against unintentional restart.
- Equipment covers and service panels must be replaced as soon as the work is completed.

1.5.3 Working on cooling systems (heat pump)

For work on stationary refrigeration systems (heat pumps) and air conditioning systems, proof of expertise is required in the European Community according to the F-Gases Directive (EC) No. 303/2008.

– Up to 3 kg coolant fill quantity: Expert certificate category II
– 3 kg coolant fill quantity or over: Expert certificate category I

- Always wear safety goggles and protective gloves.
- When working on the coolant circuit, ensure that the workplace is well ventilated.
- Never carry out work on the coolant circuit in closed rooms or work pits.
- Do not let coolant come into contact with open fire, embers or hot objects.
- Never allow coolant 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 coolant could escape.
- Components and spare parts must at least satisfy the technical requirements defined by the manufacturer.

1.5.4 Site of installation

For safe and fault-free operation, it is necessary that the installation location of the Daikin Altherma EHS(X/H) fulfils certain criteria. Related information can be found in chapter 3.2.

Information on the installation site of other components can be found in the associated documentation supplied with them.

1.5.5 Heating system and sanitary connection

- Create a heating system according to the safety requirements of EN 12828.
- With sanitary connection, you must observe;
  - EN 1717 - Protection of domestic water from contamination in domestic water installations and general requirements concerning safety equipment for the prevention of domestic water contamination by back-flow
  - EN 806 - Technical regulations for domestic water installations (TRWI)
  - And, in addition, the country-specific legal regulations

The connection of a solar installation, an electric heating rod or an alternative heat generator may cause the storage temperature to exceed 60 °C.

- For this reason you should fit scalding protection (e.g. VTA32 + screw connection set 1") during installation.

If the Daikin Altherma EHS(X/H) is connected to a heating system with steel pipes, radiators or non-diffusion-proof floor heating pipes, slurry and swarf could enter the hot water storage tank and cause blockages, local overheating or corrosion.

- To prevent possible damage, fit a dirt filter or sludge separator into the heating return flow of the system.
  - SAS 1

1.5.6 Requirements for the heating water

Observe the current technological regulations to prevent corrosion products and deposits.

Minimum requirements regarding the quality of filling and supplementary water:

- Water hardness (calcium and magnesium, calculated as calcium carbonate): ≤3 mmol/l
- Conductivity: ≤2700 µS/cm
- Chloride: ≤250 mg/l
- Sulphate: ≤250 mg/l
- pH value (heating water): 6,5 - 8,5

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

1.5.7 Operation

The Daikin Altherma EHS(X/H):

- 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.

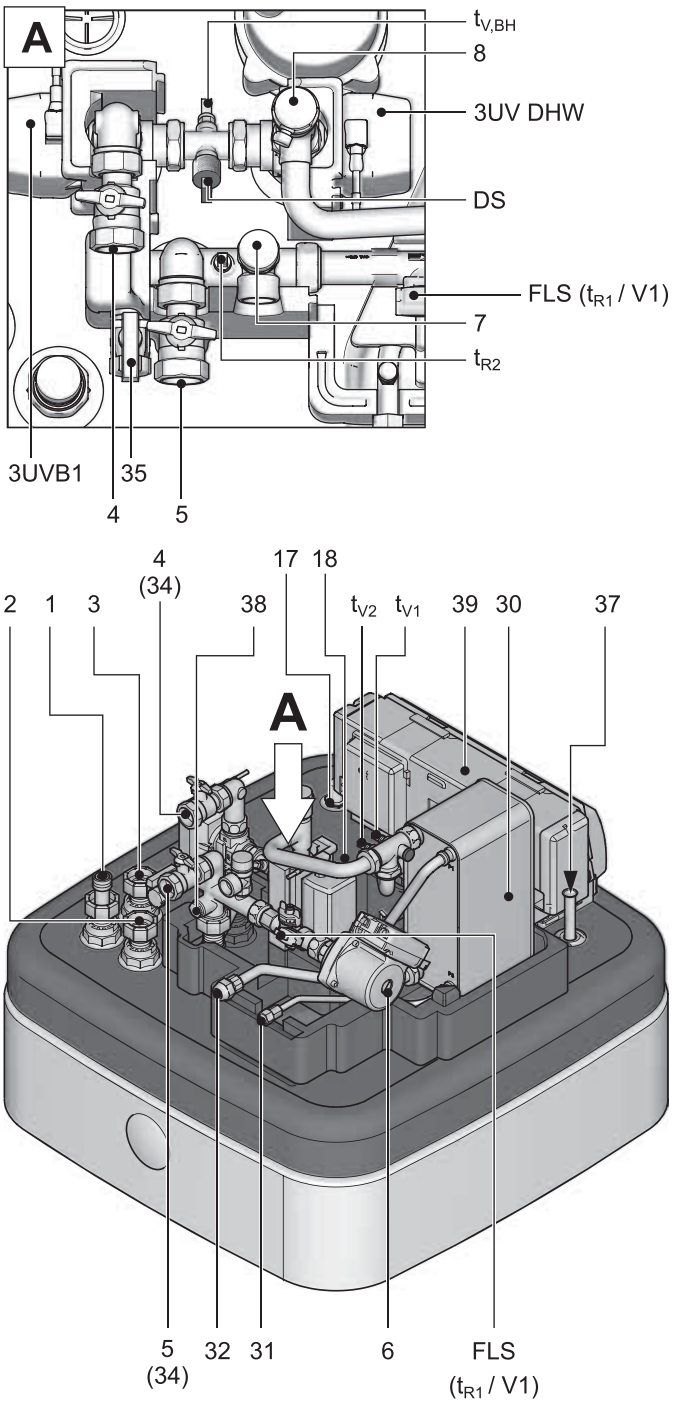
1.5.8 Instructing the user/owner

- Before you hand over the Daikin Altherma EHS(X/H), explain to the user/owner how to operate and check the system.
- Hand over the technical documentation (this document and all supporting documents) to the user and advise him that these documents must be made available at all times and be stored in the immediate vicinity of the unit.

2 Product description

2.1 Design and components

2.1.1 Top of unit



1 Solar - flow (1" IG)
2 Cold water flow (1" AG)
3 Hot water flow (1" AG)
4 Heating flow (1" AG)*
5 Heating return (1" AG)*
6 Circulation pump
7 Safety-pressure relief valve (heating circuit)
8 Automatic vent
17 Fill level indicator (tank water)
18 Daikin connection for electrical backup heater (R 1½" IG) (Accessory)
30 Plate heat exchanger (PWT)
31 Connection coolant fluid line
Daikin Altherma EHS(X/H) 04P30A/08PxxA: Cu Ø 6.4 mm (1/4"),
Daikin Altherma EHS(X/H) 16P50A: Cu Ø 9.5 mm (3/8")
32 Connection to coolant gas line
Cu Ø 15,9 mm (5/8")
34 Ball cock (heating circuit)
35 Combined filling and draining valve (heating circuit)
37 Storage tank temperature sensor t_{DHW1} and t_{DHW2}
38 Connection diaphragm expansion vessel
39 Controller housing with elect. terminal strip

3UVB1
3-way diverter valve (internal heat generator circuit)
3UV DHW
3-way diverter valve (hot water/heating)
DS pressure sensor
FLS (t_{R1} / V1)
Return flow temperature and flow sensor
t_{R2} Return temperature sensor
t_{V1}, t_{V2}
Feed temperature sensors
$t_{V, BH}$
Flow temperature sensor backup heater

Safety devices
Observe tightening torque!
AG Male thread
IG Female thread
* Ball cock (1" IG) is supplied with the equipment

Fig. 2-1 Structure and components Daikin Altherma EHS(X/H) (top of unit)

2.1.2 Device external and internal design Daikin Altherma EHS(X/H)...P30A

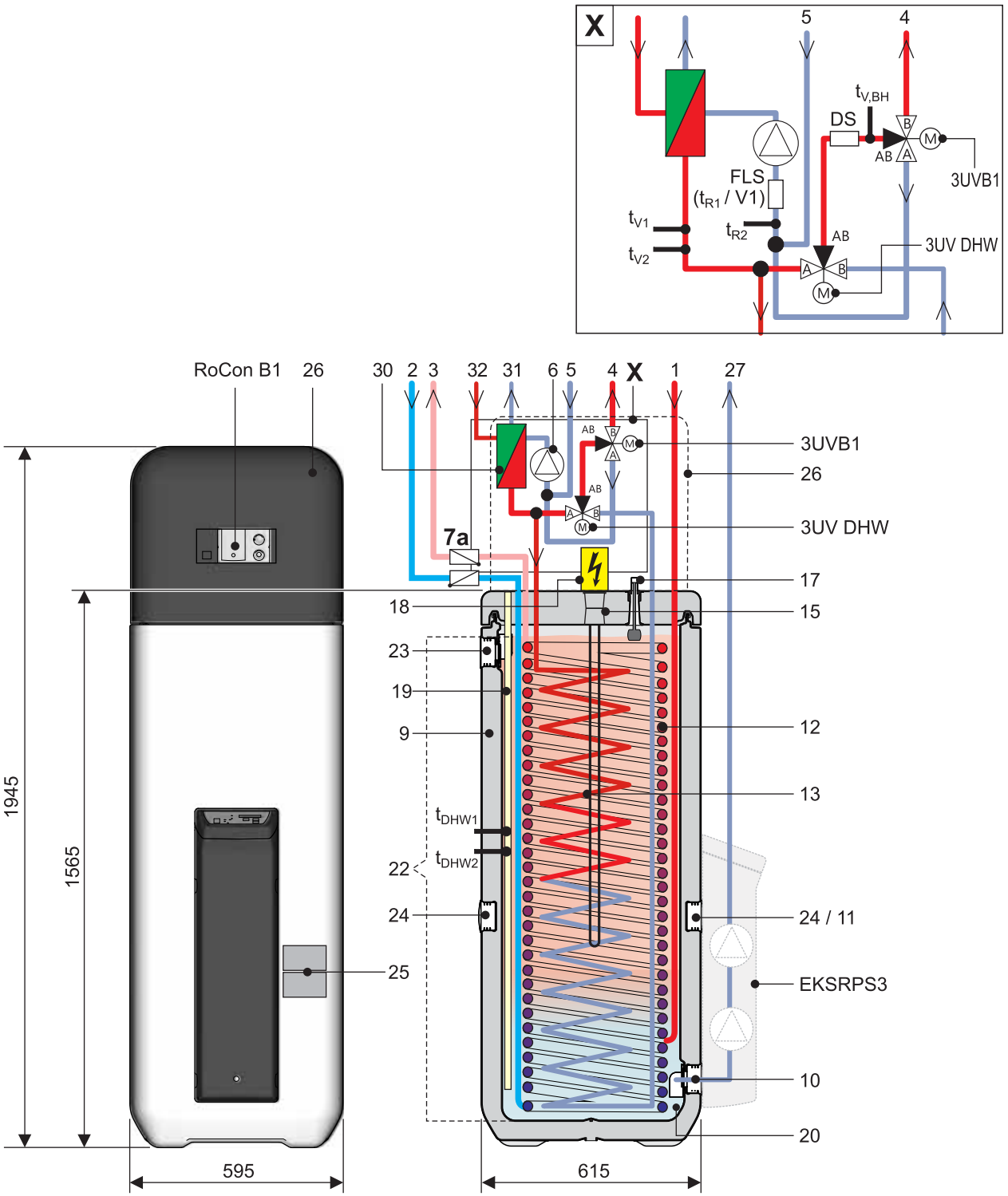


Fig. 2-2 Design and components of the Daikin Altherma EHS(X/H)...P30A (external view and internal design)
For legend descriptions see tab. 2 -1

2.1.3 Device external and internal design Daikin Altherma EHS(X/H)B...P30A

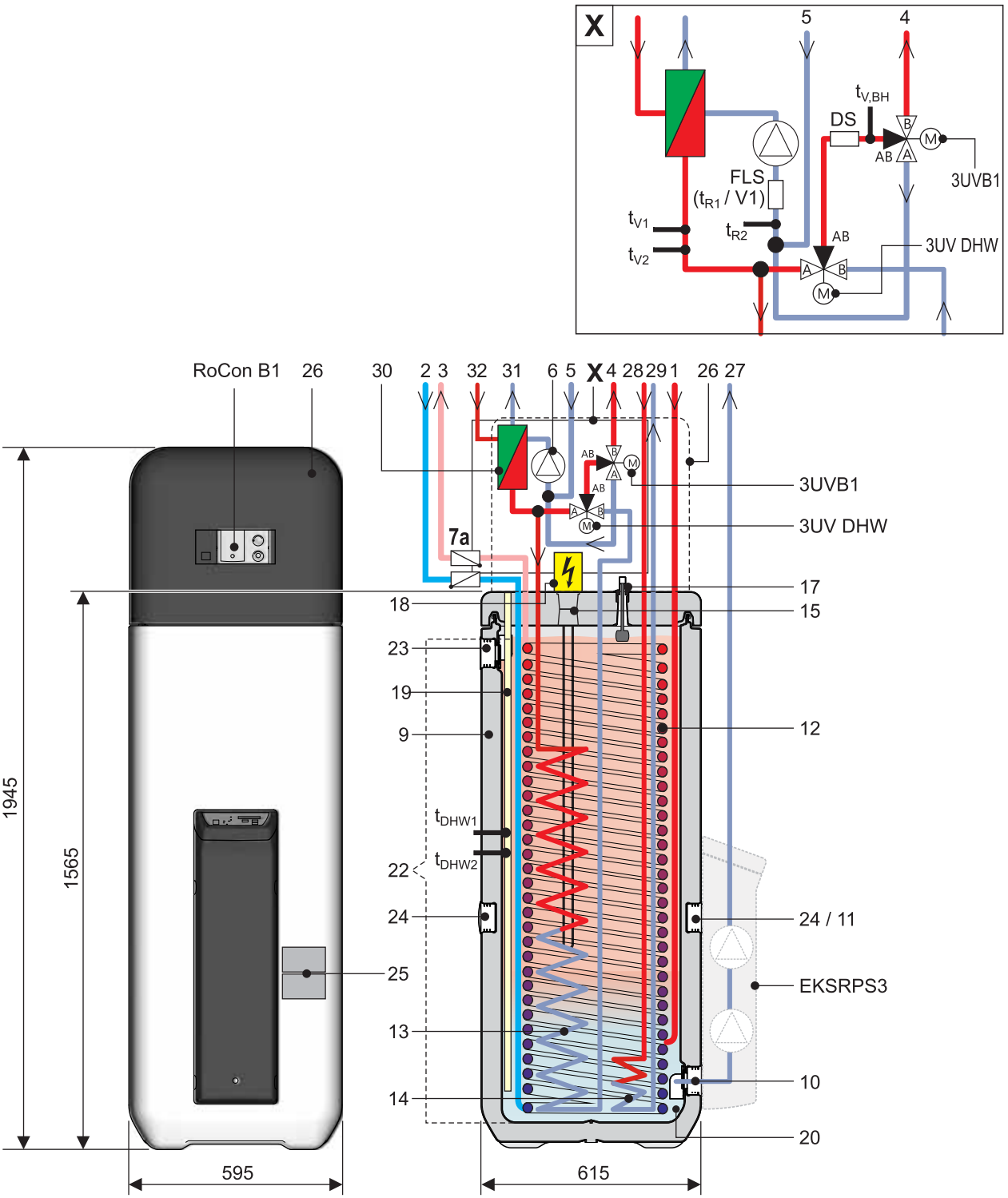


Fig. 2-3 Design and components of the Daikin Altherma EHS(X/H)B...P30A (external view and internal design)
For legend descriptions see tab. 2 -1

2.1.4 Device external and internal design Daikin Altherma EHS(X/H)...P50A

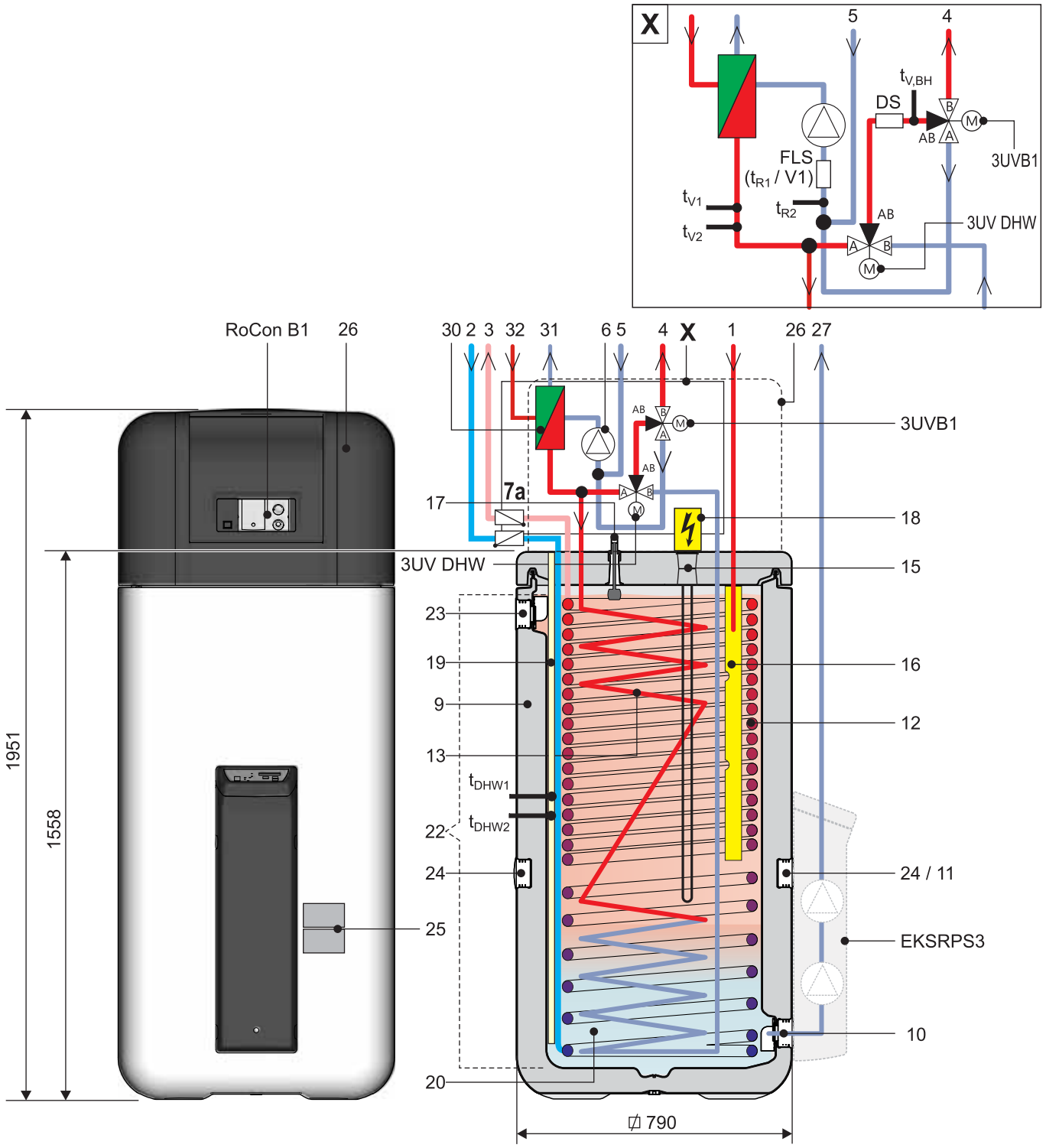


Fig. 2-4 Design and components of the Daikin Altherma EHS(X/H)...P50A (external view and internal design)
For legend descriptions see tab. 2 -1

2.1.5 Device external and internal design Daikin Altherma EHS(X/H)B...P50A

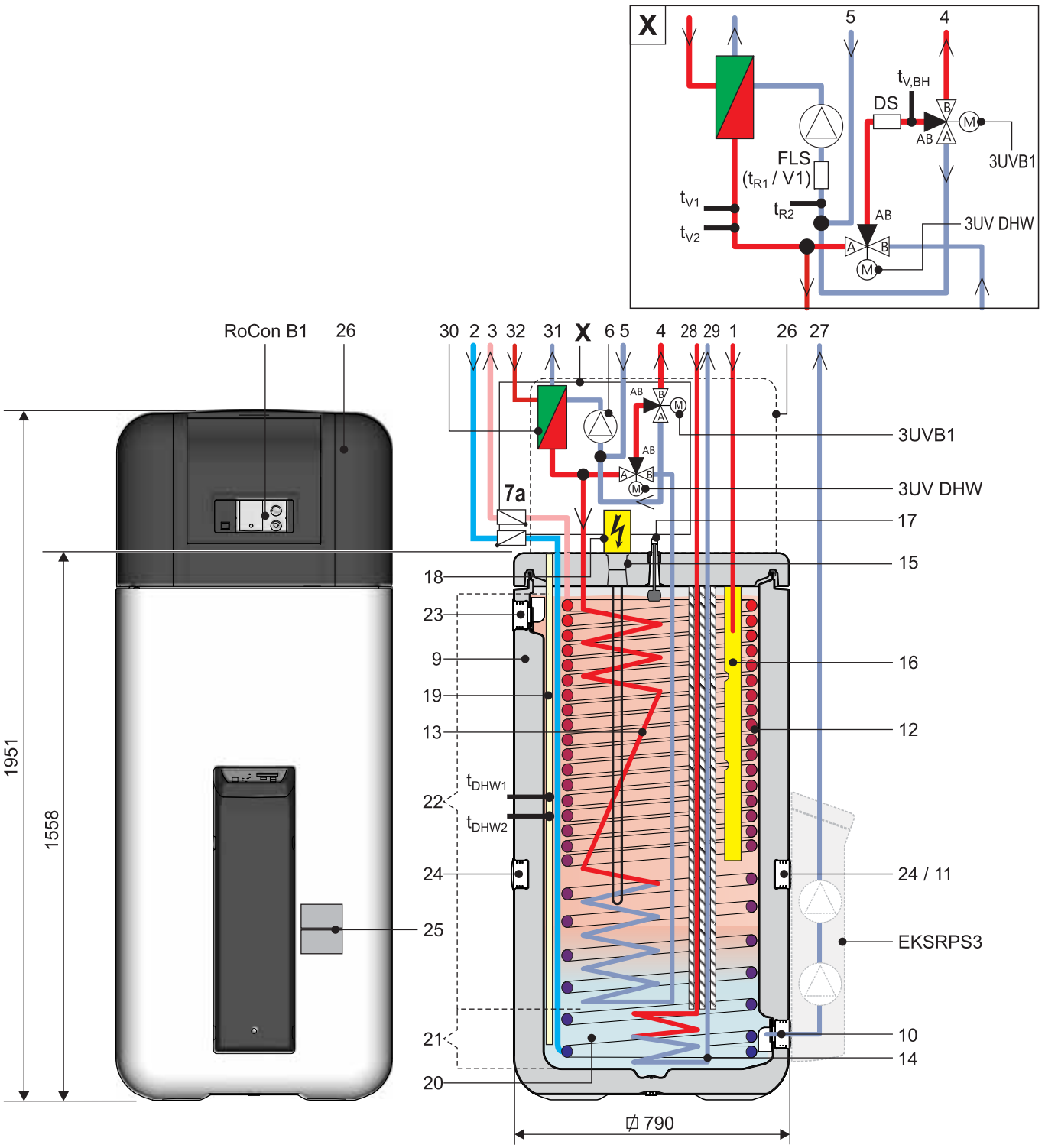


Fig. 2-5 Design and components of the Daikin Altherma EHS(X/H)B...P50A (external view and internal design)
For legend descriptions see tab. 2 -1

1	Solar - flow or connection for additional heat source(1" IG)	19	Submersible sensor sleeve for storage tank temperature sensor t_{DHW1} and t_{DHW2}	DS	Pressure sensor
2	Cold water flow (1" AG)	20	Unpressurised storage tank water	FLS (t_{R1} / V1)	Return flow temperature and flow sensor
3	Hot water flow (1" AG)	21	Solar zone	t_{DHW1}, t_{DHW2}	Storage tank temperature sensor
4	Heating flow (1" AG)*	22	Hot water zone	t_{R2}	Return temperature sensor
5	Heating return (1" AG)*	23	Safety overflow connection	t_{V1}, t_{V2}	Feed temperature sensors
6	Circulation pump	24	Mount for handle	$t_{V, BH}$	Flow temperature sensor backup heater
7a	Recommended accessories: Non-return valves (2 pcs.)	25	Type plate		
9	Storage tank (double walled jacket made of polypropylene with PUR hard foam heat insulation)	26	Protective cover	RoCon B1	Operating section Daikin Altherma EHS(X/H) control unit
10	Filling and drainage connection or Solar - return flow connection	27	Solar - return	EKSRPS3B	Optional: Daikin R3 solar control and pump unit
11	Mount for solar R3 controller or handle	28	Solar - flow (3/4" IG) (only type Daikin Altherma EHS(X/H)B)		
12	Heat exchanger (stainless steel) for drinking water heating	29	Solar - return flow (3/4" IG) (only type Daikin Altherma EHS(X/H)B)		Safety devices
13	Heat exchanger (stainless steel) for storage tank charging or heating support	30	Panel heat exchanger		Observe tightening torque!
14	Heat exchanger (stainless steel) for pressurised solar storage tank charging	31	Liquid-side coolant connection Daikin Altherma EHS(X/H) ...04P30A/08PxxA: Cu Ø 6.4 mm (1/4"), Daikin Altherma EHS(X/H)...16P50A: Cu Ø 9.5 mm (3/8")	AG	Male thread
15	Connection for optional electrical backup heater (R 1½" IG)	32	Connection to coolant gas line Cu Ø 15,9 mm (5/8")	IG	Female thread
16	Solar inflow layering pipe			*	Ball cock (1" IG) is supplied with the equipment
17	Fill level indicator (tank water)	3UVB1	3-way diverter valve (internal heat generator circuit)		
18	Optional: Electrical backup heater (BUxx)	3UV DHW	3 way diverter valve (hot water/heating)		

Tab. 2 -1 Legend from fig 2-2 to fig 2-5

3 Set-up and installation

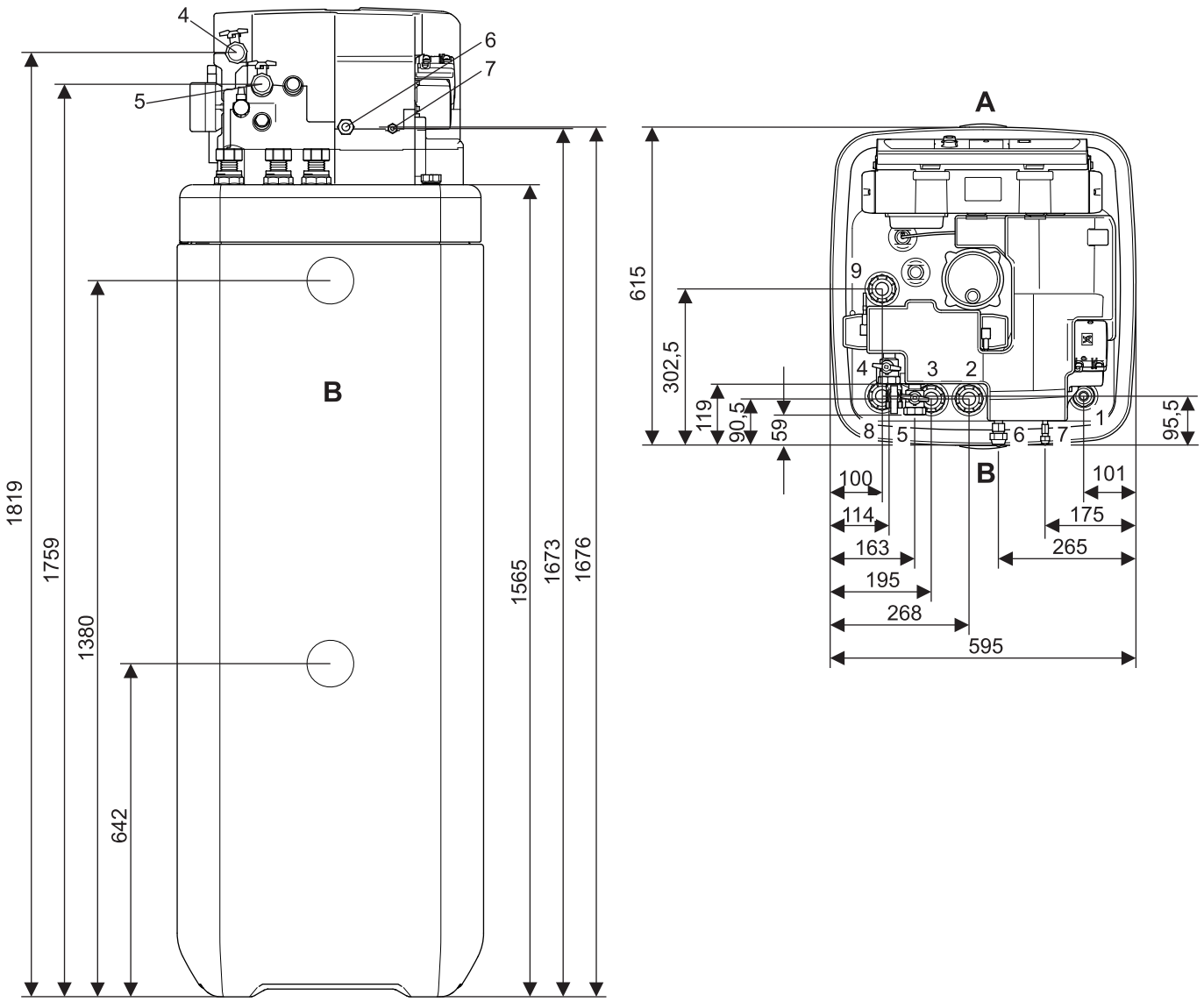
WARNUNG

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

- Work on the Daikin Altherma EHS(X/H) (such as setup, servicing, connection and initial start-up) is only to 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 responsible authorities. 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.

3.1 Dimensions and connections

3.1.1 Daikin Altherma EHS(X/H)...P30A

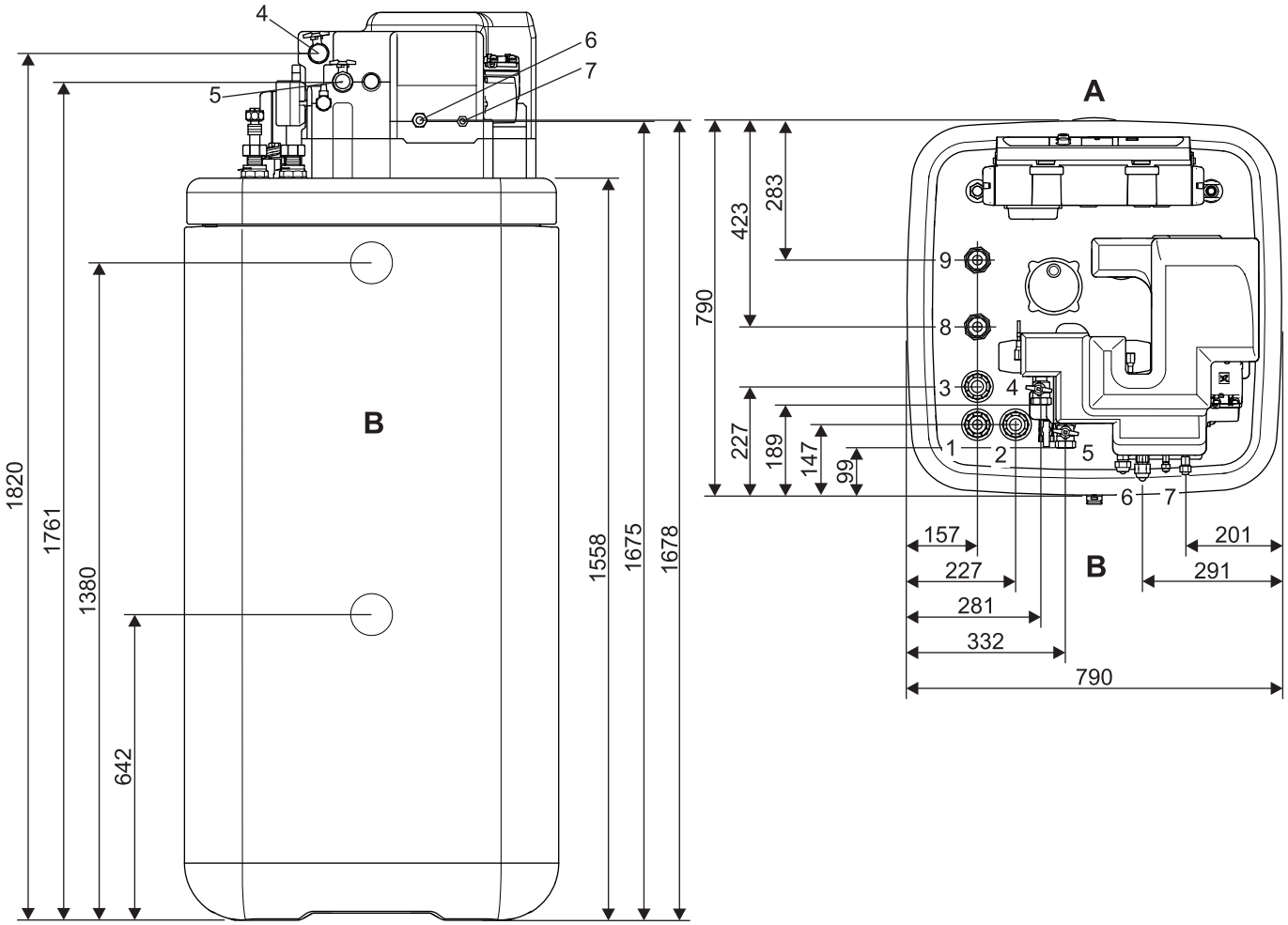


1 Solar - feed
2 Cold water
3 Hot water
4 Heating feed
5 Heating return flow
6 Connection coolant gas line
7 Connection coolant fluid line
8 Solar - feed flow (only Daikin Altherma EHS(X/H)(B) type)
9 Solar - return (only Daikin Altherma EHS(X/H)(B) type)

A Front
B Back

Fig. 3-1 Connections and dimensions Daikin Altherma EHS(X/H)...P30A (general)

3.1.2 Daikin Altherma EHS(X/H)...P50A

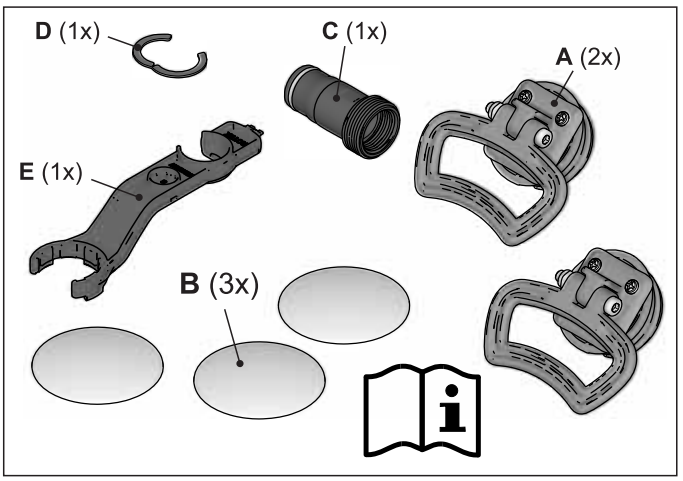


1	*Solar - feed*	*7*	*Connection coolant fluid line*
2	*Cold water*	*8*	*Solar - feed flow (only Daikin Altherma EHS(X/H)B type)*
3	*Hot water*	*9*	*Solar - return (only Daikin Altherma EHS(X/H)B type)*
4	*Heating feed*		
5	*Heating return flow*	*A*	*Front*
6	*Connection coolant gas line*	*B*	*Back*

Fig. 3-2 Connections and dimensions Daikin Altherma EHS(X/H)...P50A (general)

3.1.3 Scope of delivery

– Daikin Altherma EHS(X/H)
– Bag of accessories (see figure 3-3)



A	*Handles (only required for transport)*	*C*	*Connection piece for safety overflow*
B	*Cover screen*	*D*	*Clamping piece*
		E	*Fitting spanner*

Fig. 3-3 Content of bag of accessories

3 Set-up and installation

3.2 Set-up

CAUTION!

- Only erect the Daikin Altherma EHS(X/H) when a sufficient **ground load-bearing capacity**, of **1050 kg/m²** plus safety margin, has been assured. The ground must be flat and level.
- Outdoor installation is not permitted.
- The electronic control system must not be subjected to atmospheric factors under any circumstances.
- The storage tank must **not be** exposed **to continuous direct sunlight**, as the UV radiation and the effects of the weather will damage the plastic.
- The Daikin Altherma EHS(X/H) must be installed in a manner **protected from frost**.
- Make sure that the supply company **does not provide corrosive domestic water**.
  – Suitable water treatment may be required.

WARNING!

The plastic wall of the storage tank on the Daikin Altherma EHS(X/H) may melt due to the effects of external heat (>80°C) and, in the extreme case, can catch fire.

- Erect the Daikin Altherma EHS(X/H) only at a minimum distance of 1 m to other heat sources (>80°C) (e.g. electric heater, gas heater, chimney) and flammable materials.

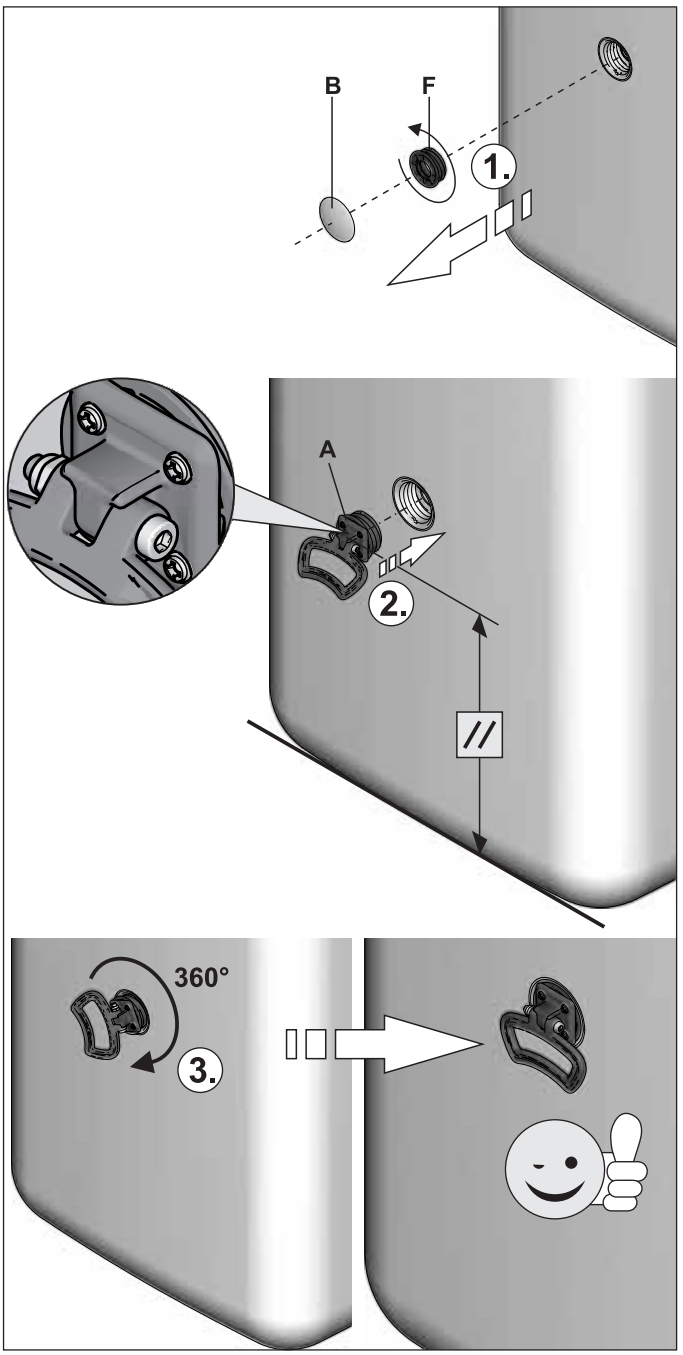
CAUTION!

p=0

If the Daikin **Altherma EHS(X/H)** is not erected with **sufficient** distance **beneath** the solar flat collectors (top edge of storage tank is higher than the lower edge of the solar panel), the unpressurised solar system in the outdoor area will be unable to drain completely.

- Erect the Daikin Altherma EHS(X/H) with a DrainBack solar connection at a sufficient depth to the flat solar panels (observe the minimum gradient in the solar connecting lines).

- Remove packing and dispose of it in an environment-friendly manner.
- Remove the cover plates on the storage tank (figure 3-4, item B) and unscrew the threaded pieces (figure 3-4, item F) from the apertures on which the handles are to be mounted (figure 2-2 to figure 2-5, item 24).
- Screw handles (figure 3-4, item A) into the threaded holes that are now free.



A Handle
B Cover screen
F Threaded piece

Fig. 3-4 Attach handles

- Install the Daikin Altherma EHS(X/H) at the installation site.
  – Recommended clearances (figure 3-5):
  From the wall (s1): ≥200 mm.
  From the ceiling (X): ≥1200 mm.
  – Carefully transport the Daikin Altherma EHS(X/H), use the handles.
  – When setting up the unit in a cabinet, behind panels or in other restricted conditions, sufficient ventilation (e.g., using ventilation gratings) must be ensured.
- If necessary, install the optional backup heater (EKBUxx) into the Daikin Altherma EHS(X/H) (figure 3-5).
  Observe the assembly and operating manual supplied with the accessory (for tightening torque see chapter 9.3).

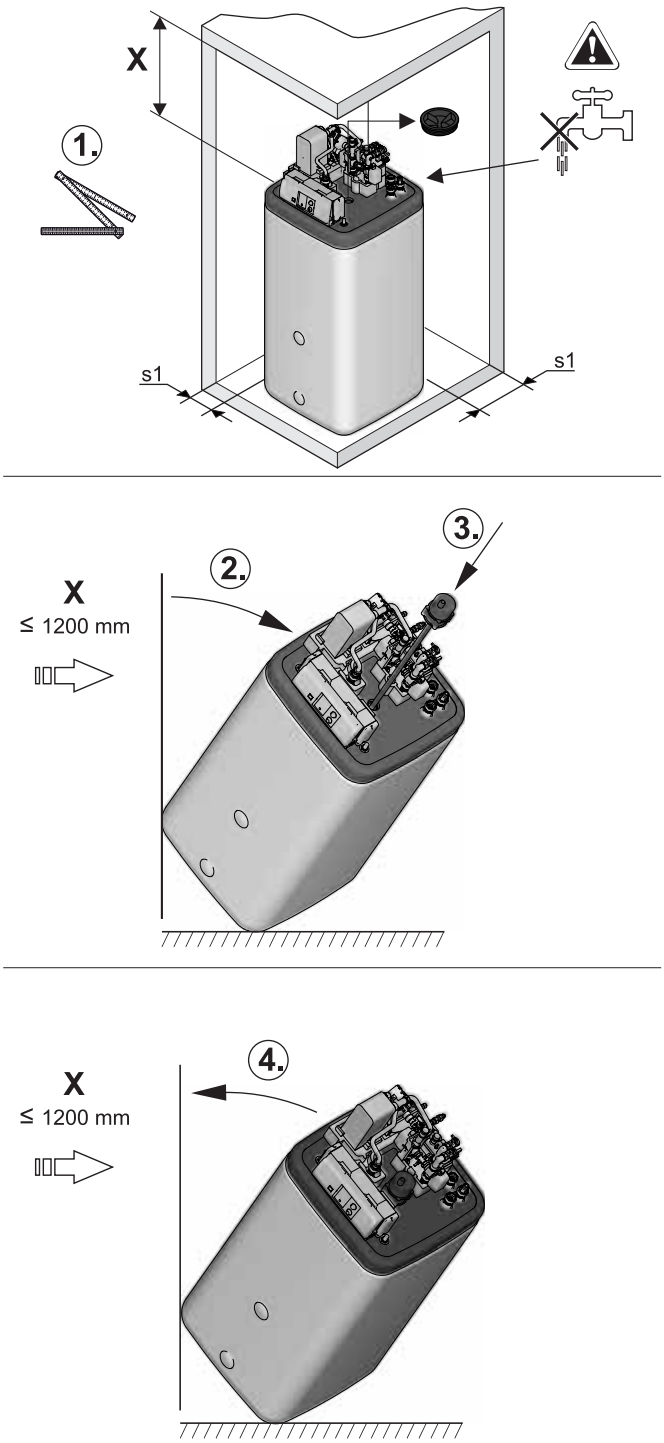


Fig. 3-5 Installation (shown using a Daikin Altherma EHS(X/H)...P50A with integration of the optional back-up heater)

3.3 Water connection

CAUTION:

If the Daikin Altherma EHS(X/H) is connected to a heating system with **steel pipes**, **radiators** or non-diffusion-proof floor heating pipes, slurry and swarf could enter the hot water storage tank and cause **blockages**, local **overheating** or **corrosion**.

- Flush the feed pipes before filling the heat exchanger.
- Rinse out the heat distribution network (in the existing heating system).
- Install the dirt filter or sludge separator into the heating return flow (see chapter 1.5.5).

CAUTION:

If the Daikin Altherma EHS(X/H) is connected to a cold water line, where **steel pipes** are used, chips can enter the special 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 contamination filter in the cold water feed (see chapter 1.5.5).

ONLY DAIKIN ALTHERMA EHS(X/H)B

CAUTION:

If the **heat exchanger** for charging the **pressurised solar** system (figure 3-1/figure 3-2, item 8+9) has an **external heating unit** (e.g. wood-burning boiler) connected to it, an excessive flow temperature at these connections can damage or destroy the Daikin Altherma EHS(X/H)B.

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

In accordance with EN 12828 you must install a safety valve at or in the immediate vicinity of the heat exchanger, with which you can limit the maximum permissible operating pressure in the heating system.. There should be no hydraulic blocking elements between the heat generator and the safety valve.

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

A diaphragm expansion vessel of adequate dimensions and pre-set for the heating system must be connected to the Daikin Altherma EHS(X/H). There should be no hydraulic blocking elements between the heat generator and the diaphragm expansion vessel.

Daikin recommends integrating a mechanical manometer for the filling of the heating system.

- For drinking water lines, comply with the EN 806 and DIN 1988 stipulations.
- Install the Daikin Altherma EHS(X/H) near to the removal point to dispense with the need for a circulation line. If a circulation line is absolutely essential, it must be installed in accordance with the schematics in chapter 8 "Hydraulic

system connection".

3.3.1 Connecting hydraulic lines

Requirement: Optional accessories (e.g. Solar, backup heater) mounted on the Daikin Altherma EHS(X/H) according to the specifications of the instructions included.

- Check cold water pressure (maximum 6 bar).
  - At higher pressure in the drinking water line, a pressure reducer must be installed.
- Establish hydraulic connections at the Daikin Altherma EHS(X/H).
  - Position of the heating connections figure 3-1 / figure 3-2, Dimensions to be taken from tab. 2 -1.
  - Pay attention to the stipulated tightening torque (see chapter 9.3 "Tightening torque").
  - Design the lines as such that the sound attenuation cowl can be applied without any problem following assembly.
  - Connect the water for filling or refilling the heating system as specified by EN 1717 to avoid contamination of drinking water by backwash.
- Connect the blow-off line to the safety over-pressure valve and diaphragm expansion vessel in accordance with EN 12828.
- Carefully insulate pipe lines against heat loss and so as to avoid the formation of condensation (insulation thickness at least 20 mm).

– **Water shortage protection:** The pressure and temperature monitoring of the control unit safely switches off the Daikin Altherma EHS(X/H) in the event of a water shortage. No additional water shortage protection is needed in the construction.

– **Avoid damages caused by deposits and corrosion:** Observe the relevant regulations of technology to prevent creation of corrosion products and deposits.
Minimum requirements regarding the quality of filling and supplementary water:
  - Water hardness (calcium and magnesium, calculated as calcium carbonate): ≤3 mmol/l
  - Conductivity: ≤2700 µS/cm
  - Chloride: ≤250 mg/l
  - Sulphate: ≤250 mg/l
  - pH value (heating water): 6,5 - 8,5

In the case of filling and top-up water with a high overall hardness or other properties that deviate from the minimum requirements, measures for the desalination, softening, hardness stabilisation or other suitable conditioning measures are required to maintain the required water quality.

WARNING!

There is a danger of scalding at hot water temperatures over 60 °C. This is possible, when solar energy is used, with a connected external heating device, when the Legionella protection is activated or when the domestic hot water target temperature is set higher than 60 °C. Only drain the storage tank container or heating system

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

- Connect the drain hose to the connection piece for the safety overflow (figure 2-2 to figure 2-5, item 23).
  - Use transparent drain hose (draining water must be visible).
  - Connect the drain hose to an adequately dimensioned waste water installation.
  - Drain should not be lockable.

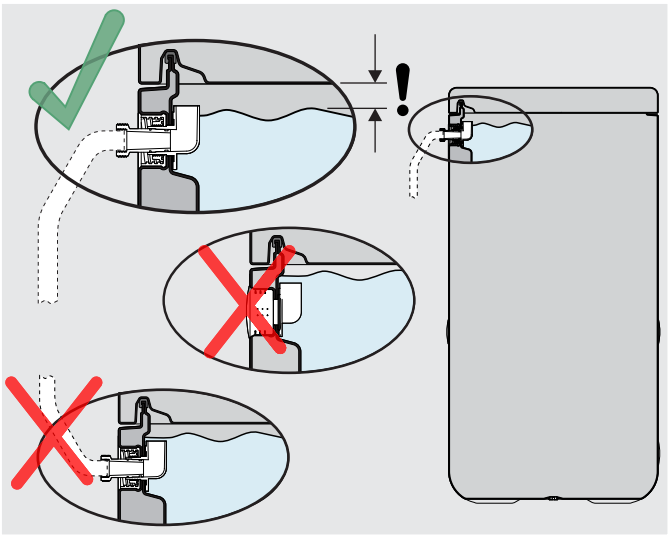


Fig. 3-6 Installation of drain hose at safety overflow

3.4 Electrical connection

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 of the systems circuits **from the power supply** (switch off main switch, disconnect fuse) and secure against unintentional restart.
- The electrical connection and working 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.
- The **equipment covers and maintenance opening covers** must be **re-fitted** immediately after completion of the work.

CAUTION:

Increased temperatures may arise **in the control housing of the** Daikin **Altherma EHS(X/H)** during operation. This can result in **currently-carrying wires** from reaching higher temperatures during operation due to self-heating. For this reason, these lines must have a **temperature for continuous use of 90 °C**.

- For the following connections, use only cables with a long-term use temperature ≥90 °C:
  - Exterior heat pump unit
  - Optional: Electrical backup heater (EKBUxx)

3.4.1 Overall connection plan Daikin Altherma EHS(X/H)

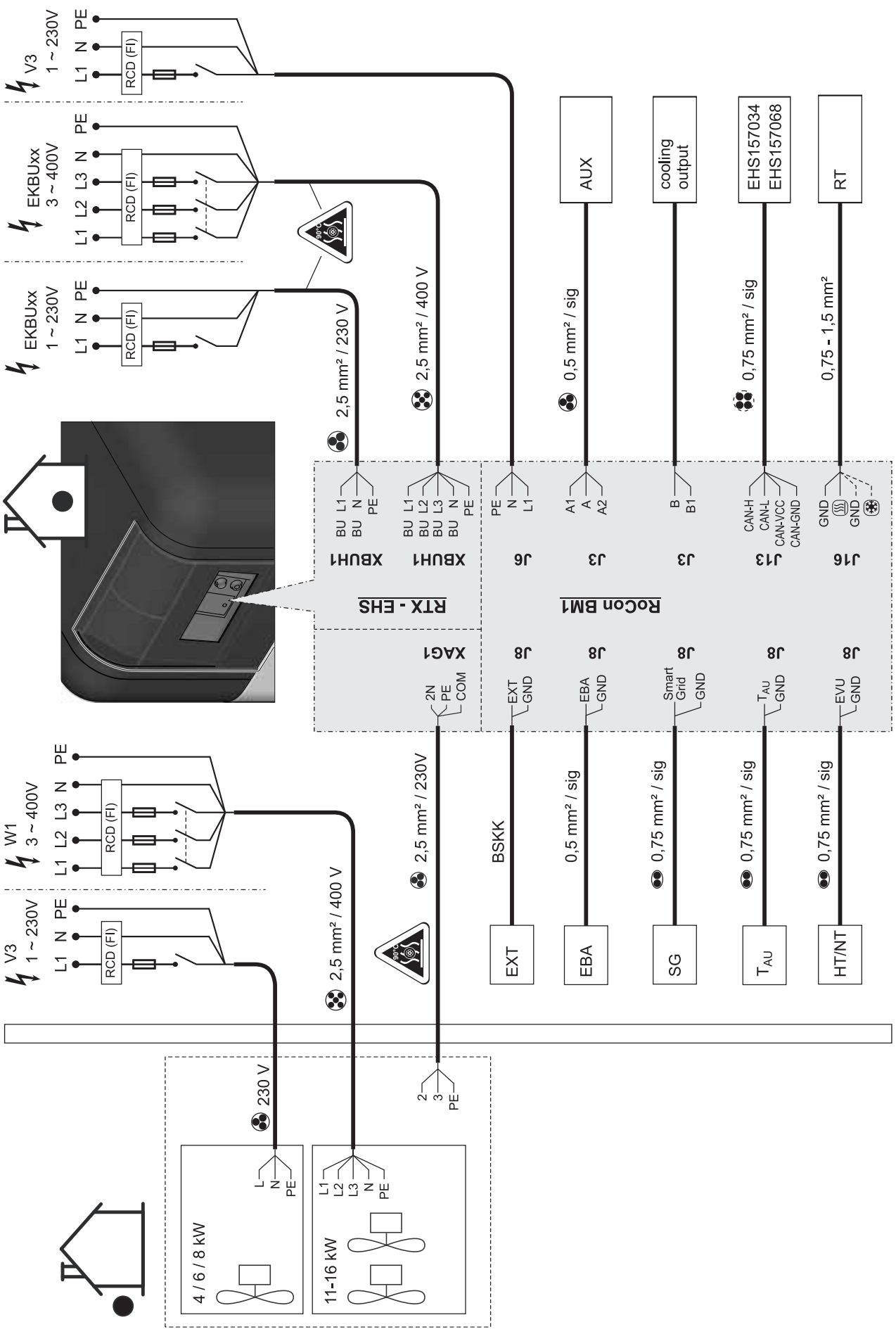
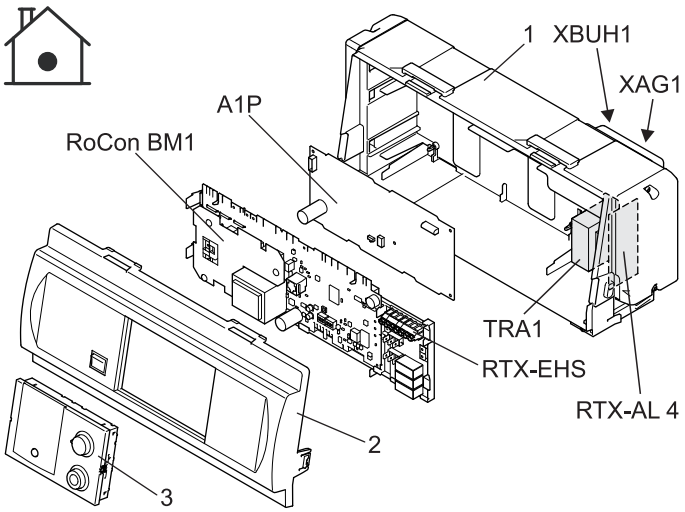


Fig. 3-7 Overall connection diagram - for electrical connection during device installation

3.4.2 Position of the circuit boards



1	*Control housing*	*For further legend descriptions see tab. 3 -3*
2	*Control panel*	
3	*Control unit for the control*	

Fig. 3-8 Overview circuit boards (internal housing)

3.4.3 Connection assignment, circuit board A1P

The A1P circuit board comes pre-connected to the unit. No assembly or connection work is necessary on the A1P circuit board!

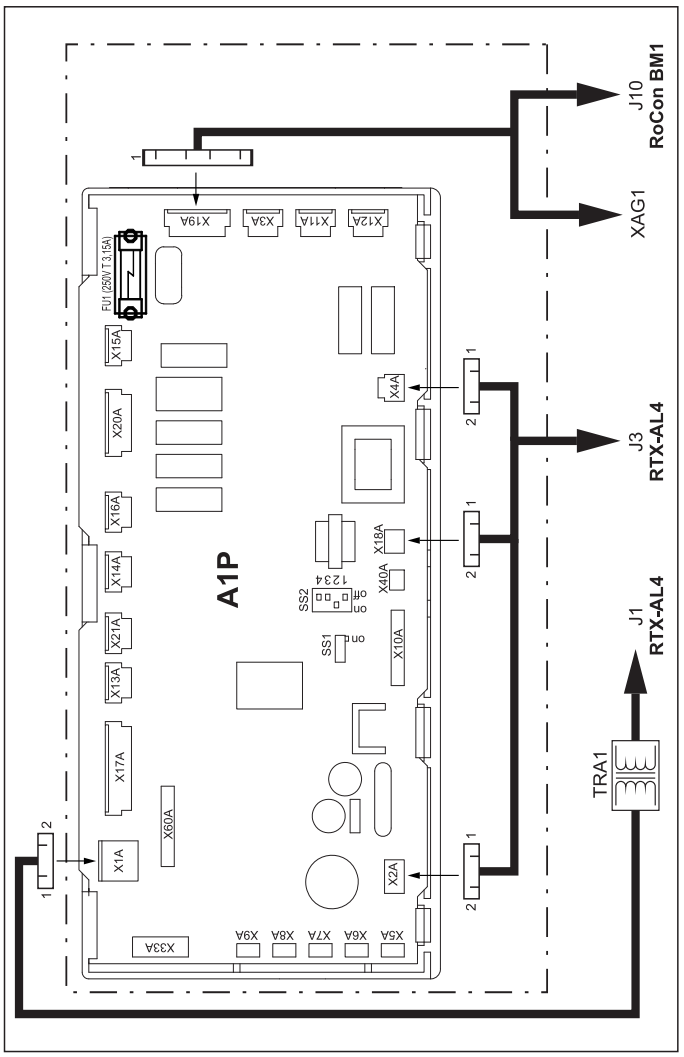


Fig. 3-9 Circuit board A1P (basic control of the heat pump)

3.4.4 Terminal assignment for the RTX-AL4 circuit board

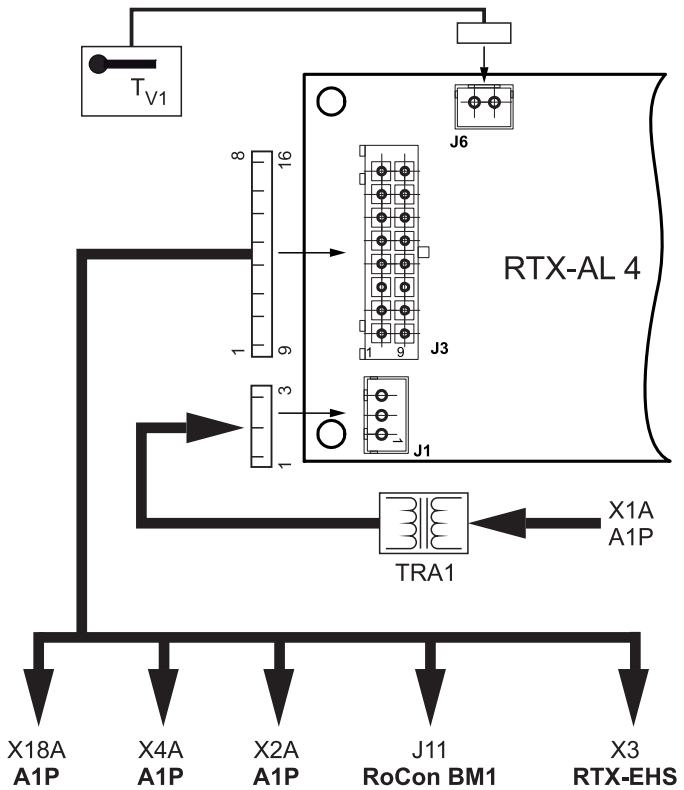


Fig. 3-10 Circuit board RTX-AL4 (interface)

3.4.5 Terminal assignment for the RTX-EHS circuit board

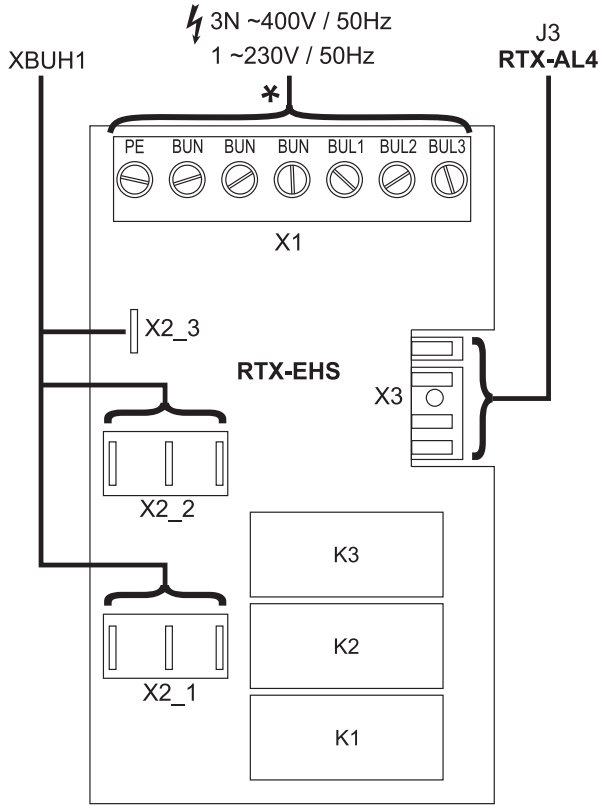


Fig. 3-11 Circuit board RTX-EHS (backup heater)

3.4.6 Connection assignment, circuit board RoCon BM1

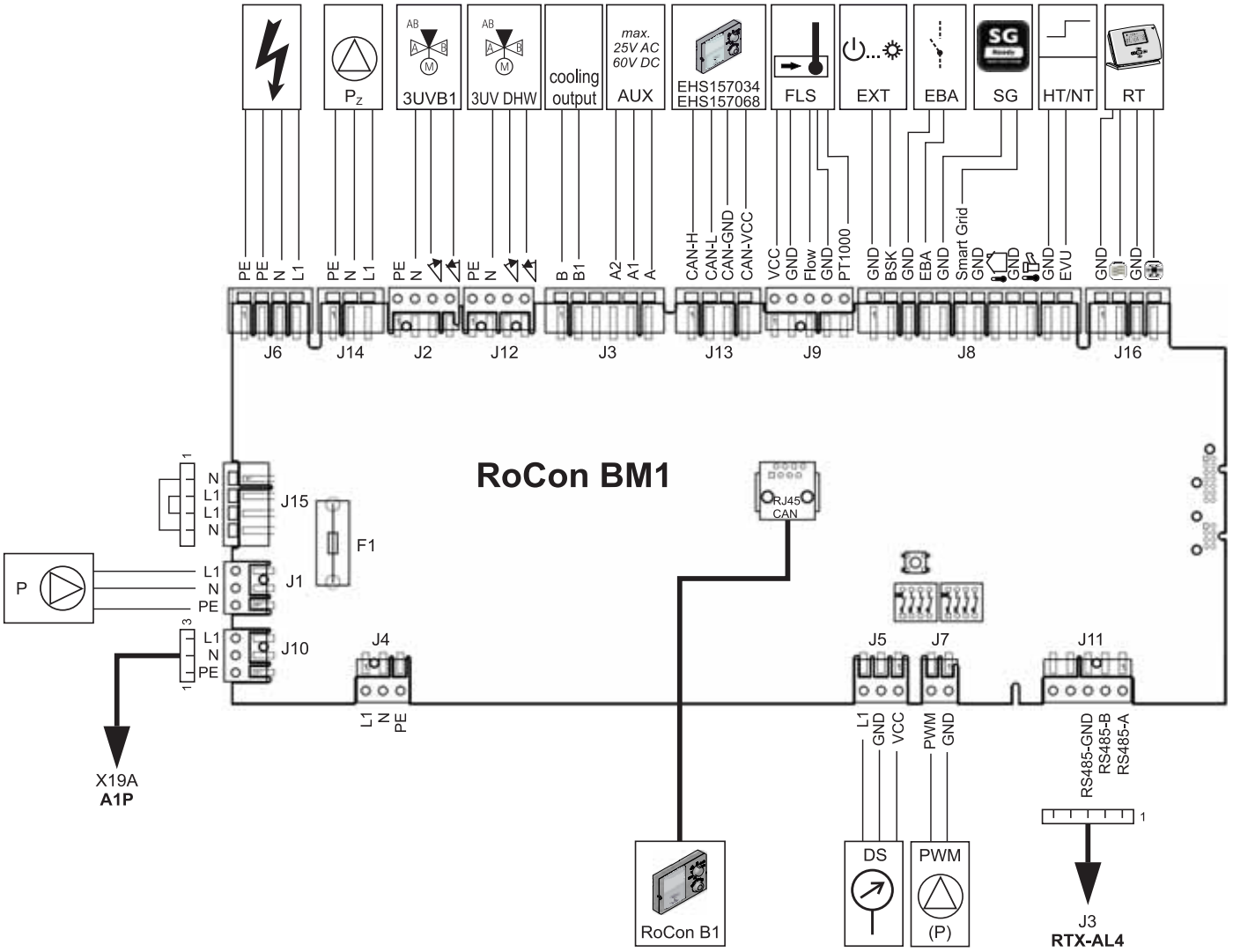


Fig. 3-12 Circuit board RoCon BM1 (Basic control module)

Mains supply 230 V, 50 Hz
(Connection plan in this instruction manual)

3.4.7 Mains connection Daikin Altherma EHS(X/H)

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

- Check the supply voltage (~230 V, 50 Hz).
- Disconnect the junction box of the domestic installation.
- Connect the cable for the mains connection on the Daikin Altherma EHS(X/H) to the junction box of the domestic installation via an all-pole disconnecting main switch to be installed by the customer (separate isolator according to EN 60335-1). Ensure that the polarity is correct.

The exterior unit and optional accessories must be connected separately to the regulator on the Daikin Altherma EHS(X/H). To do so, the cover panel of the Daikin Altherma EHS(X/H) must be removed (see section 3.4.8) and, if necessary, the control housing opened (see section 3.4.9).

3.4.8 Removing the protective cover

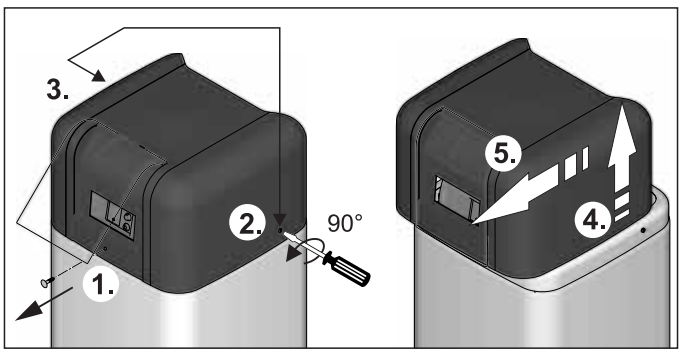


Fig. 3-13 Unscrew/loosen the screws, lift up the cover panel at the back and pull forwards.

3.4.9 Opening the control housing and establishing electrical connections

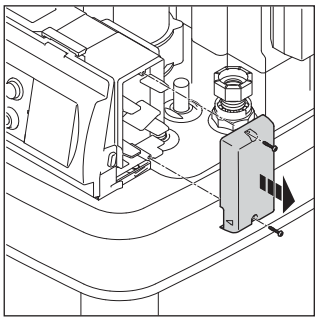


Fig. 3-14 Dismount right housing cover.

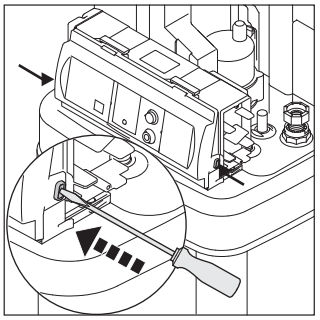


Fig. 3-15 Unlock front panel.

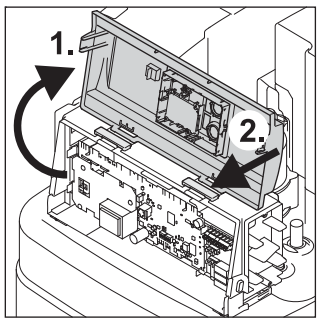


Fig. 3-16 Open front panel and place in assembly position.

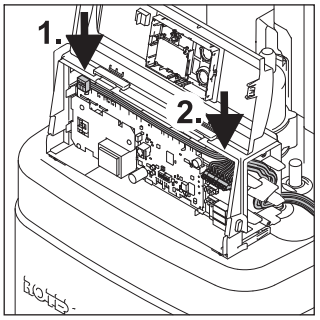


Fig. 3-17 Route cabling into the regulator and make the electrical connections.

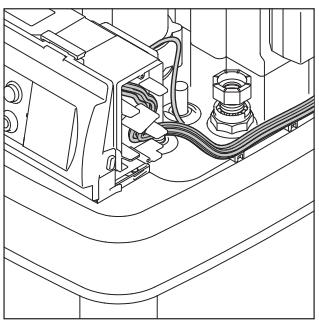


Fig. 3-18 Lay cables in the right housing cover.

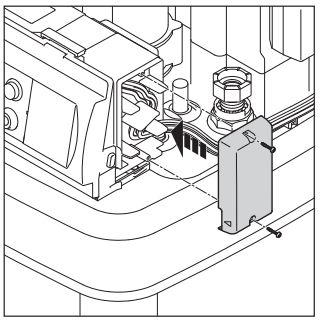
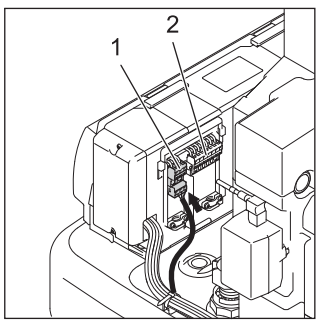


Fig. 3-19 Install the right housing cover.



1 XAG1 Terminal block for exterior unit
2 XBUH1 Terminal block for backup heater

Fig. 3-20 Make the electrical connections to the rear of the housing (see section 3.4.1).

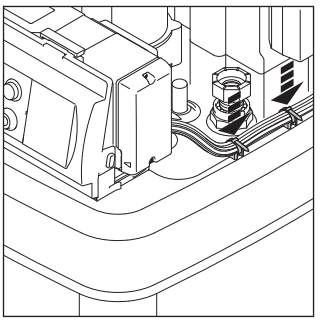


Fig. 3-21 Fasten cabling on the storage container.

3.4.10 Connection of ERLQ exterior heat pump unit

This component has a separate manual attached, including among other things instructions for installation and operation.

- Dismount the protective cover (see section 3.4.8).
- Connect the exterior heat pump unit to the terminal strip XAG1 (see figure 3-20, figure 3-22).

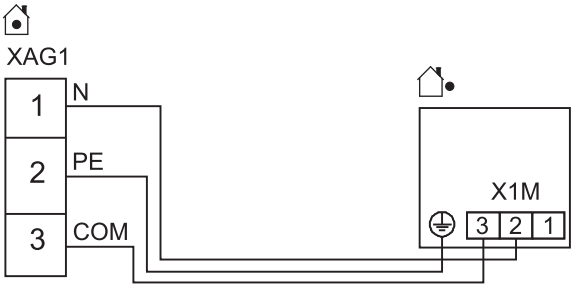


Fig. 3-22 Connection of exterior heat pump unit

When switching off the heat pump exterior unit using a switching system prescribed by the energy supply company (EVU), the internal Daikin Altherma EHS(X/H) device is not disconnected (see section 3.4.21).

3.4.11 Connection of external temperature sensor RoCon OT1

The exterior heat pump unit of the Daikin Altherma EHS(X/H) has a built-in exterior temperature sensor which is used to regulate the inflow temperature depending on the weather, with frost protection function.

Instead of the exterior temperature sensor built into the exterior heat pump unit, the optional exterior temperature sensor RoCon OT1 can also be used to regulate the inflow temperature depending on the weather, with frost protection function.

If the **Daikin Altherma EHS(X/H)** is used in a CAN bus system **as a master** ("terminal function" for the remote control of other data bus devices), the exterior temperature sensor **RoCon OT1 must be connected directly to** the regulator **RoCon HP on the master** and **not to the remote controlled device** (mixer circuit module EHS157068 or a different heat generator).

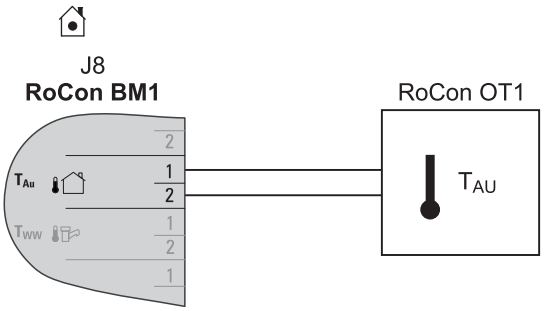


Fig. 3-23 Connection of the exterior temperature sensor RoCon OT1 to the Daikin Altherma EHS(X/H) (operating as a single solution/master in a data bus)

After connecting the exterior temperature sensor RoCon OT1 to the regulator RoCon HP of the Daikin Altherma EHS(X/H), the parameter [Outside Config] must be set to "On".

3.4.12 Connection of an external switching contact

By connecting an external switching contact (figure 3-24) the operating mode of the Daikin Altherma EHS(X/H) can be changed.

The current operating mode can be switched thanks to a changing resistance reading (tab. 3 -1). Changing the operating mode is only effective as long as the external switching contact is closed.

The operating mode has an effect on the direct circuit of the Daikin Altherma EHS(X/H), and on all other heating circuits that can be optionally connected to this device.

The operating mode display on the RoCon HP controller of the Daikin Altherma EHS(X/H) may vary from the operating mode display for the operating mode selection (parameter).

If special functions, such as "Manual Operation" are activated, the input is not evaluated.

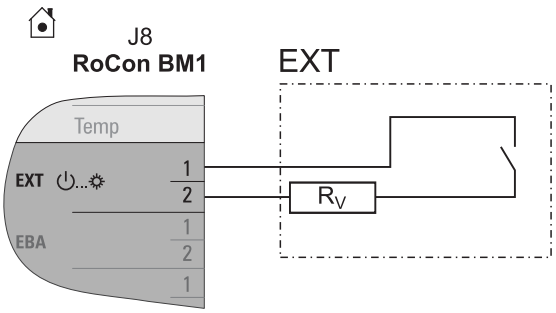


Fig. 3-24 Connection of the *EXT switching contact*

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

Tab. 3 -1 Resistance values for the evaluation of the EXT signal

When the resistance readings are greater than the value for "Automatic 2", the input will be ignored.

NOTE REGARDING THE CONNECTION OF A DAIKIN SOLAR SYSTEM

By means of the function [HZU] integrated into the RoCon HP **[HZU]** control unit (see operating manual for the control unit) it is not necessary to connect the EXT connection with the connection of the burner blocking contact of the Daikin solar system.

3.4.13 External demand signal (EDS)

By connecting the EDS contact to the Daikin Altherma EHS(X/H) (figure 3-25) and through the corresponding parameterisation in its RoCon HP control unit, a heating request can be generated via an external switching contact. If the switching contact is closed, then the Daikin Altherma EHSX switches to Heating mode. The flow temperature is adjusted to the temperature that is set in the parameters [T-Flow Day].

The EDS switching contact has preference of a request via the room thermostat.

In Cooling, Stand-by, Manual and Summer mode, the switching contact is not evaluated. In addition, the heating limits are not taken into consideration.

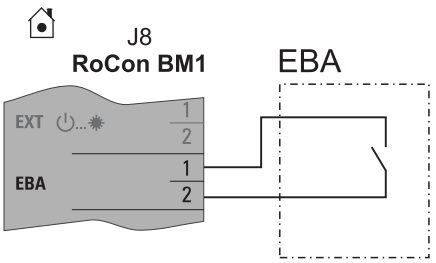


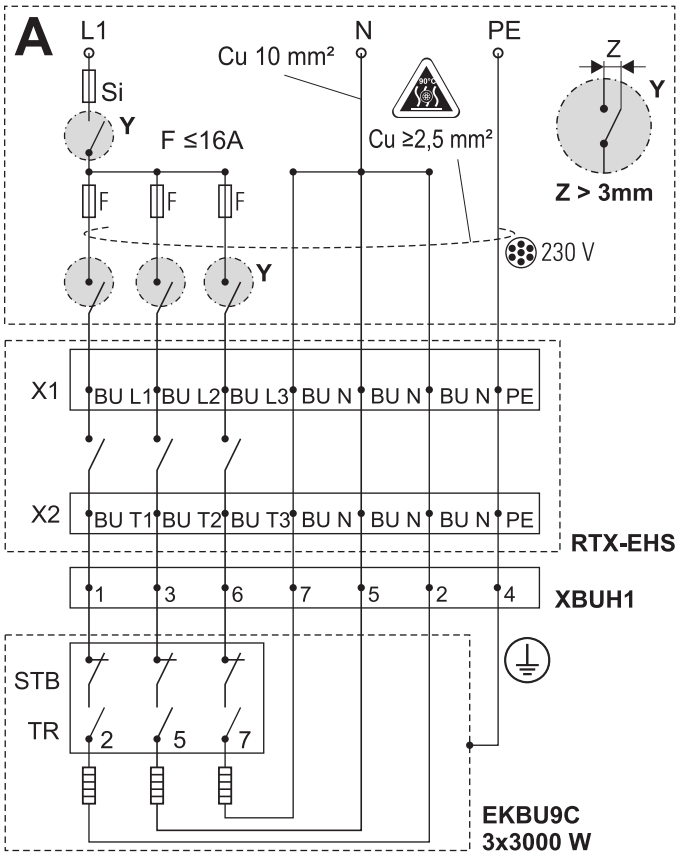
Fig. 3-25 EDS contact connection

3.4.14 Connection of the electrical Daikin backup heater (EKBUxx)

This component has a separate manual attached, including among other things instructions for installation and operation. This also applies for other types of backup heater.

- Connect the backup heater (EKBUxx) to the RTX-EHS terminal block (figure 3-11) of the Daikin Altherma EHS(X/H).

1 ~230V / 50Hz EKBU9C



A Cabling provided by the customer (observe country-specific connection conditions - request from responsible power company (EVU))!
Y Switching contactor
Z Minimum clearance of contact (>3 mm - Over voltage category III)

Fig. 3-26 1-phase connection, backup heater (EKBU9C)

3N ~400V / 50Hz EKBU9C

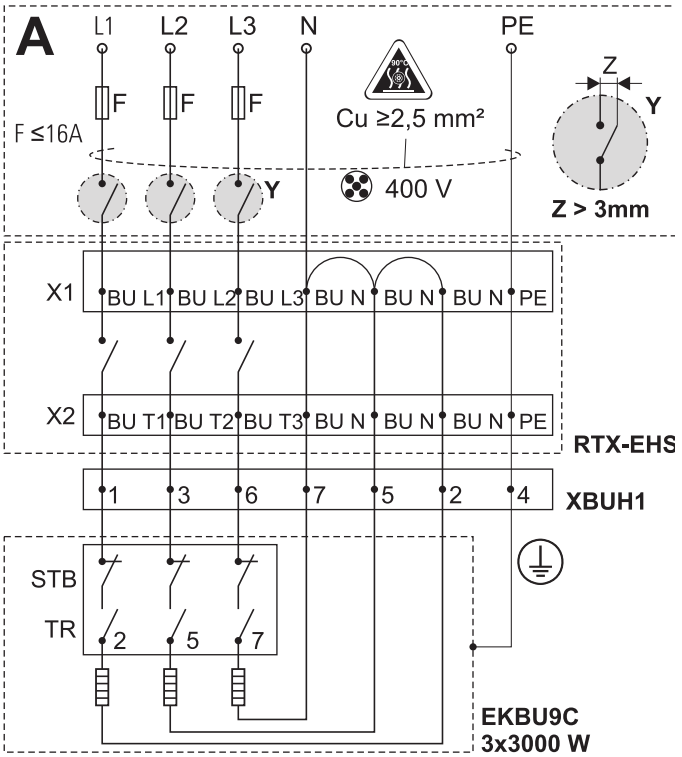


Fig. 3-27 3-phase connection, backup heater (EKBU9C)

3.4.15 Connection of the Daikin room thermostat

This component has a separate manual attached, including among other things instructions for installation and operation.

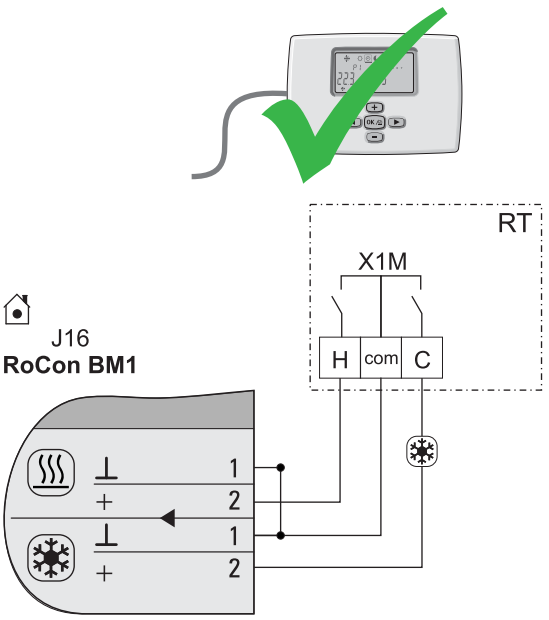


Fig. 3-28 Connection with wired RT - Daikin EKRTW

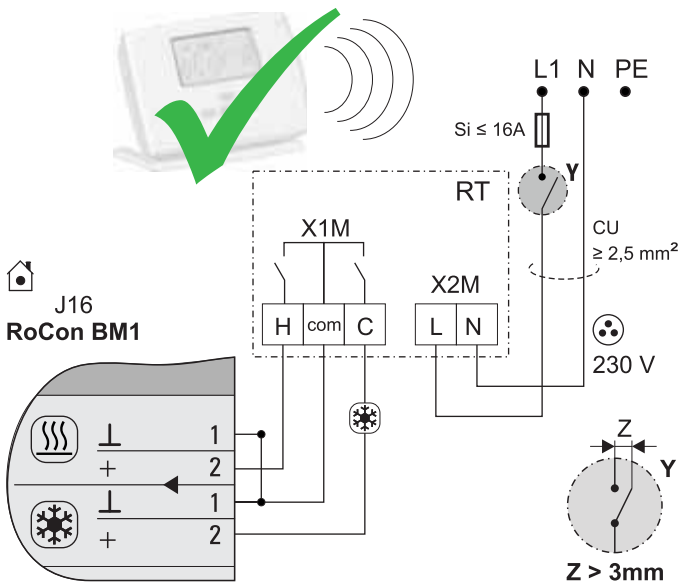


Fig. 3-29 Connection with RT - Daikin EKRTR

3.4.16 Connection of the Daikin room controller EHS157034

For the remote setting of operating modes and room target temperatures from a different room, a separate room controller EHS157034 can be connected for each heating circuit.

This component has a separate manual attached, including among other things instructions for installation and operation.

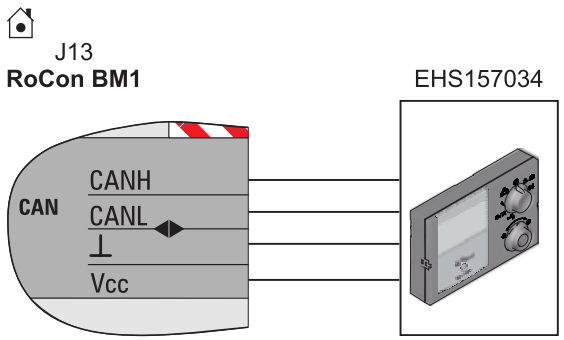


Fig. 3-30 Connection of room controller EHS157034

3.4.17 Connection of Daikin mixer module EHS157068

This component has a separate manual attached, including among other things instructions for installation and operation.

The Daikin Altherma EHS(X/H) can be connected to the EHS157068 mixer module, which is controlled via the RoCon HP electronic controller.

The connection of the CAN data bus lines is identical to the figure 3-30 to connection J13 of the Daikin Altherma EHS(X/H).

3.4.18 Internet gateway Daikin EHS157056

This component has a separate manual attached, including among other things instructions for installation and operation.

The controller can be connected to the internet via the optional EHS157056 gateway. This means that the Daikin Altherma EHS(X/H) can be controlled remotely via mobile phone (using an App).

3.4.19 Connection of the Daikin FWXV(15/20)AVEB

This component has a separate manual attached, including among other things instructions for installation and operation.

– Original Daikin connecting cable (**HPc-VK**)
– Control of the 2-way diverter valve (2UV) for isolating the Daikin FWXV(15/20)AVEB if this device is not required.
– DIP switch setting **SS2-3** on circuit board A1P = **OFF** (see also tab. 7-3, page 50).

Mode (heating/cooling) can only be switched on the Daikin Altherma EHS(X/H).

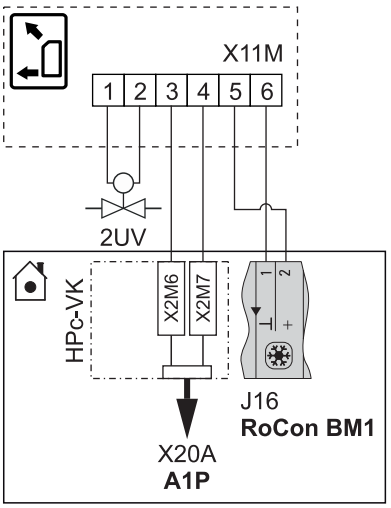


Fig. 3-31 Connecting the Daikin FWXV(15/20)AVEB to the Daikin Altherma EHS(X/H)

3.4.20 Connection of the switching contact (AUX output)

The switching contact (AUX output) can be used for various parameterisable functions.

If the Daikin Altherma EHS(X/H) is in the [Cooling] operating mode, the switching contact B-B1 closes.

The switching contact A-A1-A2 switches as configured in the parameter [AUX Fct] (see operating manual for the control unit).

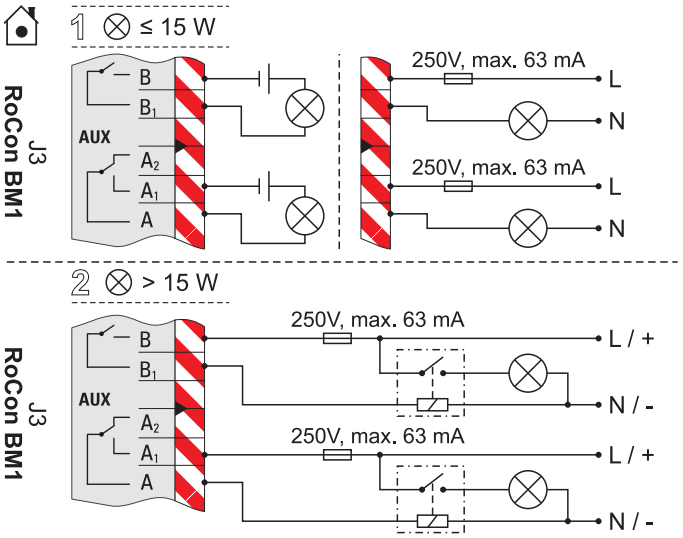


Fig. 3-32 Connection *switching contact (AUX output)*

3.4.21 Low tariff mains connection (HT/NT)

If the outdoor unit is connected to a reduced tariff mains connection, the **voltage-free switching contact S2S** of the receiver, which evaluates the low tariff input signal emitted by the electricity supply company, must be connected to the **plug J8**, switching contact EVU on the **RoCon BM1 circuit board** (see figure 3-33).

When the **parameter [HT/NT Function] >0** is set, certain system components are switched off during peak tariff times (see operating manual of the control unit).

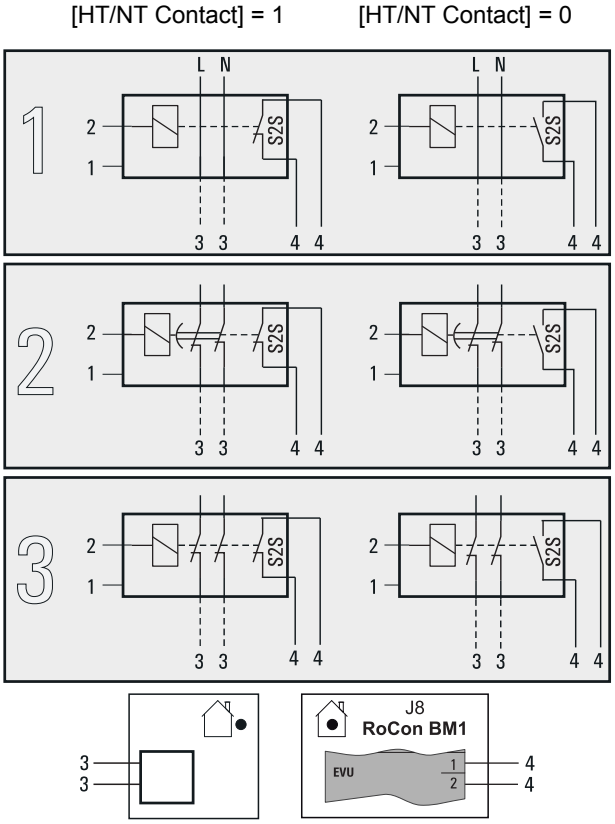
The following types of reduced tariff mains connection are standard:

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

The potential-free switching contact **S2S** can be designed as an **open or closed switching contact**.

a) If it is **designed as an open** switching contact, then the **parameter [HT/NT Contact] = 1** must be set.
If the EVU transmits the reduced tariff signal, switching contact S2S is opened. The system switches to "Mandatory OFF". If the signal is sent again, the potential-free switching contact S2S is closed and the machine resumes operation.

b) If it is **designed as an closed** switching contact, then the **parameter [HT/NT Contact] = 0** must be set.
If the EVU transmits the reduced tariff signal, switching contact S2S is closed. The system switches to "Mandatory OFF". If the signal is sent again, the potential-free switching contact S2S is opened and the machine resumes operation.



1 *Mains connection boxes for reduced-tariff mains connection*
2 *Recipient for evaluation of the HT/NT control signal*
3 *Power supply to heat pump exterior unit (see relevant instruction manual for the heat pump exterior unit)*
4 *Potential-free switching contact for heat pump interior unit*

Fig. 3-33 *Connection HT/NT contact*

3.4.22 Connection intelligent controller (Smart Grid - SG)

Once the function is activated by parameter [SMART GRID] = 1 (see operating manual for the control unit), depending on the signal from the energy supply company, the heat pump is switched to Stand-by, Normal or an operating mode with higher temperatures.

To do so, the **potential-free contacts SG1/SG2** of the intelligent controller must be connected to the **J8 plug**, the Smart Grid switching contact and the EVU switching contact, on the **RoCon BM1 circuit board** (see figure 3-34).

As soon as the Smart Grid function is active, the HT/NT function is deactivated automatically. Depending on the value of the parameter [Mode SG] the heat pump operated in a different manner (see operating manual for the control unit).

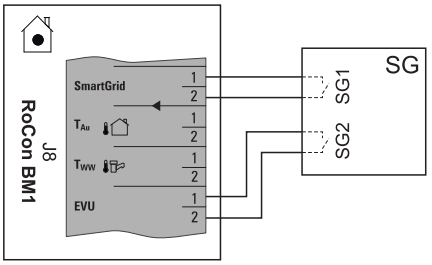


Fig. 3-34 Connection Smart Grid

3.4.23 Symbols and legend keys on connection and circuit diagrams

Symbols	Explanation	Symbols	Explanation
	Safety earthing		External cabling (number of individual cores and the mains voltage are partially quoted.)
	Low external voltage earthing		Push button
	Connection terminal		DIP switch
	Plug connection		Optional component
	Terminal rail		Plug and socket connection
	2-core cabling (non-screened)		3-core cabling (non-screened)
	4-core cabling (non-screened)		5-core cabling (non-screened)
	6-core cabling (non-screened)		Shielded cabling (for example 3-strand)

Tab. 3 -2 Symbol explanations for connection and circuit diagrams

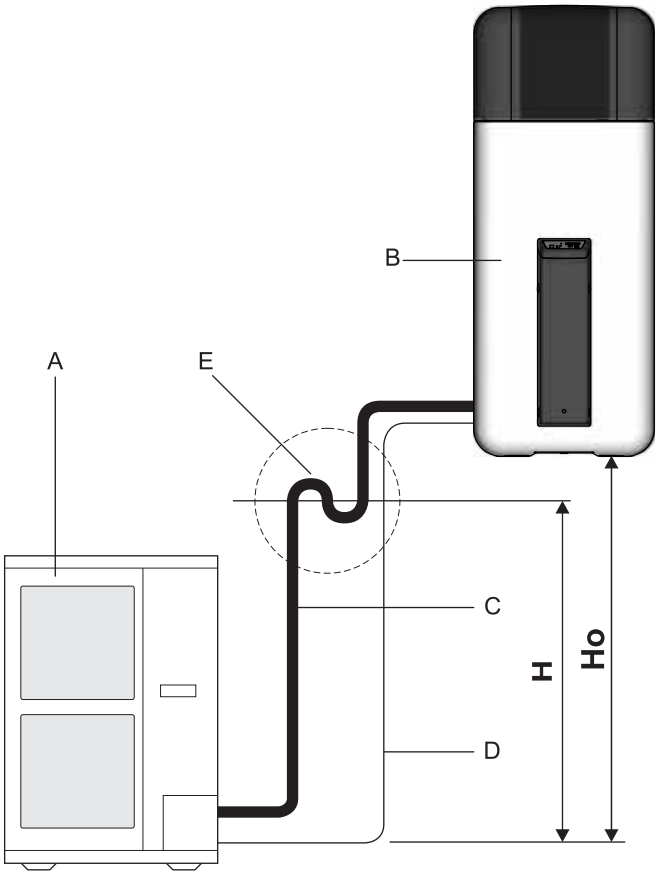
Key names			
Short designation	**Explanation**	**Short designation**	**Explanation**
3UVB1	3-way diverter valve (internal heat generation circuit)	EHS157068	Mixer module
3UV DHW	3 way diverter valve (hot water/heating)	EHS157034	Room controller
A1P	Circuit board (basic control of the heat pump)	RT	Room thermostat (EKRTR/EKRTW)
AUX	Switching contact - Output	RTX-AL4	Switch board (interface)
EKBUxx	Backup heater	RTX-EHS	Switch boarde (Backup heater)
cooling output	Output status for "Cooling" operating mode	ERLQ	External unit for heat pump
DS	Pressure sensor	EHS(X/H)	Heat pump indoor unit
EBA	Switching contact for external demand signal	SG	Switching contact for Smart Grid (intelligent mains connection)
Ext	Switching contact for external operating mode switching	TRA1	Transformer
F1	Fuse 250 V T 2 A (RoCon BM1)	t_{AU}	External temperature sensor (RoCon OT1)
FU1	Fuse 250 V T 3,15 A (A1P)	t_{DHW1}	Storage temperature sensor 1 (RoCon BM1)
FLS	Flow sensor (t_{R1}/ V1)	t_{DHW2}	Storage temperature sensor 2 (A1P)
HT/NT	Switching contact for reduced-tariff mains connection	t_{R1}	Return flow temperature sensor 1 (FLS - RoCon BM1)

Key names					
Short designation		Explanation	Short designation		Explanation
RoCon BM1	J1	Plug connection for heat circulation pump P	t_{R2}		Return flow temperature sensor 2 (A1P)
	J2	Plug connection 3UVB1	t_{V1}		Flow temperature sensor 1 (RTX-AL4)
	J3	Plug connection AUX contact	t_{V2}		Flow temperature sensor 2 (A1P)
	J4	Plug connection - Not occupied	$t_{V, BH}$		Flow temperature sensor backup heater (A1P)
	J5	Plug connection pressure sensor	V1		Flow sensor (FLS - RoCon BM1)
	J6	Plug connection mains voltage	XAG1		Plug connection exterior heat pump unit
	J7	Plug connection PWM - Signal for heat circulation pump P	XBUH1		Plug connection backup heater (EKBUxx)
	J8	Plug connection EXT	A1P	X1A	Plug connection to TRA1
		Plug connection EBA		X2A	Plug connection to J3 from RTX AL4
		Plug connection SmartGrid switching contact EVU		X4A	Plug connection to J3 from RTX-AL4
		Plug connection exterior temperature sensor t_{AU}		X5A	Plug connection flow temperature sensor t_{V2}
		Plug connection storage temperature sensor t_{DHW1} + t_{DHW2}		X6A	Plug connection flow temperature sensor $t_{V, BH}$
		Plug connection HT/NT switching contact EVU		X7A	Plug connection temperature sensor (fluid-side coolant) t_{L2}
	J9	Plug connection FLS (t_{R1}/ V1)		X8A	Plug connection return line temperature sensor t_{R2}
	J10	Plug connection internal cabling (to A1P)		X9A	Plug connection tank temperature sensor t_{DHW2}
	J11	Plug connection internal cabling (to RTX-AL4)		X18A	Plug connection to J3 from RTX-AL4
	J12	Plug connection 3UV DHW		X19A	Plug connection to XAG1 + J10 from RoCon BM1
	J13	Plug connection System-Bus (e.g. room controller)	X2M6		Connecting cable clamp HPc-VK
	J14	Plug connection circulation pump P_Z	X2M7		Connecting cable clamp HPc-VK
	J15	Plug connection internal cabling (strapping plug)	X11M		Terminal block in FWXV(15/20)AVEB
	J16	Plug connection room thermostat (EKRTR/EKRTW)	RTX-EHS	K1	Relay 1 for backup heater
RTX-AL4	J1	Plug connection to TRA1		K2	Relay 2 for backup heater
	J6	Plug connection flow temperature sensor t_{V1}		K3	Relay 3 for backup heater
P		Heat circulation pump (device-internal)		X1	Terminal block for mains connection to backup heater
P_Z		Circulation pump		X2_1	Internal cabling
PWM		Pump connection (PWM signal)		X2_2	
RJ45 CAN		Plug connection (Rocon BM1) internal cabling (to RoCon B1)		X2_3	
RoCon B1		Control unit for the controller		X3	Plug connection internal cabling to J3 (RTX-AL4)
RoCon BM1		Circuit board (basic control model)			

Tab. 3 -3 Key names for connection and circuit diagrams

3.5 Laying coolant lines

- Check whether oil trap arc necessary.
  - Required if Daikin Altherma EHS(X/H) is not installed at ground level with the heat pump exterior unit (figure 3-35, $H_O \geq 10$ m).
  - At least one oil trap arc must be installed every 10 m difference in height (figure 3-35, H = clearance from oil trap arc to oil trap arc).
  - Oil trap arc only required in 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 heat insulation to joins until after start-up (for purposes of leakage search).
- Establish flange connections and connect to the units. (🔧 Pay attention to the tightening torque, see chapter 9.3 "Tightening torque").



A Exterior heat pump unit (ERLQ)
B Daikin Altherma EHS(X/H)
C Gas line
D Liquid line
E Oil trap arc
H Height to 1st oil trap (max. 10 m)
H_O Height difference between heat pump exterior unit and heat pump interior unit.

Fig. 3-35 Oil trap arc coolant line

3.6 Pressure test and filling the coolant circuit

RISK OF ENVIRONMENTAL DAMAGE!

Important information regarding the coolant used.

The entire heat pump system contains coolant with fluorinated greenhouse gases, which are listed in the Kyoto Protocol and, if released, are harmful to the environment.

Coolant type: R410A
GWP* value: 1975

** GWP = Global Warming Potential*

- Fill in the total coolant filling quantity on the supplied label on the heat pump exterior unit (for information consult the installation instructions for the heat pump exterior unit).
- Never allow coolant to be released into the atmosphere - always suction it off and recycle using a suitable recycling device.

- Perform pressure test with nitrogen.
  – Use nitrogen 4.0 or higher.
  – Maximum 40 bar.
- After leak search is complete, completely drain.
- Vacuum lines.
  – Pressure to be reached 1 mbar absolute.
  – Time: Minimum 1 h
- Check whether additional coolant is needed for primer filling, fill where necessary.
- Open stop valve on exterior unit completely until the stop. Tighten loosely.
- Reassemble valve caps.
- Check whether the storage tank temperature sensors t_{DHW1} and t_{DHW2} are inserted to a depth of 80 cm.

3.7 Filling the system with water

Only fill the Daikin Altherma EHS(X/H) following the sequence stated below and once all installation work is complete.

3.7.1 Checking the water quality and adjusting the pressure gauge

- Observe the information on the water connection and water quality in accordance with section 3.3.

The correct minimum pressure marking must be set on the pressure gauge installed by the customer before filling the system for the first time:

- Rotate the pressure gauge glass in such a way that the minimum pressure mark corresponds to the **system height +2 m** (1 m water column = 0.1 bar).

3.7.2 Filling the hot water heat exchanger

- Open the shutoff valve for the cold water supply pipe.
- Open the hot water tap connections so that the draw-off volume can be set as high as possible.
- Once water has been discharged from the tap connections, do not interrupt the cold water flow; this will ensure that the heat exchanger will be fully vented and that any impurities or residue will be discharged.

3.7.3 Filling the storage tank

See chapter 6.4.

3.7.4 Filling the heating system

See chapter 6.5.

4 Start-up

WARNING!

A Daikin Altherma EHS(X/H) that is installed or started incorrectly may not operate properly and is dangerous for the health and safety of individuals.

- The Daikin Altherma EHS(X/H) may only be started up by authorised and trained heating experts.

CAUTION!

A Daikin Altherma EHS(X/H) not put into operation properly can lead to damage to property and the environment.

- To prevent corrosion products and deposits, observe the applicable regulations of technology (VDI 2035, BDH/ZVSHK Technical information "Deposit Formation").
  Minimum requirements regarding the quality of filling and supplementary water:
  – Water hardness (calcium and magnesium, calculated as calcium carbonate): ≤3 mmol/l
  – Conductivity: ≤2700 µS/cm
  – Chloride: ≤250 mg/l
  – Sulphate: ≤250 mg/l
  – pH value (heating water): 6.5 - 8.5.
- During system operation, the water pressure at the pressure gauge must be checked at regular intervals. If necessary, readjust by refilling

4.1 Initial start-up

After the Daikin Altherma EHS(X/H) was installed and connected completely, it will need to be undergo a one-time adaptation to the installation environment to be carried out by technical personnel (configuration).

After this configuration is complete, the installation is ready for operation and the operator can make additional custom configurations on it.

The heating specialist must instruct the operator [on using the machine], must prepare the commissioning report, and fill out the operating manual.

The settings of the optional components such the room thermostat or Daikin solar installation must be configured on the respective components themselves.

4.1.1 Requirements

– The Daikin Altherma EHS(X/H) is fully connected.
– The coolant system is dehumidified and filled with the specified amount of coolant.
– The heating system and storage tank container are filled.
– Optional accessories have been mounted on and connected up.
– The control valves of the heating system are open.

4.1.2 Start-up

- Turn power supply to Daikin Altherma EHS(X/H) on.
  ➔ After the start phase, the operating language selector is displayed.
- Use the rotary switch to select the desired language.

The operating language can be changed again at any time.

- Confirm the changes with a brief push of the rotary switch.
  ➔ The Daikin Altherma EHS(X/H) Basic Configuration is loaded.
  ➔ The message "Starting Up" is displayed.
  ➔ The message "Initialization" is displayed.
  ➔ The standard display for the current rotary switch setting is displayed.

4.1.3 Set the commissioning parameters

To set the commissioning parameters, the heating expert must be logged into the controller.

- Technician login

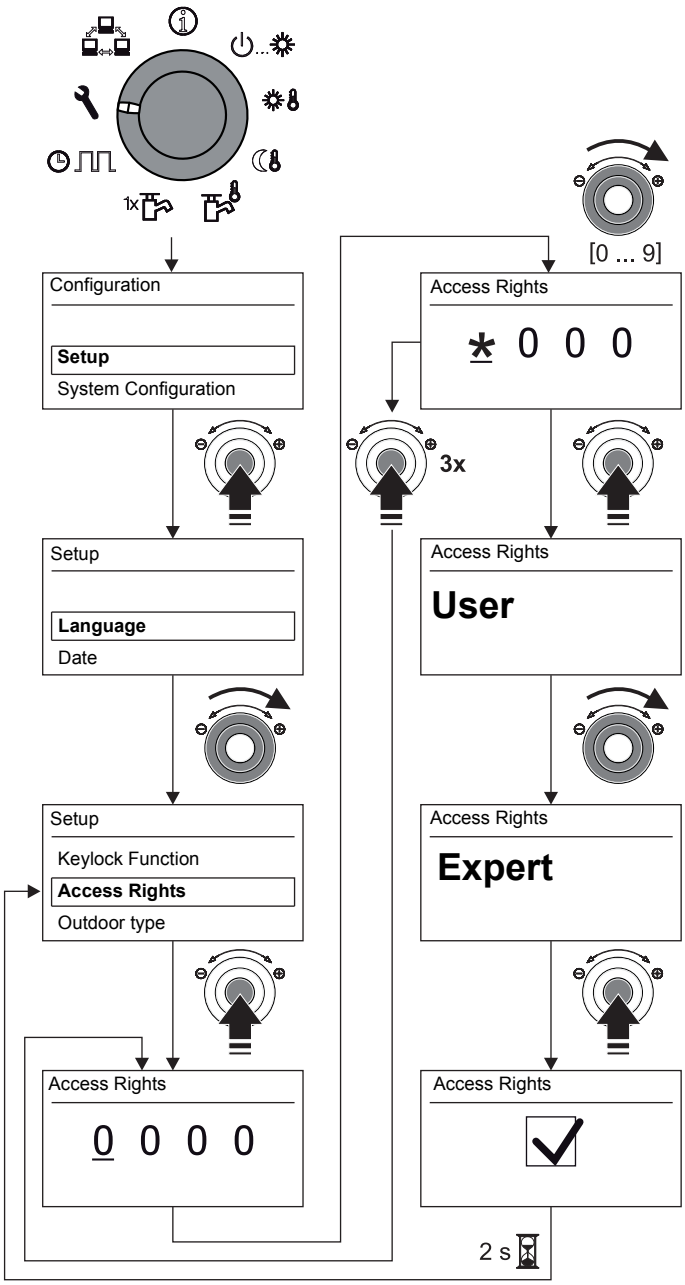


Fig. 4-1 Enter technician code

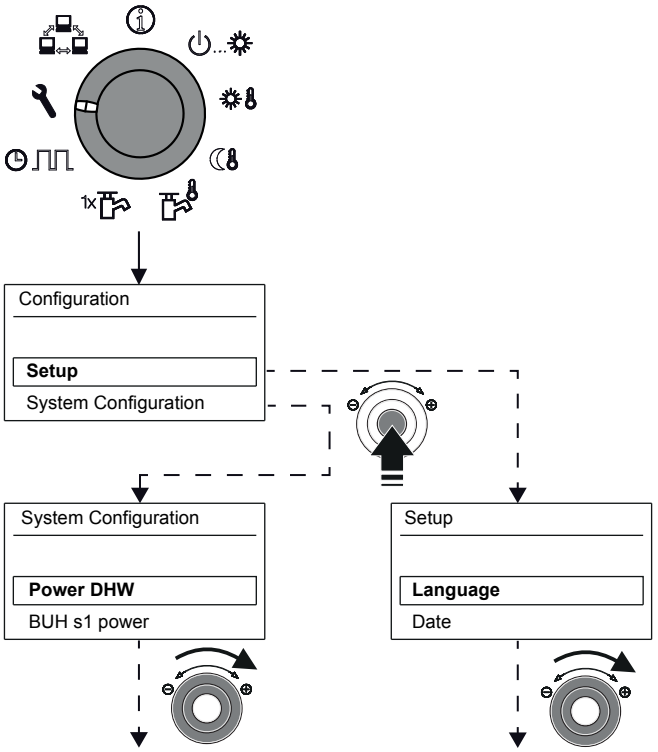


Fig. 4-2 Setting the commissioning parameters

- Set required commissioning parameters. Here the supplied "Commissioning Checklist" is to be observed and completed.
  - **For clarification** of the **operating parameters**, see **Operating Manual of the Control Unit**.
  - Enter configuration values into the corresponding tables in the "Notes" chapter of the Operating Manual for the Control Unit.
- Activate Legionella protection ([Anti-Legionella day] parameter) if required.
- Configure additional commissioning parameters depending on the system requirements for the control unit of the Daikin Altherma EHS(X/H).

4.1.4 Venting the internal heating circulation pump

If the storage temperature falls below a certain minimum value, the safety settings of the Daikin Altherma EHS(X/H) prevent the operation of the heat pump in the case of low external temperatures:
- **External temperature <-2°C**, minimum **storage temperature = 30°C**
- **External temperature <12°C**, minimum **storage temperature = 23°C**.

Without backup heater:
The storage tank water must be heated to the minimum required storage temperature by an external heater.

With backup heater (EKBUxx):
With an outdoor temperature < 12 °C and a storage tank temperature < 35 °C, the backup heater (BUH) is switched on automatically on in order to heat up the storage tank water to at least 35 °C.

- In order to **accelerate the heating process with the back-up heater**, **temporarily**
  - Set parameter **[Function Heating Rod]** = "1" and
  - Set parameter **[Power DHW]** to the **maximum value of the back-up heater**.
  - Switch the rotary switch to operating mode 1x Hot Water and set the parameter [1x Hot Water] to "On". Following successful heating, reset the parameters to "Off".

- **Vent** the internal **heat circulation pump** as follows:
  - Activate Air Purge (see section 4.1.5).
  - Open ventilation screw on heat circulation pump.
  - Allow pump wheel to run until water emerges from the ventilation screw without bubbles.
  - Close ventilation screw on the heat circulation pump again.

4.1.5 Activating the parameter [Air Purge]

By activating the Air Purge the RoCon HP control unit starts a defined sequence program with Start-Stop operation of the integrated heat circulation pump and various settings for the 3-way diverter valve integrated into the Daikin Altherma EHS(X/H).

Existing air can leak from the automatic venting valve during the venting function and the hydraulic circuit connected to the Daikin Altherma EHS(X/H) is evacuated.

- Perform Air Purge (see operating manual of the control unit).

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

Prior to activating this function, the heating circuit must be completely filled.

4.1.6 Check minimum flow

The **minimum flow must be checked with a closed heating circuit**.

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

If the minimum flow is insufficient:
- There may be air in the circulation pump.
  ➔ Vent the circulation pump.
- The valve drive of the 3-way diverter valve (3UVB1 / 3UV DHW) is defective.
  ➔ Check the function of the valve drive, if necessary, replace valve drive.

- Close valves and actuators of all closed heat distribution circuits.
- Set "Heating" operating mode on the control unit of the Daikin Altherma EHS(X/H).
- Read info parameter [Flow Rate].
  ➔ The flow rate must be at least 900 l/h (see operating manual of the control unit).

4.1.7 Configuring Screed Program parameters (only if necessary)

With the Screed Program the flow temperature is controlled on the basis of a pre-set temperature profile.

Further information on the Screed Program, its activation and expiry, see the operating manual of the control unit.

After expiry of the Screed Program the RoCon HP control unit continues to operate in the previously set operating mode. Unless configured previously, the following tasks need to be carried out in conclusion.

a) When connecting without room temperature controller:
- Set the heating characteristic curve or the desired flow temperature.

b) When connecting with the room temperature controller:
- Activate the room temperature controller.
- Set the heating characteristic curve or the desired flow temperature. If required, activate the parameter [Room Influence] and set the preset room temperature.

4.2 Re-commissioning

4.2.1 Requirements

CAUTION!

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

- Only set up at temperatures below 0°C when a water temperature of at least 5°C can be guaranteed in the heating system and storage tank.

Daikin recommends not operating the installation in extremely frosty conditions.

– The Daikin Altherma EHS(X/H) is fully connected.
– The coolant system is dehumidified and filled with the specified amount of coolant.
– The heating and hot water systems are filled and charged at the right pressure (see chapter 6.5).
– The storage tank is filled up to the overflow (see chapter 6.4).

4.2.2 Start-up

If the storage temperature falls below a certain minimum value, the safety settings of the Daikin Altherma EHS(X/H) prevent the operation of the heat pump in the case of low external temperatures:

– **External temperature <-2°C**, minimum **storage temperature = 30°C**
– **External temperature <12°C**, minimum **storage temperature = 23°C**.

Without backup heater:
The storage tank water must be heated to the minimum required storage temperature by an external heater.

With backup heater (EKBUxx):
With an outdoor temperature <12°C and a storage tank temperature <35°C, the backup heater (BUH) is switched on automatically on in order to heat up the storage tank water to at least 35°C.

- In order to **accelerate the heating process with the back-up heater**, **temporarily**
  – Set parameter **[Function Heating Rod]** = "1" and
  – Set parameter **[Power DHW]** to the **maximum value of the back-up heater**.
  – Switch the rotary switch to operating mode 1x and set the parameter [1x Hot Water] to "On". Following successful heating, reset the parameters to "Off".

1. Check the cold water connection and, where necessary, fill the potable water heat exchanger.
2. Turn power supply to Daikin Altherma EHS(X/H) on.
3. Wait for the start phase.
4. After the start phase has completed, in heating mode, evacuate the heating system, check the installation pressure and adjust where necessary (max. 3 bar).

Air Purge

(see operating manual of the control unit)

5. Carry out a visual inspection for leaks on all joints internally. Seal any leaks that occur in a professional manner.
6. Set the dial on the controller to the required operating mode.
7. If a Daikin p=0 solar system is connected, commission this in accordance with instructions provided. After disconnecting the Daikin p=0 solar system, check the level in the buffer storage tank once again.

5 Decommissioning

WARNING!

Danger of scalding and flooding when opening the solar return flow coupling or heating and hot water pipes due to escaping hot water.

- Only drain the storage tank container or heating system
  - when they have been left to cool sufficiently,
  - with a suitable device for the safe draining or catching of escaping water,
  - wearing appropriate protective clothing.

5.1 Temporary shutdown

CAUTION!

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

- If there is any risk of frost, drain any water from the decommissioned heating system.
- If the heating system is not drained and there is a risk of frost, the power supplies must be secured and the external main switch must remain switched on.

If the Daikin Altherma EHS(X/H) is not needed for a long time, it can be temporarily decommissioned.

Daikin therefore recommends that you do not disconnect the system from power supply, but rather only place it in "Stand-By Mode" (consult the operating manual for the control system).

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 Daikin Altherma EHS(X/H) on the water side, or
– suitable antifreeze measures must be taken for the connected heating system and hot water storage tank (e.g. draining).

If there is a danger of frost and the power supply cannot be guaranteed for just a few days, the unit's excellent heat insulation means that the Daikin Altherma EHS(X/H) does not have to be drained, provided that the storage tank temperature is monitored regularly and does not fall below +3°C.

However, there is no frost protection for the connected heat distribution system through this.

5.1.1 Draining the storage tank

- Daikin Disconnect the Altherma EHS(X/H) from the power supply.
- Connect the outlet hose to the **KFE filling connection (Accessory KFE BA)**(figure 5-1, item A) and run the point to a drain point that is at least soil deep.

If no **KFE filling connection** is available, the connection piece (figure 5-1, item C) can be removed from the safety overflow (figure 5-1, item B) and used.

Once the draining process is complete, this must be replaced before the heating system can be started again.

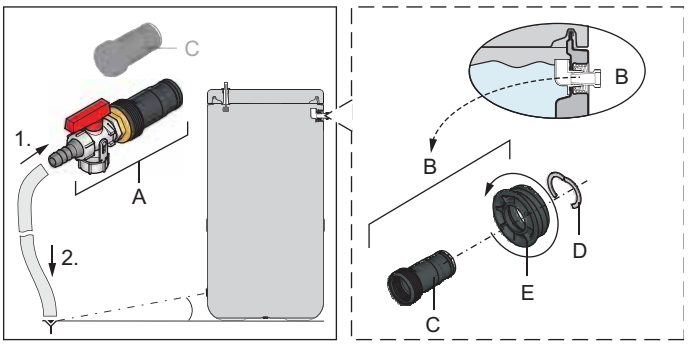


Fig. 5-1 Connecting the drain hose

Optional: Removing the connection piece from the safety overflow

A	*KFE filling connection (Accessory KFE BA)*	*E*	*Threaded piece*
B	*Safety overflow*	*F*	*Sealing plug*
C	*Connection piece for safety overflow*	*G*	*Connecting angle*
D	*Clamping piece*	*X*	*Valve insert*

Tab. 5-1 Legend from figure 5-1 to figure 5-6

Without p=0 solar installation

- Remove the covering blind from the filling and emptying fitting.
- **When using the KFE filling connection (Accessory KFE BA):** Remove the covering blind from the handle and unscrew the threaded piece (figure 5-2, item E) from the storage tank container.

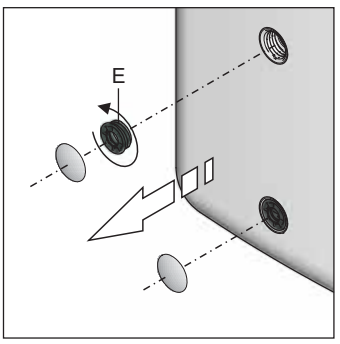


Fig. 5-2 Unscrew threaded piece

- Insert the **KFE filling connection** into the threaded piece (figure 5-3, item E) and secure it using a clamping piece (figure 5-3, item D).
- Place a suitable collection trough under the filling and emptying fitting.
- At the filling and emptying fitting, unscrew the threaded piece (figure 5-4, item and remove the sealing plug (figure 5-4, item F) **and immediately screw** the pre-assembled threaded insert with the **KFE filling connection** back into the filling and emptying fitting (figure 5-4).

CAUTION!

Storage water will gush out as soon as the sealing plug is removed.

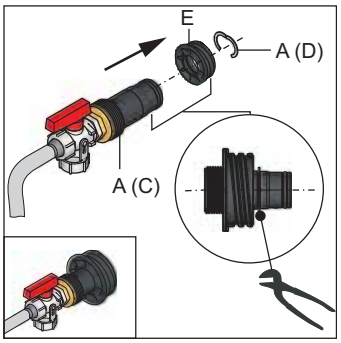


Fig. 5-3 Assembling the KFE filling connection

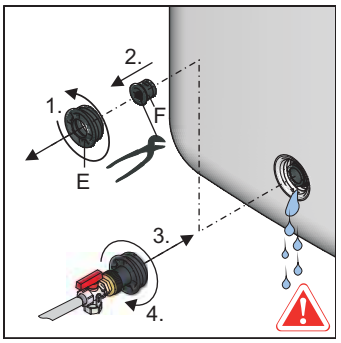


Fig. 5-4 Screwing the KFE filling connection into the filling and emptying fitting

- Open the KFE cock of the **KFE filling connection** and drain the water content of the storage tank.

Only for the p=0 solar installation

- Adjust the valve insert on the connecting angle so that the blind plug is cut off (figure 5-5).
- Remove the blanking plug from the connecting angle (figure 5-5) and place a suitable collection trough under the unit.

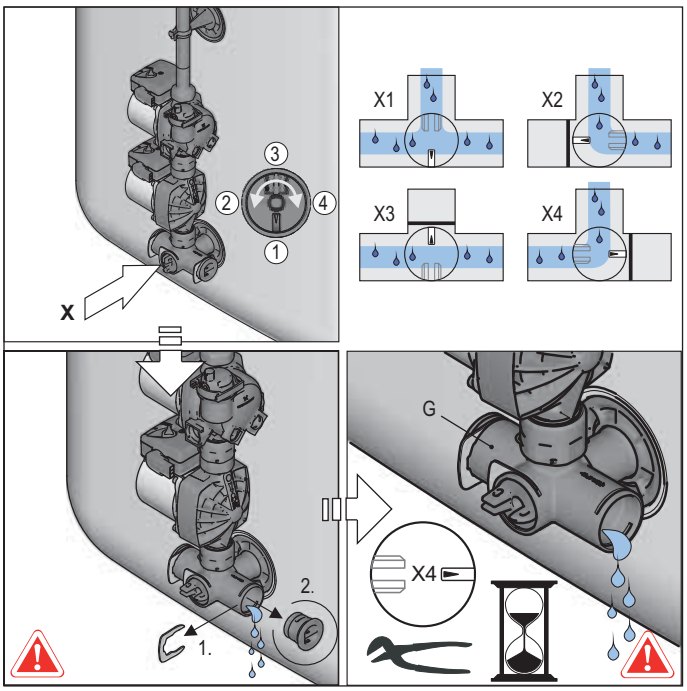


Fig. 5-5 Shutting off the valve insert and removing the blanking plug from the connecting angle

- Insert the **KFE filling connection** into the connecting angle and secure using a retaining clamp (figure 5-6).

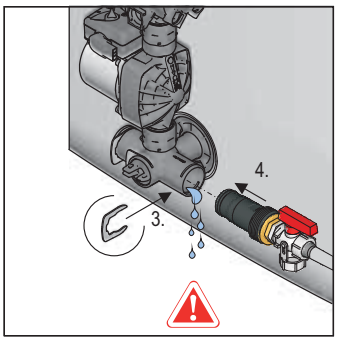


Fig. 5-6 Assembling the KFE filling connection in the connecting angle

- Open the KFE cock on the **KFE filling connection**.
- Adjust the valve insert on the connecting angle so that the flow to the drain hose is opened (also refer to figure 5-5) and drain the water content of the storage tank.

5.1.2 Draining the heating circuit and hot water circuit

- Connect the drain hose to the combined filling and draining valve on the Daikin Altherma EHS(X/H).
- Open the combined filling and draining valve on the Daikin Altherma EHS(X/H).
- Allow the heating and warm water circuit to drain.
- Disconnect the heating flow and return flow as well as the cold water inflow and the hot water outflow from the Daikin Altherma EHS(X/H).
- Connect the discharge hose on the heating flow and return flow as well as the cold water inflow and hot water outflow so that the hose opening is at ground level.
- Allow the individual heat exchangers to run empty one after the other based on the suction lifter method.

5 Decommissioning

5.2 Final shutdown

WARNING!

Cooling systems (heating pumps), climate control systems and heating devices that are incorrectly dismantled can both endanger life and health of people and be impaired in their function during start-up.

- Work on the Daikin Altherma EHS(X/H) (such as dismantling components, temporary or final shutdown of system) is only to 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 responsible authorities. 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.
- You **must observe** the **warning and safety instructions** in the installation manual on working in the coolant system.

A final shutdown may be necessary if
– The system is defective and is being dismantled and disposed of.
– Components of the system are defective, are being dismantled and replaced.
– The system or parts of the system are being dismantled and reassembled in another location.

The Daikin Altherma EHS(X/H) is designed to be environmentally friendly and easy to install: The jobs described above can therefore be carried out in an efficient and environmentally-friendly manner.

When changing locations or replacing parts on the coolant system in the pipe network:
- Pump the coolant back into the external heat pump unit (see installation and operating guide for the particular external heat pump unit).

When disposing of the machine or replacing parts in the coolant system:

- Suction the coolant from the machine and recycle (see installation and operating guide for the particular external heat pump unit).

CAUTION!

Coolant escaping from the system causes long-term damage to the environment.

Mixing different kinds of coolant can result in hazardous toxic gases being released. Mixing with oils when coolant escapes can lead to the soil being contaminated.

- Never allow coolant to be released into the atmosphere - always suction it off and recycle using a suitable recycling device.
- Always recycle coolant thus keeping it separated from oils and other additives.
- Only keep each type of coolant separate in suitable pressure vessels.
- Dispose of coolants, oils and additives professionally and in accordance with the applicable national regulations of the country it is being used in.

- Decommissioning a Daikin Altherma EHS(X/H) (see section 5.1).
- Disconnect the Daikin Altherma EHS(X/H) from all electrical connections, coolant and water connections.
- Dismantle the Daikin Altherma EHS(X/H) or components in accordance with the installation guide in reverse order.
- Daikin Altherma EHS(X/H) disposed off in a professional manner.

Recommendations for disposal

The Daikin Altherma EHS(X/H) has an environmentally friendly design. 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.

Daikin has complied with the standards for environmentally-friendly disposal as a result of the environmentally-friendly design of the Daikin Altherma EHS(X/H). 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 a facility that specialises in reuse, recycling and recovery.

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

6 Service and maintenance

6.1 General

Regular inspection and maintenance of the Altherma EHS(X/H) reduces energy consumption and ensures a long life and smooth operation.

RISK OF ENVIRONMENTAL DAMAGE!

Important information regarding the coolant used.

The entire heat pump system contains coolant with fluorinated greenhouse gases, which are listed in the Kyoto Protocol and, if released, are harmful to the environment.

Coolant type: R410A
GWP* value: 1975

** GWP = Global Warming Potential*

- Fill in the total coolant filling quantity on the supplied label on the heat pump exterior unit (for information consult the installation instructions for the heat pump exterior unit).
- Never allow coolant to be released into the atmosphere - always suction it off and recycle using a suitable recycling device.

Have the inspection and maintenance carried out by authorised and trained HVAC engineers once a year, ideally **before the heating period**. This can prevent faults during the heating period.

Daikin recommends an inspection and maintenance contract to ensure regular inspection and maintenance.

Legal requirements

According to the 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 perform regular maintenance on their fixed cooling systems, check impermeability and have any leaks repaired immediately.

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

Operators of Daikin heat pump systems are subject to **the following obligations**:

The European statutory investigation period applies for heat pumps from a total system coolant filling quantity of 3 kg or, as of 01.01.2017 from a total filling quantity of 5 t CO_2-equivalent (in the case of R410A from 2.4 kg).

Daikin nonetheless recommends the conclusion of a maintenance contract, including documentation of the work carried out in the operating manual in order to preserve the right to guarantee, including for systems for which there is not legal obligation to monitor impermeability.

- With a system coolant **total filling quantity** of **3 kg – 30 kg** or from **6 kg** in hermetic systems and from 01.01.2017 with a total filling quantity of 5-50 t CO_2-equivalent or from 10 t CO_2-equivalent in hermetic systems:
  - ➔ **Inspections** carried out by certified personnel at intervals of no more than **12 months** and documentation of the work performed in accordance with valid regulations. This documentation must be retained for at least 5 years.

Certified people are those who have proof of expertise for the European Community for work on stationary refrigeration systems (heat pumps) and air conditioning systems, according to the F-Gases Directive (EC) No. 303/2008.

- Up to 3 kg coolant fill quantity: Expert certificate category II
- 3 kg coolant fill quantity or over: Expert certificate category I

6.2 Removing the protective cover

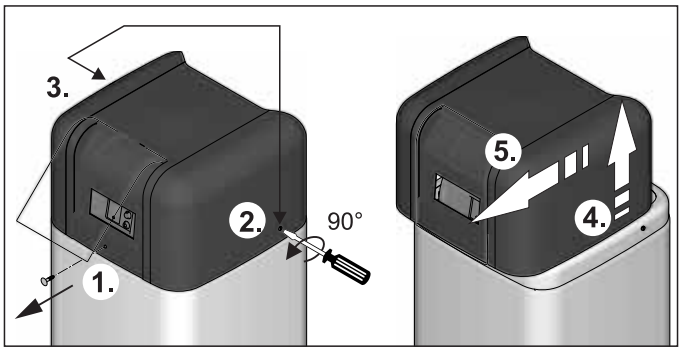


Fig. 6-1 Unscrew/loosen the screws, lift up the cover panel at the back and pull forwards.

6.3 Activities to be performed annually

WARNING!

Improperly carried out work on the Daikin Altherma EHS(X/H) and its components that have been connected as an option can endanger human life and health and adversely affect the operation of the these components.

- Work on the Daikin Altherma EHS(X/H) (such as maintenance or servicing) is only to 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 appropriate responsible authorities. 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 coolant is heavier than air. **In pits** or in badly ventilated **rooms** it can collect in **high concentrations**. **Breathing in high concentrations** of gaseous **coolant** leads to **feelings of faintness and suffocation**. Toxic gases **can be formed if gaseous** coolants come **into contact with open fire or hot objects**.

- When working on the coolant circuit, ensure that the workplace is well ventilated.
- If necessary, before starting work, evacuate the coolant system completely.
- Never carry out work on the coolant circuit in closed rooms or work pits.
- Do not let coolant come into contact with open fire, embers or hot objects.
- Never allow coolant 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. coolant can escape through leaks.

WARNING!

At normal atmospheric pressure and ambient temperatures, **liquid coolant** 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 coolant 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 coolant could escape.

WARNING!

Under the cover of the Daikin Altherma EHS(X/H) **temperatures of up to 90°C** can arise during operation. During operation, **hot water temperatures >60°C arise.**

– Touching components during or after operation leads to a **risk of burns**.
– Water discharged during maintenance and servicing work can cause **scalding** on contact with the skin.

- Before carrying out servicing and maintenance work, allow the Daikin Altherma EHS(X/H) to cool down sufficiently.
- Wear protective gloves.

WARNING!

Live parts can cause an **electric shock** on contact and cause fatal burns and injuries.

- Before beginning work on live parts, **disconnect** all of the systems circuits **from the power supply** (switch off main switch, disconnect fuse) and secure against unintentional restart.
- Electrical connection and work on electrical components must only be carried out by **qualified electricians** in compliance with valid standards and guidelines as well as the specifications of the energy supply company.
- **Covers off equipment and servicing flaps are to be replaced** as soon as the work is completed.

1. Dismount the protective cover (see section 6.2).
2. Carry out a functional inspection of the Daikin Altherma EHS(X/H), as well as all installed accessory components (backup heater, solar installation) by checking the temperature display and the switching states in the individual modes.
3. If a Daikin solar system of the DrainBack p=0 type is connected and in operation, switch this off and empty the solar panels.
4. When operating the Daikin Altherma EHS(X/H) in a bivalent-alternative system; switch off all heat generators and deactivate the bivalent control unit.
5. Visual check of general condition of the Daikin Altherma EHS(X/H).
6. Visual check of the water storage tank level (filling level indicator)
   ➔ Top up the water if necessary (see section 6.4), determine the reason for the low water level and remedy it.

The Daikin Altherma EHS(X/H) is designed to be low-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.

7. 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.
8. Visual check of connections, lines and safety pressure relief valve. In the event of damage, determine the cause.
   ➔ Replace defective parts.
9. Check all electrical components, connections, and cables.
   ➔ Repair damaged parts or replace them.

Should the connection cable of the optional backup heater exhibit any damage, the complete backup heater must be replaced.

The connection cable cannot be replaced 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 Daikin Altherma EHS(X/H).
    ➔ Top up the water in the heating system if necessary, until the pressure display is within the permitted range (see section 6.5).
12. Clean plastic surface of Daikin Altherma EHS(X/H) **with a soft cloth and mild cleaning agent**. Do not use any cleaners with aggressive solvents (damage to the plastic surface may occur).
13. Refit the cover (see section 6.2).
14. Servicing of the external unit and other heating components connected to the Daikin Altherma EHS(X/H) should be carried out as specified in the respective associated installation and operating manuals.
15. Complete the confirmation of servicing in the supplied operating manual of the Daikin Altherma EHS(X/H).

6.4 Filling and topping up the storage tank

CAUTION!

Filling the storage container with excessive water pressure or at too great a flow speed can result in damage to the Daikin Altherma EHS(X/H).

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

CAUTION!

UK only!

If filling or topping up the storage tank is done by means of the boiler filling and drain valve, a temporary filling loop must be used with the appropriate backflow prevention device in accordance with clause G24.2, Guidance to the Water Supply (Water Fittings) Regulations 1999.

If the storage temperature falls below a certain minimum value, the safety settings of the Daikin Altherma EHS(X/H) prevent the operation of the heat pump in the case of low external temperatures:
- **External temperature <-2°C**, minimum **storage temperature = 30°C**
- **External temperature <12°C**, minimum **storage temperature = 23°C**.

Without backup heater:
The storage tank water must be heated to the minimum required storage temperature by an external heater.

With backup heater (EKBUxx):
With an outdoor temperature <12°C and a storage tank temperature <35°C, the backup heater (BUH) is switched on automatically on in order to heat up the storage tank water to at least 35°C.

- In order to **accelerate the heating process with the back-up heater**, **temporarily**
  - Parameter **[Function Heating Rod]** = "1" and
  - Set parameter **[Power DHW]** to the **maximum value of the back-up heater**.
  - Switch the rotary switch to operating mode 1x and set the parameter [1x Hot Water] to "On". Following successful heating, reset the parameters to "Off".

Without installed solar system

- Connect the **filling hose** with backflush prevention (1/2") **to** the **connection "DrainBack Solar - feed"** (see figure 6-2, **item 1)**.
- **Fill** the storage tank on the Daikin Altherma EHS(X/H) **until water comes out of** the **connection** (figure 6-2, **item 23)**, that has **been connected as the safety overflow**.
- Disconnect the filling hose with backflush prevention (1/2") again.

With KFE filling connection or with installed p=0 solar system (see also chapter 5.1)

- Without solar system: **KFE filling connection (Accessory KFE BA)** at the filling and draining connection of the Daikin Altherma EHS(X/H) (figure 2-2 to figure 2-5, item 10)
  or
  with solar system: Mount the **KFE filling connection (Accessory KFE BA)** at the interaction of the p=0 control and pump unit (EKSRPS3B).
- Connect the **filling hose** with backflush prevention (1/2") **to** the previously installed **KFE cock**.
- **Fill** the storage tank on the Daikin Altherma EHS(X/H) **until water comes out of** the **connection** (figure 6-2, **item 23**), that has **been connected as the safety overflow**.
- Disconnect the filling hose with backflush prevention (1/2") again.

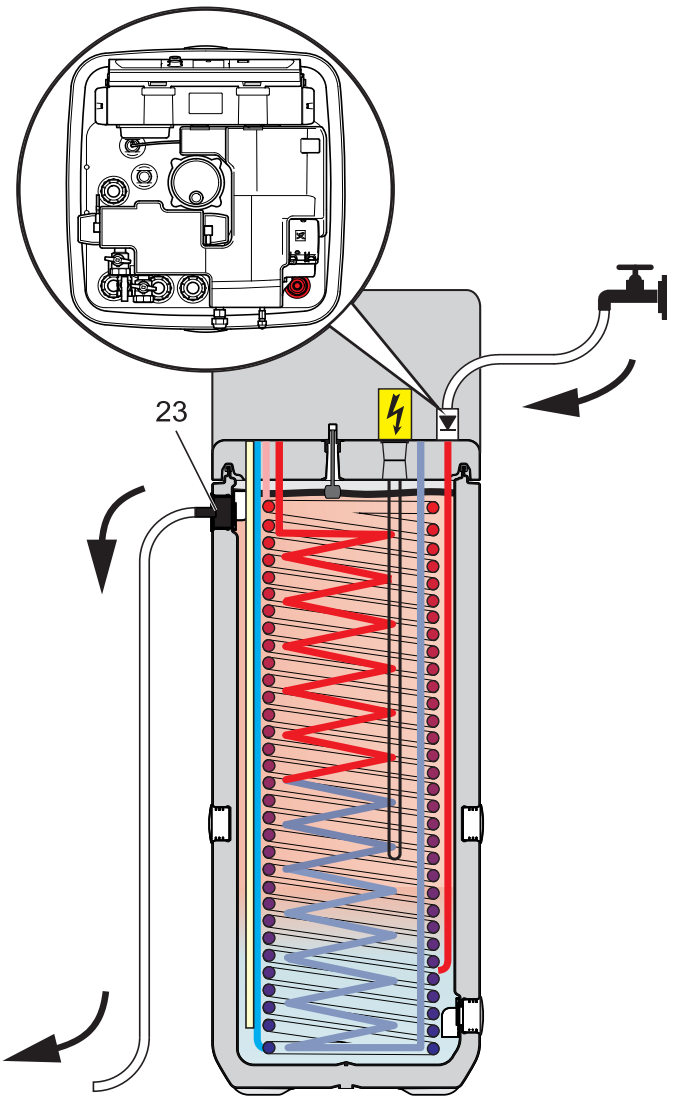


Fig. 6-2 Buffer storage filling - without solar system

6.5 Filling and topping up the heating system

DANGER!

During the filling procedure, water can leak from potential leaking sites, which, in the event of contact with live parts, can result in an electric shock.

- Prior to the filling procedure, disconnect the Daikin Altherma EHS(X/H) from the power.
- After the initial filling, prior to switching on the power supply to the Daikin Altherma EHS(X/H), check whether all electronic parts and connection points are dry.

WARNING!

Polluted domestic water is hazardous to health.

- When filling the heating system prevent any back-flow of heating water into the drinking water piping.

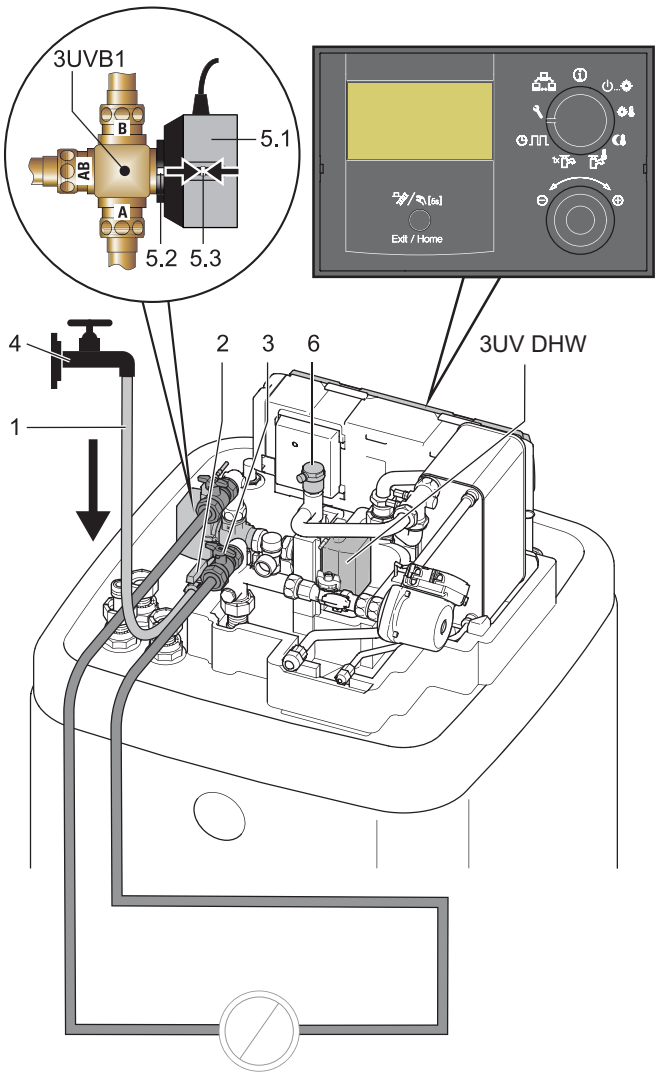
1. **Only required upon initial start-up and re-commissioning following complete drainage!**
   Remove the valve drive of the 3-way diverter valve **3UVB1 + 3UV DHW** (see figure 6-3). To do so, press the unlock button on the valve drive (see figure 6-3, item 5.2) and turn the valve drive a 1/8-turn anti-clockwise (bayonet socket).

   When the valve drive is removed, the AB-B path is opened.

2. Connect the filling hose (figure 6-3, item 1) with backflush prevention (1/2") and an external pressure gauge (on-site) to the KFE cock (figure 6-3, item 2) and secure from slipping using a hose clamp.
3. Open the water cock (figure 6-3, item 4) in the supply line.
4. Open KFE cock (figure 6-3, item 2) and watch the pressure gauge.
5. Fill the system with water until the system target pressure is reached on the pressure gauge (**System height +2 m**, whereby 1 m water column = 0.1 bar).
   The overpressure valve must not be triggered!
6. Close KFE cock (figure 6-3, item 2).
7. Switch on the power supply of the Altherma EHS(X/H).
8. Turn the rotary switch to the operating mode "Heat".
   ➔ Daikin Altherma EHS(X/H) runs in the hot water heating mode after the start phase.
9. During the hot water heating mode, continuously check the water pressure at the external pressure gauge. Where necessary, refill with water via the KFE cock (figure 6-3, item 2).
10. Vent the entire heating network (open the regulation valve. At the same time the underfloor heating system can be filled and flushed with the underfloor heating distributor.).
11. **Only required upon initial start-up and re-commissioning following complete drainage!**
    - **Remove the valve drive** of the 3-way diverter valves **3UVB1 + 3UV DHW**.
    - Begin the Air Purge.

    Air Purge
    (see operating manual of the control unit)

12. Inspect the water pressure at the external pressure gauge again. Where necessary, refill with water via the KFE cock (figure 6-3, item 2).
13. Close the water cock (figure 6-3, item 4) in the supply line.
14. Disconnect the filler hose (figure 6-3, item 1) with flow-back preventer from the KFE cock (figure 6-3, item 2).



1	*Filler hose*	***5.2***	*Unlocking button of the drive lock*
2	*KFE cock*	***5.3***	*Hand lever*
3	*Ball cock*	***6***	*Automatic bleeder*
4	*Water cock*	***3UVB1, 3UV DHW***	*3-way diverter valve*
5.1	*Valve drive*		

Fig. 6-3 Filling the heating circuit

7 Errors, malfunctions and messages

CAUTION!

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

- Secure potential equalisation before touching the control panel circuit board (e.g. by touching the control panel mounting).

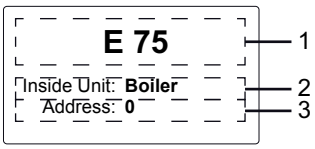
7.1 Deleting errors, correcting malfunctions, deleting messages

Electronic control of the Daikin Altherma EHS(X/H):
– Signals an error by means of the background of the display lighting up red and shows an error code in the display (see tab. 7-2).
– Shows information messages regarding the operating status, which is not signalled by red background lighting.

An integrated Protocol saves up to 15 error-related or other information messages regarding the operating status that last occurred.

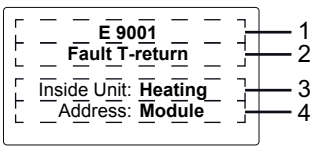
Depending on the operating mode, messages are also forwarded to connected room stations or room thermostats.

7.1.1 Current fault display



1 Fault message as code (see tab. 7-2)
2 Location information (equipment) of the detected fault
3 Bus address of the unit causing the fault

Fig. 7-1 Displays an active error message (controller fault)



1 Fault message as code (see tab. 7-2)
2 Fault message as clear text (see tab. 7-2)
3 Location information (equipment) of the detected fault
4 Bus address of the unit causing the fault

Fig. 7-2 Display of a current error message (heat pump fault)

7.1.2 Read Protocol

The Protocol can be read in the *"Special Level"* (see figure 7-3).

The last received (latest) message is in the first position. All other previous messages are then pushed backwards by one place when a new entry is made. The 16th message will be deleted any time a new message is received.

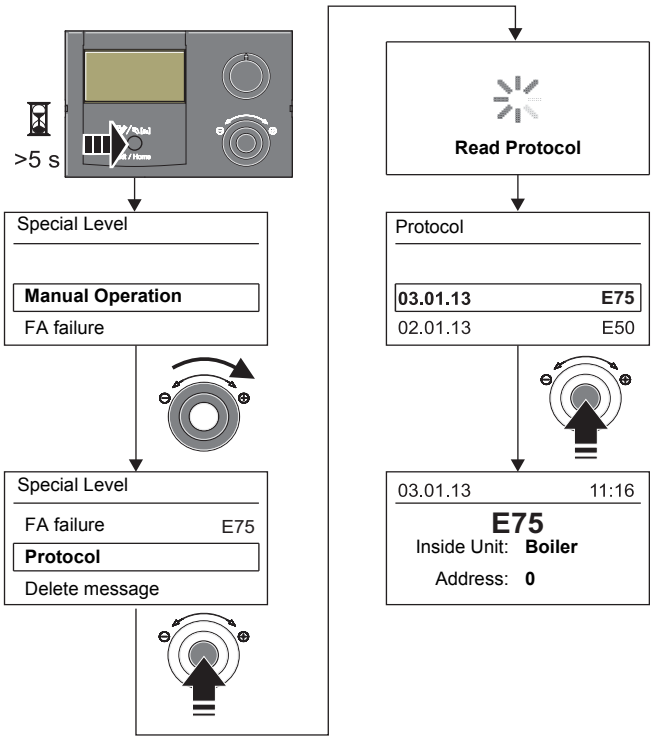


Fig. 7-3 Reading the protocol

7.1.3 Troubleshooting

- Detecting and remedying the cause of the malfunction.

– Contactor triggered:
Nothing shown on the display in the controller. Ascertain cause of triggering the contactor and remedy fault. Start up system again.
➔ Once the cause has been remedied, the system will resume operations as normal.

– Contactor not triggered:
a) No fault codes are shown but the system is not working properly. Troubleshooting and eliminating faults (see section 7.2).
➔ Once the cause has been eliminated, the system continues to work normally.
b) Fault codes are displayed as long as the fault conditions are present. Troubleshooting and eliminating faults (see section 7.3). If the fault message is still displayed after the cause of the fault has been corrected, the system must be disconnected from the power supply for at least 10 in order to unlock it.
➔ Once the cause has been eliminated, the system continues to work normally.

7 Errors, malfunctions and messages

7.2 Malfunctions

Malfunction	Possible cause	Possible solution
System not working (nothing on the display, operation LED on RoCon BM1 off)	No mains voltage	● Switch on the external main switch of the machine. ● Switch on system fuse(s). ● Replace system fuse(s).
Switching time program is not working or programmed switching times are being carried out at the wrong time.	Date and time are not correctly set.	● Set date. ● Set time. ● Check week day-switching time allocation.
	Incorrect operating mode set.	● Set to operating mode "Automatic 1" or "Automatic 2".
	During a switching time the user made a manual setting (e.g. changed the target temperature, changed the operating mode)	1. Place the rotary switch in the ***"Info"*** ⓘ position. 2. Place the rotary switch in the ***"Operating Mode"*** ⏻...✲ position. 3. Select correct operating mode.
Control unit does not respond to entries	Operating system of control unit crashed.	● Carry out RESET of control unit. To do so, disconnect the system from the power supply for at least 10 s and then switch on again.
Operating data are not updated	Operating system of control unit crashed.	● Carry out RESET of control unit. To do so, disconnect the system from the power supply for at least 10 s and then switch on again.
Heating does not warm up	Heating request switched off (e.g. switching time program is in the economy phase, external temperature is too high, parameters for backup heater (EKBUxx) are set incorrectly, hot water request is active)	● Check the operating mode setting. ● Check the request parameters. ● Check setting of the date, time and switching time program on the control unit.
	Coolant compressor is not working.	● If there is a backup heater installed (EKBUxx): Check whether the return flow temperature backup heater heats up to at least 15 °C (if the return flow temperature is lower, the system first uses the backup heater in order to reach this minimum back flow). If applicable, check the power supply, thermal protection and overheating fuse for the backup heater.
	System is in the operating mode "Cooling".	● Switch the operating mode to "Heating".
	Settings for off-peak mains connection do not correspond to settings for electrical connections.	● HT/NT function is active and the parameter [HT/NT Contact] is set incorrectly. Other configurations are also possible. However, these must match the type of off-peak mains connection. ● The parameter [SMART GRID] is active and the connections are set incorrectly.
	The power company has sent the high-cost 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 completely open. ● Check that the water filter is dirty. ● Check that the expansion tank is defective. ● Fully vent the heating system and device-internal circulation pump. ● On the control unit (rotary switch position ***"Info"*** ⓘ) check that there is sufficient water pressure (>0.5 bar), if necessary, refill the heating water. ● Check that the resistance in the water circuit is not too high for the pump (see installation manual for "Technical Data").
	Target value range is too low.	● Increase parameter [Heat-Slope]. ● Increase parameter [T vbh1 max]. ● Increase parameter [Max T-Flow].
	Weather-controlled flow temperature regulation.	● Check the settings on the *"HC Configuration"* level of the parameters [T-Outside lim day], [Heat-Slope] and the settings in the ***"Set Temp Day"*** rotary switch position.
	Optional: Backup heater (EKBUxx) not switched on.	● Check the mains supply to the backup heater (EKBUxx). ● Thermal contactor on backup heater (EKBUxx) was triggered. Unlock. ● Overheat fuse on backup heater (EKBUxx) defective. Replace. ● Check the parameters [Function Heating Rod] and [BUH s1 power] and [BUH s2 power].
	Water quantity in heating system too low	● Check the primary pressure in the expansion container and the water pressure, if necessary, refill the heating water and reset the primary pressure (see chapter 6.5).
	Hot water supply is taking too much of the output of the heat pump.	● Check the settings of the parameter [Function Heating Rod] in level *"Configuration"*, sub-level *"Setup"*. ● Check the settings of the parameter [Power DHW] in level *"Configuration"*, sub-level *"System Configuration"*.

7 Errors, malfunctions and messages

Malfunction	Possible cause	Possible solution
Hot water does not warm up	DIP switch configured incorrectly	● Check DIP switch setting on board A1P (see section 7.4).
	Hot water supply switched off (e.g. switching time program is in the economy phase, parameters for hot water supply have been set incorrectly).	● Check the operating mode setting. ● Check the request parameters.
	Storage tank charging temperature too low.	● Increase the target hot water temperature.
	Draw-off rate too high.	● Reduce the draw-off rate, limit throughput.
	Output of heat pump too low.	● Check the switching times for room heating and hot water supply for overlaps.
	Water quantity in heating system too low.	● Check the primary pressure in the expansion container and the water pressure, if necessary, refill the heating water and reset the primary pressure (see chapter 6.5).
	Optional: Backup heater (EKBUxx) not switched on.	● Check the mains supply to the backup heater (EKBUxx). ● Thermal contactor on backup heater (EKBUxx) was triggered. Unlock. ● Overheat fuse on backup heater (EKBUxx) defective. Replace. ● Check the parameters [Function Heating Rod] and [BUH s1 power] and [BUH s2 power].
Room cooling does not cool	Water flow too low.	● Check that all stop valves of the water circuit are completely open. ● Check that the water filter is dirty. ● Check that the expansion tank is defective. ● Fully vent the heating system and device-internal circulation pump. ● On the control unit (rotary switch position ***"Info"*** ⓘ) check that there is sufficient water pressure (>0.5 bar), if necessary, refill the heating water. ● Check that the resistance in the water circuit is not too high for the pump (see installation manual for "Technical Data").
	"Cooling" switched off (e.g. switching time programme is in the setback phase, external temperature too low).	● Check the operating mode setting. ● Check the request parameters. ● Check setting of the date, time and switching time program on the control unit.
	Coolant compressor is not working.	● If there is a backup heater installed (EKBUxx): Check whether the return flow temperature backup heater heats up to at least 15°C (if the return flow temperature is lower, the heat pump first uses the backup heater in order to reach this minimum back flow). If applicable, check the power supply, thermal protection and overheating fuse for the backup heater.
	System is in the operating mode "Heating".	● Switch the operating mode to "Cooling".
	Outdoor temperature <4°C	The heat pump has automatically switched to the "Heating" operating mode so as to be able to guarantee frost protection should the external temperature drop further. Room cooling not possible.

Malfunction	Possible cause	Possible solution
Cooling effect of room cooling too little	Water flow too low.	● Check that all stop valves of the water circuit are completely open. ● Check that the water filter is dirty. ● Check that the expansion tank is defective. ● Fully vent the heating system and device-internal circulation pump. ● On the control unit (rotary switch position ***"Info"*** ⓘ) check that there is sufficient water pressure (>0.5 bar), if necessary, refill the heating water ● Check that the resistance in the water circuit is not too high for the pump (see installation manual for "Technical Data").
	Water quantity in the heating system too low	● Check the primary pressure in the expansion container and the water pressure, if necessary, refill the heating water and reset the primary pressure (see chapter 6.5).
	Quantity of coolant in the heating system too low or too high.	● Have the coolant level checked by a Daikin specialist heating technician. Have him check the heating system for leaks.
Device-internal circulation pump is excessively noisy while running	Air in the water circuit	● Fully vent the heating system and device-internal circulation pump.
	Noises caused by vibrations.	● Check the Altherma EHS(X/H), its components and covers to ensure they are fastened correctly.
	Bearing damage in the device-internal circulation pump.	● Reduce pump speed [Min Perform Pump] and [Max Perform Pump]). ● Replace device-internal circulation pump.
	Water pressure at pump inlet too low.	● On the controller (rotary switch setting ***"Info"*** ⓘ) check whether there is adequate water pressure (>0.5 bar). ● Check that the pressure gauge is working correctly (connect an external pressure gauge). ● Check the primary pressure in the expansion container and the water pressure, if necessary, refill the heating water and reset the primary pressure (see chapter 6.5).
Safety pressure relief valve is leaking or always open.	Expansion tank is defective.	● Replace expansion tank.
	Water pressure in the heating system is too high.	● On the control unit (rotary switch position ***"Info"*** ⓘ) check that the water pressure lies beneath the stated maximum pressure. If necessary, bleed the water until the pressure lies in central permissible range.
	Safety pressure relief valve is stuck.	● Check safety pressure relief valve and if necessary, replace it. – Turn the red knob on the safety pressure relief valve counterclockwise. If you can hear a rattling noise, the safety pressure relief valve needs replacing.

Tab. 7-1 Possible malfunctions of the Altherma EHS(X/H)

7 Errors, malfunctions and messages

7.3 Fault codes

In the case of all malfunctions/error messages due to possibly defective sensors, all associated connection cables, connection points (plug contacts correctly in place) and printed circuit boards must be checked before replacing the sensor.

Component allocation: See figure 2-1 to figure 2-5 and figure 7-4

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E9001	80	Fault T-return	Return flow temperature sensor t_{R2}	Sensor or connection cable defective. ● Check, replace.
E9002	81	Fault feed flow sensor	Flow temperature sensor t_{V2} or $t_{V, BH}$	Sensor or connection cable defective. ● Check, replace.
E9003	89	Frost protection function error	Plate heat exchanger (PHE)	Measured value t_{V2} <0°C – Failure of the frost protection function for the plate heat exchanger because the water flow is too low. See error code E9004 / 7H. – Failure of the frost protection function of the plate heat exchanger because there is a lack of coolant in the system. See error code E9015 / E4.
E9004	7H	Fault volume flow	Flow sensor FLS	Water flow is too low or there is none at all, minimum water flow required: 900 l/h. 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 device-internal circulation pump must be completely bled. ● On the controller (rotary switch setting ***"Info"*** ⓘ) check whether there is adequate water pressure (>0.5 bar). ● Check the function of the 3-way switching valve 3UVB1 (compare actual setting of 3UVB1 with BPV position [Overview] displayed in the parameter). ● Does this error occur during a defrost operation in the room heating or hot water supply operating mode? With optional backup heater: Check its power supply and fuses. ● Check the fuses in the control housing of the Daikin Altherma EHS(X/H) (pump fuse (FU1) on circuit board A1P and printed circuit board fuse (F1) on the RoCon BM1 circuit board). ● Check flow sensor FLS for contamination and function, if necessary clean, replace.
E9005	8F	Flow temperature $t_{V, BH}$ >75°C	Flow temperature sensor $t_{V, BH}$	Flow temperature of the backup heater ($t_{V, BH}$) is too high. – Flow temperature sensor delivers false values. Temperature sensor or connection cable defective. ● Check, replace. – Contact problem A1P-bridge on X3A.
E9006	8H	Flow temperature $t_{V, BH}$ >65°C	Flow temperature sensor $t_{V, BH}$	
E9007	A1	IU main board def	Circuit board A1P	Communication between the heat pump exterior equipment and heat pump interior equipment malfunctioning. – Electromagnetic influences. ● Perform reset. – Circuit board A1P defective. ● Replace circuit board A1P.
E9008	A5	Coolant temperature outside of the valid range	Temperature sensor (liquid-side coolant) t_{L2}	No heat absorption at the plate heat exchanger. ● Check flow. ● If the flow is OK, then replace the coolant temperature sensor.

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E9009	AA	STB fault	Optional: STB backup heater (EKBUxx)	STB triggered in the backup heater (EKBUxx). ● Replace backup heater (EKBUxx).
E9010	AC		Bridge on board A1P	Bridge of connection socket "X21A" missing on board A1P. ● Plug in strapping plug.
E9011	C0	Fault flow sensor	Flow sensor FLS	Flow sensor FLS defective. ● Replace flow sensor FLS.
E9012	C4	Fault feed flow sensor	Flow temperature sensor t_{V2} or $t_{V, BH}$	Measurement outside the permitted value range. Sensor or connection cable defective. ● Check, replace.
E9013	E1	OU main board def	Main board of the heat pump exterior unit	– Main board in the heat pump exterior unit defective. – Ventilator motor defective. ● Check, replace.
E9014	E3	Coolant over-pressure	High pressure switch S1PH in the coolant system	Pressure in coolant system is too high. – High pressure switch S1PH or ventilator motor defective. ● Check, replace. – Poor cable contact. – Flow in the heating system too low. – Filled coolant quantity too high. ● Check, replace. – Service valve in the heat pump exterior unit not open. ● Service valve open.
E9015	E4	Coolant under-pressure	Pressure sensor S1NPH in the heat pump exterior unit	Pressure in the coolant system is too low. – Coolant level too low. ● Check, correct cause, refill coolant. – Pressure sensor S1NPH in the heat pump exterior unit defective. – Temperature sensor lamella heat exchanger R4T in the heat pump exterior unit defective. – Solenoid valve in the heat pump exterior unit not open. – Main board in the heat pump exterior unit defective. ● Check, replace.
E9016	E5	Load protec comp	Electronic overload protection in the coolant compressor	Coolant compressor overload protection triggered. Pressure difference between the high and low pressure sides in the coolant circuit too high (>26 bar). – Coolant compressor defective. – Inverter board in the heat pump exterior unit defective. – Coolant compressor/inverter board cabling, poor contact. – Filled coolant quantity too high. ● Check, replace. – Service valve in the heat pump exterior unit not open. ● Service valve open.
E9017	E7	Fan blocked	Ventilator motor in the heat pump exterior unit	– A fan in the external heat pump device is blocked. ● Check ventilator for the effects of contamination or blockages, if necessary clean and clear blockage. – Ventilator motor defective. – Ventilator motor, poor contact. – Over voltage at the ventilator motor. – Fuse in the heat pump exterior unit defective. – Inverter board in the heat pump exterior unit defective. ● Check, replace.

7 Errors, malfunctions and messages

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E9018	E9	Expansion valve	Electronic expansion valve	The electronic expansion valve in the external heat pump unit is defective, replace.
E9019	EC	Hot water temperature >85°C	Storage temperature sensor t_{DHW2}	The storage temperature sensor t_{DHW2} delivers a temperature value >85°C. Sensor or connection cable defective. ● Check, replace.
E9020	F3	Evaporator overtemp	Discharge temperature sensor (hot gas sensor) R2T at the coolant compressor of the heat pump exterior unit too high	– Discharge temperature sensor R2T at the coolant compressor or connection cable defective. – Coolant compressor defective. ● Check, replace.
E9021	H3	HPS-System	High pressure switch S1PH in the heat pump exterior unit	– High pressure switch S1PH defective. – Main board in the heat pump exterior unit defective. – Cabling, poor contact. ● Check, replace.
E9022	H9	Fault AT sensor	External temperature sensor R1T in the heat pump exterior unit	Sensor or connection cable defective. ● Check, replace.
E9023	HC	Fault DHW sensor	Storage temperature sensor t_{DHW2}	
E9024	J1	Pressure sensor	Pressure sensor S1NPH in the heat pump exterior unit	
E9025	J3	Fault T-return	Discharge temperature sensor R2T in the heat pump exterior unit	
E9026	J5	Suction pipe sensor	Suction temperature sensor R3T in the heat pump exterior unit	
E9027	J6	Aircoil sensor Defrost	Temperature sensor of the lamella heat exchanger R5T in the heat pump exterior unit	
E9028	J7	Aircoil sensor temp	Temperature sensor of the lamella heat exchanger R4T in the heat pump exterior unit (only in 11-16 kW systems)	
E9029	J8	Fault cold sensor OU	Temperature sensor liquid-side R6T in the heat pump exterior unit	

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E9030	L4	Electrical defect	Temperature sensor R10T on the inverter board in the heat pump exterior unit (only in 11-16 kW systems)	Excess temperature in the heat pump exterior unit – Very high external temperature. – Insufficient cooling of the inverter board. – Air suction inlet contaminated/blocked. – Inverter board in the heat pump exterior unit defective. – Temperature sensor on inverter board defective, plug connection X111A not correct. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9031	L5		Over voltage error in electrical components	– Current mains over voltage. – Coolant compressor blocked or defective. – Inverter board in the heat pump exterior unit defective. – Cabling, poor contact. – Service valve in the heat pump exterior unit not open. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9032	L8		Electrical components	– Coolant compressor defective. – Inverter board in the heat pump exterior unit defective. ● Check, replace. ● If necessary contact Daikin service technician.
E9033	L9			– Coolant compressor blocked or defective. – Before starting the coolant compressor, pressure difference between the high and low pressure sides too high. – Service valve in the heat pump exterior unit not open. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9034	LC			Communication error - Internal communication in the heat pump exterior unit disrupted – Electromagnetic influences. ● Perform reset. – Main board in the heat pump exterior unit defective. – Inverter board in the heat pump exterior unit defective. – Ventilator motor defective. – Cabling, poor contact. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9035	P1	OU main board def	Inverter board in the heat pump exterior unit	– No supply voltage from the mains connection. – Inverter board in the heat pump exterior unit defective. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9036	P4	Electrical defect	Temperature sensor R10T on the inverter board in the heat pump exterior unit (only in 11-16 kW systems)	Excess temperature in the heat pump exterior unit – Inverter board in the heat pump exterior unit defective. – Temperature sensor on inverter board defective, plug connection X111A not correct. ● Check, correct cause, replace. ● If necessary contact Daikin service technician.
E9037	PJ	Setting output	Power setting for the heat pump exterior unit incorrect	● Contact a Daikin service technician.

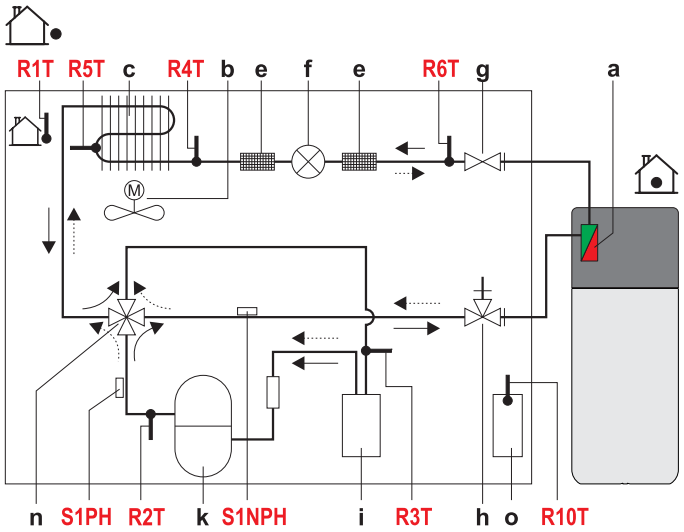
7 Errors, malfunctions and messages

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E9038	U0	Coolant leak	Sensors and parameter settings in the heat pump exterior unit	Loss of coolant. – Coolant quantity too low. See error code E9015 / E4. – Block or leak in the coolant line. ● Check, correct cause, refill coolant.
E9039	U2	Under/over voltage		Mains voltage outside the permitted range – Sporadic errors shortly after a power outage. ● No error correction required. – Inverter board in the heat pump exterior unit defective. ● Check, replace. ● If necessary contact Daikin service technician.
E9041	U4	Transmission fault	Electrical components	Communication between the heat pump exterior equipment and heat pump interior equipment malfunctioning. – Cabling or connections, poor contact. – No heat pump exterior unit connected. – Circuit board A1P defective. – Main board in the heat pump exterior unit defective. ● Check, replace.
E9042	U5			Communication between switch board A1P and RoCon BM1 disrupted. ● See error code E200.
E9043	U7			Communication between main board and inverter board disrupted. – Main board in the heat pump exterior unit defective. – Inverter board in the heat pump exterior unit defective. – Cabling, poor contact. ● Check, correct cause, replace.
E9044	UA			Configuration of switchboard A1P not suitable for the heat pump exterior unit ● Replace circuit board A1P. ● If necessary contact Daikin service technician.
E75	—	Error in external temperature sensor	External temperature sensor t_{AU} (RoCon OT1)	Optional external temperature sensor RoCon OT1 defective or not connected. ● If there is no external temperature sensor connected, check the parameter [Outside Config] configuration.
E76	—	Storage temperature sensor error	Storage temperature sensor t_{DHW1}	Storage temperature sensor t_{DHW1} or connection cable defective or not connected. ● Check, replace. ● Check configuration [Storage Config].
E81	—	Communication fault	Circuit board RoCon BM1	Parameter store in EEPROM faulty. ● Contact a Daikin service technician.
E88	—		Circuit board RoCon BM1	Parameter store in external flash memory faulty. ● Contact a Daikin service technician.
E91	—		Connected CAN modules	Bus ID of a CAN module duplicated, set unique data bus address.
E128	—	Return flow temperature sensor error	Return flow temperature sensor t_{R1}	Return flow temperature sensor t_{R1} in the flow sensor FLS or connection cable defective. ● Check, replace.

Code		Malfunction / Error message	Component / Designation	Causes and possible error correction
Display	Internal			
E129	—	Pressure sensor error	Pressure sensor DS	Pressure sensor DS defective. ● Check, replace.
E198	—	Flow measurement not plausible	Flow sensor FLS, 3-way diverter valve 3UVB1	Error occurs if the 3-way diverter valve 3UVB1 is in the bypass position, the device-internal circulation pump is running, but the volumetric flow measurement is too low (<900 l/h). – Air in the heating system ● Vent. – Device-internal circulation pump not running. ● Check electrical connection and control settings. If the circulation pump is defective, replace it. – Flow sensor FLS contaminated, blocked. ● Check, clean. – Flow sensor FLS defective. – Valve drive for 3-way diverter valve 3UVB1 defective. ● Check, replace.
E200	—	Communication fault	Electrical components	Modbus communication between RoCon BM1 and switchboard A1P is disrupted. – Check RTX-AL4 switch board. – Cabling or connections, poor contact. ● Check, replace
E8005	—	Water pressure in the heating system too low	Pressure sensor DS	Water pressure has fallen below the minimum permissible value. – Too little water in the heating system. ● Check heating system for leakage, refill water. – Pressure sensor DS defective. ● Check, replace.
E8100	—	Communication	Electrical components	Modbus initialization also failed after heat pump start-up. Circuit board A1P defective. ● Check, replace.
E9000	—	Temporary internal message	—	Not relevant to proper system operation.
W8006	—	Pressure loss warning	Pressure sensor DS	Warning message: Maximum permissible pressure drop exceeded. Too little water in the heating system. ● Check heating system for leakage, refill water.
W8007	—	Water pressure in the heating system too high		Warning message: Water pressure has exceeded the maximum permissible value. – Membrane expansion vessel defective or incorrect pressure set. ● Check, replace. – Setting for the[Max Pressure] parameter too low. ● If necessary, set parameter. If setting is correct, drain water, reduce pressure.

Tab. 7-2 Error codes on the main control unit of Altherma EHS(X/H)

Respect the maximum tightening torque of the temperature sensor (see chapter 9.3 "Tightening torque").



a Plate heat exchanger (condensator)
b Ventilator motor
c Lamella heat exchanger (evaporator)
e Filter
f Electronic expansion valve
g Service valve (liquid line)
h Service valve with maintenance connection (gas line)
i Accumulator
k Coolant compressor
n 4-way diverter valve (—> Heat, ····> Cool)
o Inverter board

R1T External temperature sensor
R2T Discharge temperature sensor (coolant compressor)
R3T Suction temperature sensor (coolant compressor)*
R4T Temperature sensor lamella heat exchanger input*
R5T Temperature sensor lamella heat exchanger centre
R6T Temperature sensor liquid line (t_{L2})*
R10T Temperature sensor on inverter board*
S1PH High pressure switch
S1NPH Pressure sensor DS
** Only with 11-16 kW heat pump external devices.*

Fig. 7-4 Components in the heat pump circuit (simplified diagram)

7.4 Monitoring and configuration DIP Switch

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 of the systems circuits **from the power supply** (switch off main switch, disconnect fuse) and secure against unintentional restart.

- Disconnect the system from the power supply.
- Open the control housing and remove the RoCon BM1 switch board.
- Check the DIP switch setting on the A1P circuit board of the Daikin Altherma EHS(X/H), adjust where necessary (see tab. 7-3).
  The factory preset may only be changed if e.g. an optional accessory was connected.
- Replace the RoCon BM1 switch board, close the control housing and reconnect the power supply.

DIP switch settings are not recognised until a brief interruption to the power supply.

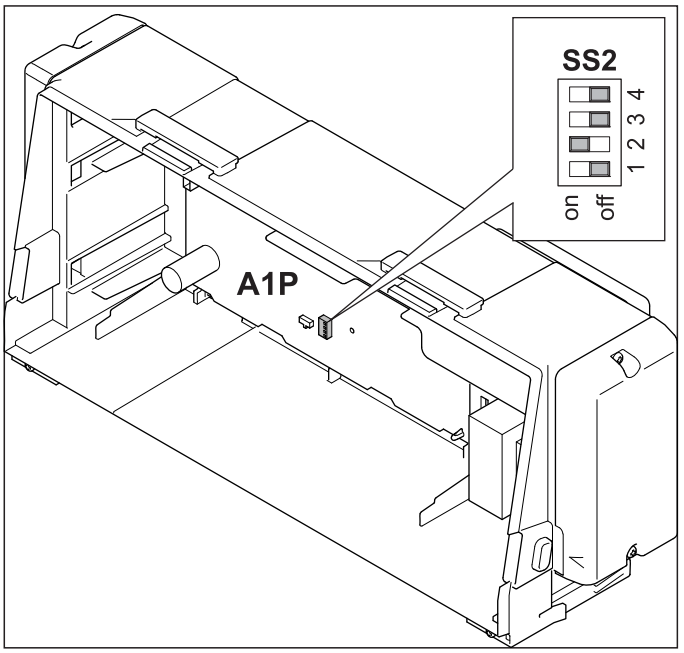


Fig. 7-5 Setting of DIP switch SS2

DIP switch	No.	Designation	Factory setting
SS2	1	Do not change.	OFF
	2	Domestic hot water generation	ON
	3	Room thermostat/pump in continuous operation	OFF
	4	Do not change.	OFF

Tab. 7-3 DIP switch settings

7.5 Emergency operation

In the case of incorrect setting in the electronic control system, emergency heating operation can be maintained by activating the special "Manual Operation" function on the control unit (see operating manual for the control unit).

If the 3-way valves are intact, the Daikin Altherma EHS(X/H) switches to **Heating mode**. The necessary flow temperature can be adjusted with the rotary switch:

A **storage charge** can be realised using the special "Manual Operation" function,

- **Remove** the **valve drive** of the 3-way diverter valve **3UV DHW** (see figure 6-3). To do so, press the unlock button on the valve drive (see figure 6-3, item 5.2) and turn the valve drive a 1/8-turn anti-clockwise (bayonet socket).

When the valve drive is removed, the AB-B path is opened.

Should the **valve drive** of the 3-way diverter valve **3UVB1** be **defective**, a **Parallel operating mode** can be enforced. For this:

- **Remove valve drive** from both 3-way diverter valves **3UVB1 + 3UV DHW**.
  - ➔ The flow temperature is configured for storage charging by means of heat absorption in the heat exchanger (series switching).

In order to prevent a malfunction due to a low flow level, when the valve drive of the 3-way diverter valve 3UVB1 has been removed, sufficient heat absorption must be ensured in the heating system.

- Open actuators in the heat distribution network.
- Set flow temperature as low as possible.

8 Hydraulic system connection

WARNING!

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).

CAUTION!

The Daikin units can also be optionally fitted with gravity breaks made of plastic. They are suitable for maximum operating temperatures of 95°C. If a heat exchanger is operated at temperatures greater than 95°C, another gravity brake must be installed in the building.

A selection of diagrams of the most common systems is shown below. The arrangements shown are only examples, and are no substitute for careful system planning. For more diagrams see the Daikin home page.

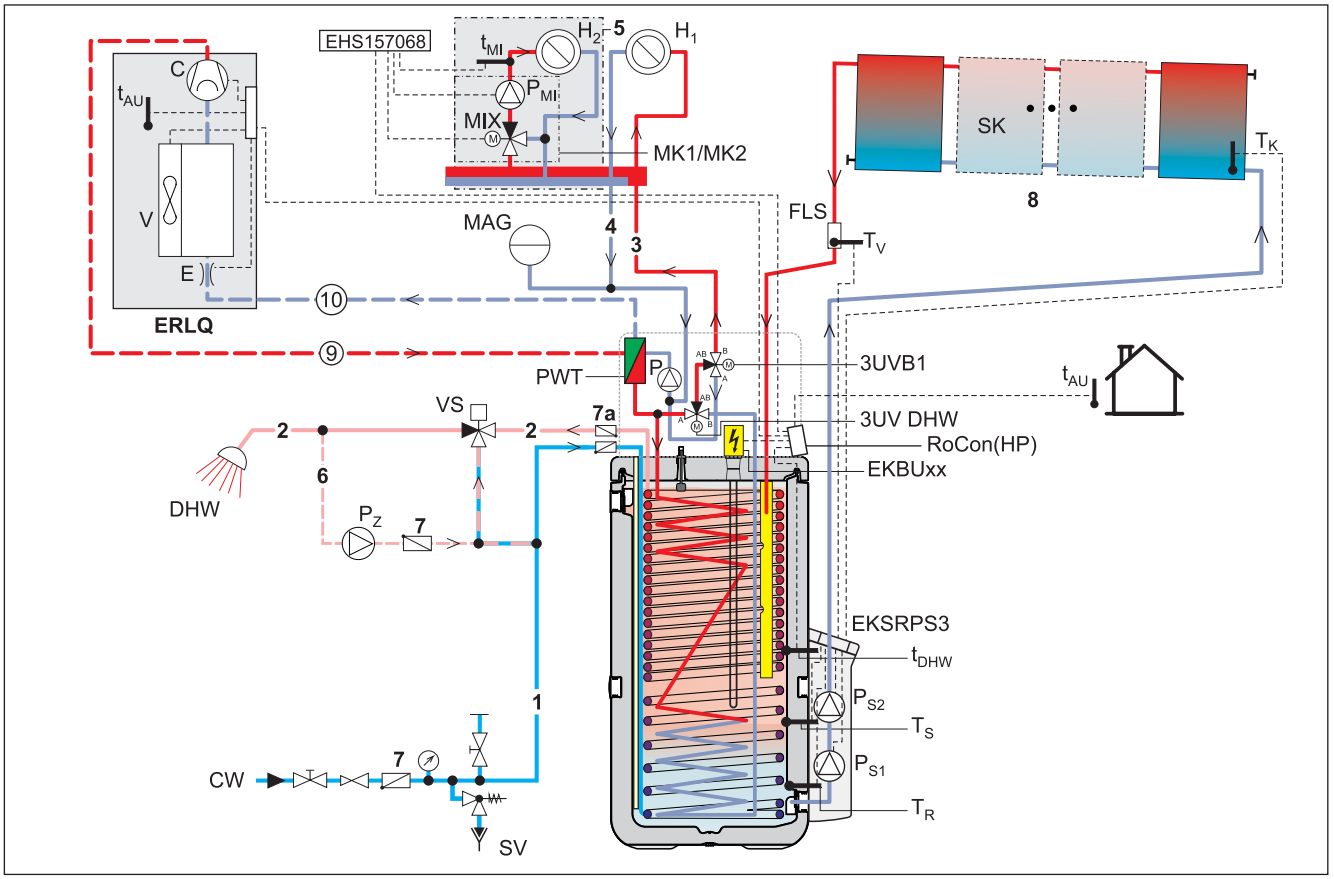


Fig. 8-1 Daikin Altherma EHS(X/H) (all types) with DrainBack Solar p=0 *(for legend see tab. 8 -1)*

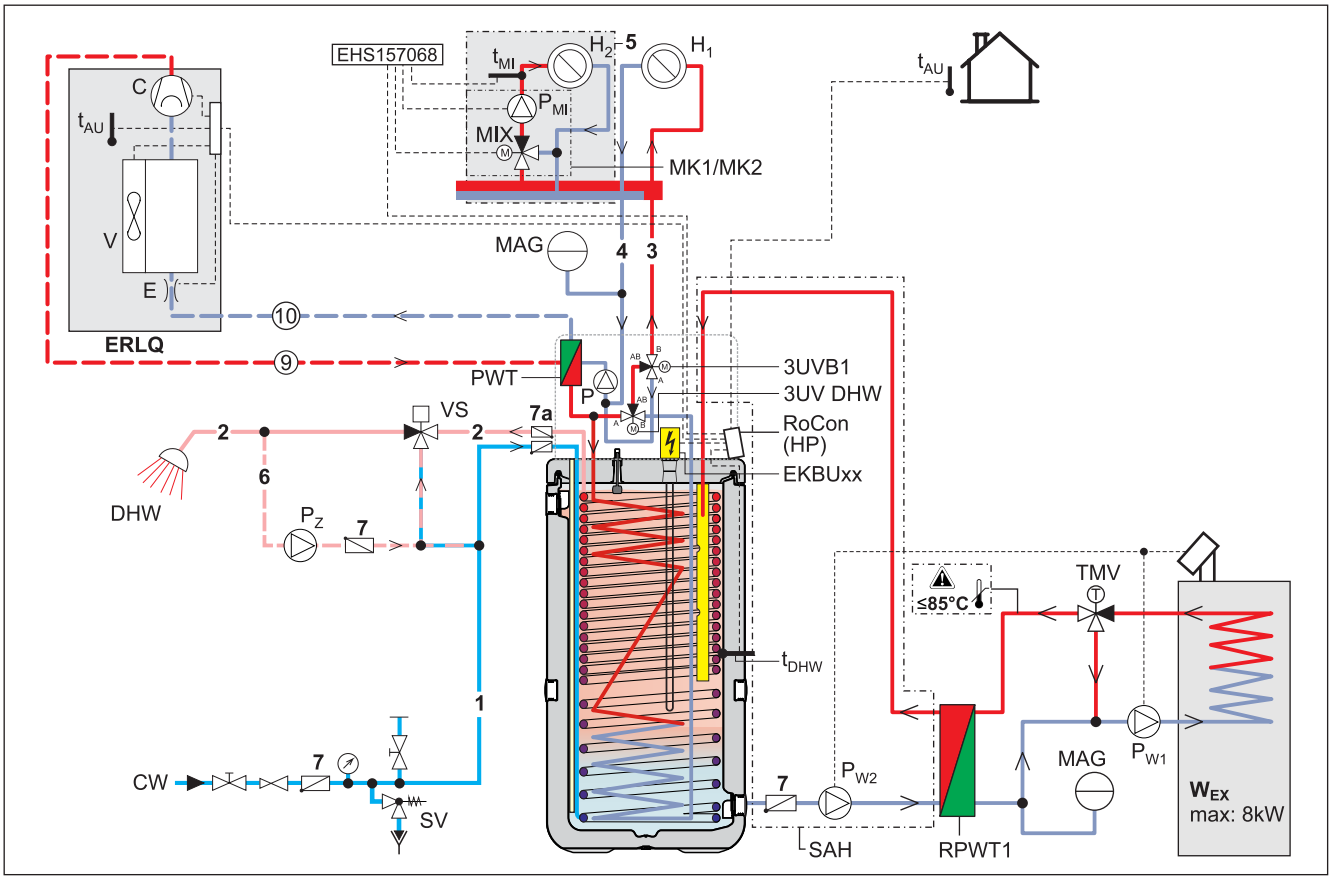


Fig. 8-2 Daikin Altherma EHS(X/H)..P50A with wood-burning boiler <8kW without solar support (for legend, see tab. 8 -1)

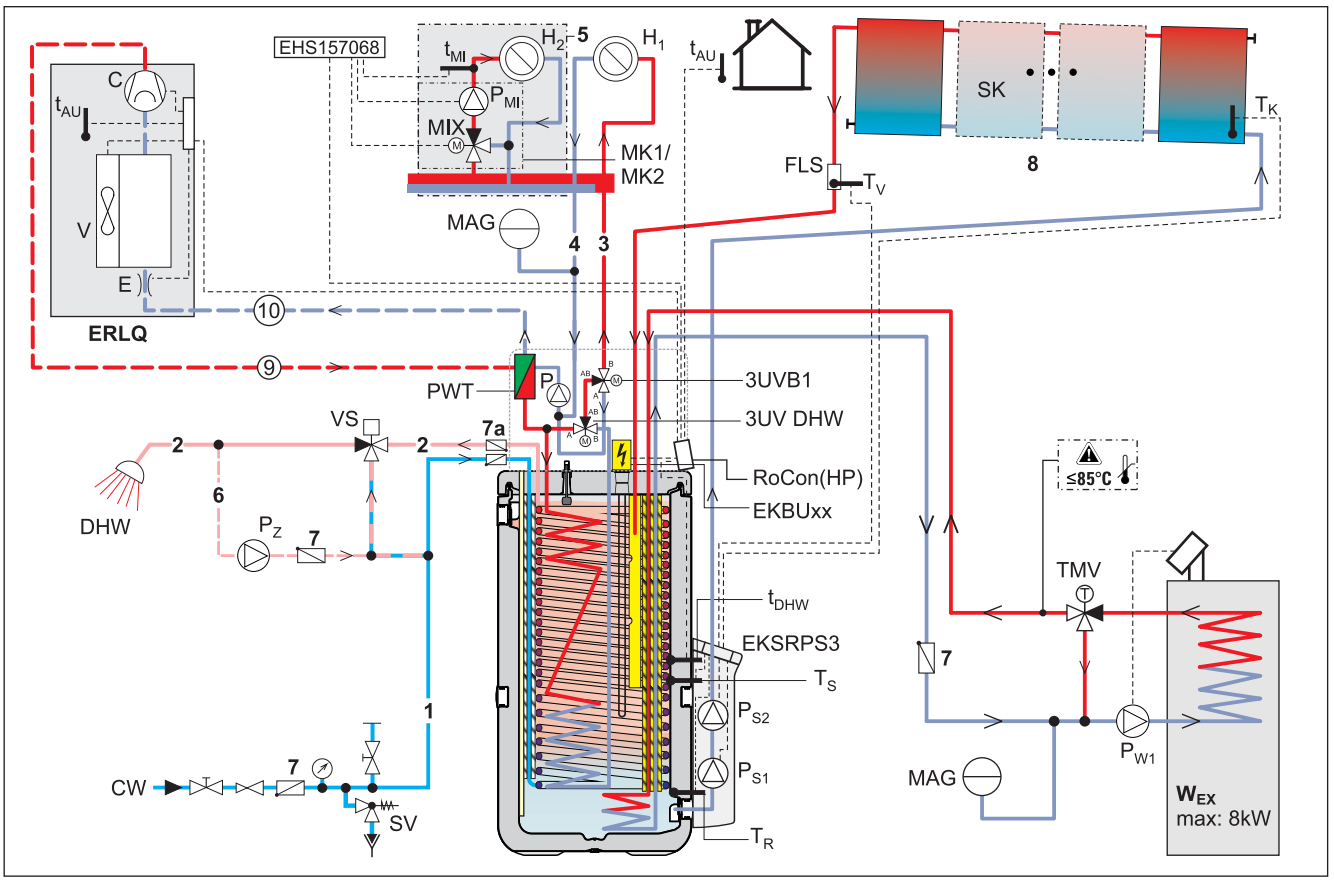


Fig. 8-3 Daikin Altherma EHS(X/H)B..P50A with wood-burning boiler <8kW and DrainBack solar p=0 *(for legend see tab. 8 -1)*

Short name	Meaning
1	Cold water distribution network
2	Hot water distribution network
3	Heating flow
4	Heating return flow
5	Mixer circuit (optional)
6	Circulation (optional)
7	Check valve, return valve
7a	Non return valves
8	Solar circuit
9	Gas pipe (coolant)
10	Fluid pipe (coolant)
3UVB1	3-way diverter valve (internal heat generation circuit)
3UV DHW	3 way diverter valve (hot water/heating)
EKBUxx	Backup heater
C	Coolant compressor
CW	Cold water
DHW	Domestic hot water
E	Expansion valve
FLS	FlowSensor - solar flow and feed flow temperature measurement
H_1,H_2 ... 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 controlled)
P_{Mi}	Mixing circuit pump
P_{S1}	Solar operating pump p=0
P_{S2}	Solar pressure increasing pump p=0
P_{W1}	Primary circuit pump W_{EX}
P_{W2}	Secondary circuit pump W_{EX}
P_Z	Circulation pump
PWT	Panel heat exchanger (condenser)
RoCon HP	Control unit for Daikin Altherma EHS(X/H)
EHS157068	Mixer circuit control
EKSRPS3B	Solar regulation and pump unit p=0
ERLQ	External unit for heat pump
RT	Room thermostat
SAH	Storage tank connection (wood boiler)
SK	Solar panel field
SV	Safety over-pressure valve
t_{AU}	Outside temperature sensor RoCon OT1 (see chapter 3.4.11)
t_{DHW}	Storage tank temperature sensor (heat generator)
t_{MI}	Mixer circuit flow temperature sensor
t_K	Solar collector temperature sensor
t_R	Solar return flow temperature sensor
T_S	Solar storage cylinder temp. sensor
T_V	Solar flow temperature sensor
TMV	Thermostatic 3-way valve for return temperature increase

Short name	Meaning
V	Fan (vaporiser)
VS	Protection against scalding VTA32
W_{EX}	External heat generator

Tab. 8 -1 Short names in hydraulic drawings

9 Technical data

9.1 Equipment data

9.1.1 Daikin Altherma EHS(X/H)...P30A

Type			Daikin Altherma EHS(X/H)			
			04P30A	08P30A	B04P30A	B08P30A
Can be used with an external heat pump unit			ERLQ004CA V3	ERLQ006CA V3 / ERLQ008CA V3	ERLQ004CA V3	ERLQ006CA V3 / ERLQ008CA V3
Dimensions and weights		**Unit**				
Dimensions (H x W x D)		cm	195 x 61.5 x 59.5			
Empty weight		kg	87		92	
Main components						
Water heat circulation pump	Type	—	Grundfos UPM2 15-70 CES87			
	Speed rates	—	Continuously variable (PWM)			
	Voltage	V	230			
	Frequency	Hz	50			
	Protection type	—	IP 42			
	Maximum rated output	W	45			
Heat exchanger (water/coolant)	Type	—	Stainless steel underfloor heat exchanger			
	Heat insulation	—	EPP			
Storage tank						
Total storage capacity		Litres	300			
Maximum permissible storage water temperature		°C	85			
Heat consumption at stand-by and at 60°C		kWh/24h	1.3			
Domestic water heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	27.8			
	Maximum operating pressure	Bar	6			
	Domestic water heat exchanger surface	m^2	5.8			
Storage tank charging heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	13.2			
	Heat exchanger surface area	m^2	2.7			
Pressurised solar heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	—		4.2	
	Heat exchanger surface area	m^2	—		0.8	
Thermal performance data[1)]	Hot water quantity without re-heating at a flow rate of 8 l/min (12 l/min) (T_S=50°C)	Litres	184 (153)			
	Hot water quantity without re-heating at a flow rate of 8 l/min (T_S=60°C)	Litres	282 (252)			
	Hot water quantity without re-heating at a flow rate of 8 l/min (12 l/min) (T_S=65°C)	Litres	352 (321)			
	Re-heating rime with a draw-off quantity of:					
	140 l = 5820 Wh (Ø bathtub)	Min	90	45	90	45
	90 l = 3660 Wh (Ø shower draw-off quantity)		55	30	55	30
Pipe connections	Cold and hot water	Inches	1" AG			
	Heating feed and return flow	Inches	1" IG			
	Solar connections	Inches	1" IG			

9 Technical data

Type				Daikin Altherma EHS(X/H)			
				04P30A	08P30A	B04P30A	B08P30A
Coolant circuit							
Number of circuits			—	1			
Pipe connections	Number		—	2			
	Liquid line	Type	—	Flanged connection			
		External Ø	Inches	1/4" AG			
	Gas line	Type	—	Flanged connection			
		External Ø	Inches	5/8" AG			
Operating data							
Operating range	Flow temperature for room heating/cooling function	Heating (min./max.)	°C	15 to 55			
		Cooling ❄ (min./max.)	°C	5 to 22			
	Hot water generation (with EKBUxx)	Heating (min./max.)	°C	25 to 80			
Noise level	Audibility		dBA	42			
	Noise pressure [2]		dBA	28			
Electrical data							
Voltage supply	Phases		—	1			
	Voltage		V	230			
	Voltage range		V	Voltage ±10%			
	Frequency		Hz	50			
Mains connection [3]	Exterior heat pump unit for Altherma EHS(X/H)		—	4G			
	External unit for heat pump		—	3G			
	Optional auxiliary heating	Backup heater (EKBUxx)	—	3G (1-phase) / 5G (3-phase)			

1) T_{CW} Cold water input temperature = 10 °C
T_{DHW} Hot water draw-off temperature = 40 °C
T_S Storage target temperature (charge state before drawing off)

2) With a reference spacing of 1 m.

3) Number of individual wires in the connection cable, including protective earth. The cross-section of the individual lines is dependent on the current load, the length of the connection cable and the respective legal provisions.

Tab. 9-1 Basic data for the Daikin Altherma EHS(X/H)...P30A

9.1.2 Daikin Altherma EHS(X/H)...P50A

Type			Daikin Altherma EHS(X/H)			
			08P50A	16P50A	B08P50A	B16P50A
Can be used with an external heat pump unit			ERLQ006CAV3/ERLQ008CAV3	ERLQ011CA/ERLQ014CA/ERLQ016CA(V3/W1)	ERLQ006CAV3/ERLQ008CAV3	ERLQ011CA/ERLQ014CA/ERLQ016CA(V3/W1)
Dimensions and weights		**Unit**				
Dimensions (H x W x D)		cm	195 x 79 x 79			
Empty weight		kg	114	116	119	121
Main components						
Water heat circulation pump	Type	—	Grundfos UPM2 15-70 CES87			
	Speed rates	—	Continuously variable (PWM)			
	Voltage	V	230			
	Frequency	Hz	50			
	Protection type	—	IP 42			
	Maximum rated output	W	45			
Heat exchanger (water/coolant)	Type	—	Stainless steel underfloor heat exchanger			
	Heat insulation	—	EPP			
Storage tank						
Total storage capacity		Litres	500			
Maximum permissible storage water temperature		°C	85			
Heat consumption at stand-by and at 60°C		kWh/24h	1.4			
Domestic water heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	29			
	Maximum operating pressure	Bar	6			
	Domestic water heat exchanger surface	m^2	6.0			
Storage tank charging heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	12.1	17.4	12.1	17.4
	Heat exchanger surface area	m^2	2.5	3.5	2.5	3.5
Pressurised solar heat exchanger (stainless steel 1.4404)	Water capacity heat exchanger	Litres	—	12.5	—	12.5
	Heat exchanger surface area	m^2	—	1.7	—	1.7
Thermal performance data[1)]	Hot water quantity without re-heating at a flow rate of 8 l/min (12 l/min) (T_S=50°C)	Litres	364 (318) 328 [4)] (276 [4)])		324 (282) 288 [4)] (240 [4)])	
	Hot water quantity without re-heating at a flow rate of 8 l/min (T_S=60°C)	Litres	540 (494)		492 (444)	
	Hot water quantity without re-heating at a flow rate of 8 l/min (12 l/min) (T_S=65°C)	Litres	612 (564)		560 (516)	
	Re-heating rime with a draw-off quantity of:					
	140 l = 5820 Wh (Ø bathtub)	Min	45	25	45	25
	90 l = 3660 Wh (Ø shower draw-off quantity)		30	17	30	17
Pipe connections	Cold and hot water	Inches	1" AG			
	Heating feed and return flow	Inches	1" IG			
	Solar connections	Inches	1" IG			

9 Technical data

Type				Daikin Altherma EHS(X/H)			
				08P50A	16P50A	B08P50A	B16P50A
Coolant circuit							
Number of circuits			—	1			
Pipe connections	Number		—	2			
	Liquid line	Type	—	Flanged connection			
		External Ø	Inches	1/4" AG	3/8" AG	1/4" AG	3/8" AG
	Gas line	Type	—	Flanged connection			
		External Ø	Inches	5/8" AG			
Operating data							
Operating range	Flow temperature for room heating/cooling function	Heating (min./max.)	°C	15 to 55			
		Cooling ❄ (min./max.)	°C	5 to 22			
	Hot water generation (with EKBUxx)	Heating (min./max.)	°C	25 to 80			
Noise level	Audibility		dBA	42	46	42	46
	Noise pressure [2]		dBA	28	32	28	32
Electrical data							
Voltage supply	Phases		—	1			
	Voltage		V	230			
	Voltage range		V	Voltage ±10%			
	Frequency		Hz	50			
Mains connection [3]	Exterior heat pump unit for Altherma EHS(X/H)		—	4G			
	External unit for heat pump		—	3G	3G / 5G	3G	3G / 5G
	Optaionl auxiliary heating	Backup heater (EKBUxx)	—	3G (1-phase) / 5G (3-phase)			

1) T_{CW} Cold water input temperature = 10 °C
T_{DHW} Hot water draw-off temperature = 40 °C
T_S Storage target temperature (charge state before drawing off)

2) With a reference spacing of 1 m.

3) Number of individual wires in the connection cable, including protective earth. The cross-section of the individual lines is dependent on the current load, the length of the connection cable and the respective legal provisions.

4) Hot water storage tank only to be charged using a heat pump, without a backup heater.

Tab. 9-2 Basic data for the Daikin Altherma EHS(X/H)...P50A

9.2 Characteristic lines

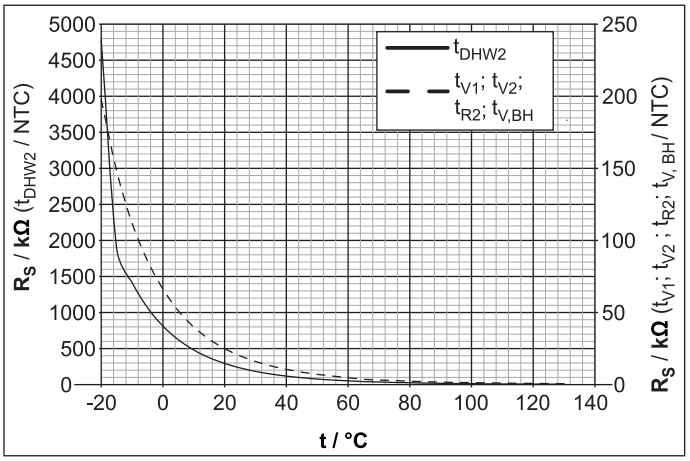
9.2.1 Sensor characteristic lines

Temperature sensor																
		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_{DHW2}	NTC	—	—	811.5	480.6	293.2	183.8	118.2	77.7	52.3	35.8	25.1	17.8	12.9	9.5	7.1
t_{Au} (RoCon OT1), t_{DHW1}	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_{Au} (R1T)	NTC	197.8	112.0	65.8	40.0	25.0	16.1	10.6	7.2	5.0	3.5	2.5	—	—	—	—
t_{V1}, t_{V2}, $t_{V, BH}$, t_{R2} 🔧	NTC	197.80	120.00	65.84	39.91	24.95	16.04	10.58	7.14	4.77	3.19	2.36	1.74	1.33	1.07	0.84

FLS Sensor (Flow/Temperature)										
FLS (t_{R1} / V1)		Measured flow in l/min								
		10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	—
	V1	Sensor output frequency in Hz								
	(14 - 229 Hz)	28	54	81	108	135	162	188	215	—
		Measured temperature in °C								
		10.0	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
	t_{R1}	Sensor resistance in Ohm								
	(Pt 1000)	1039	1077	1116	1155	1194	1232	1270	1308	1347

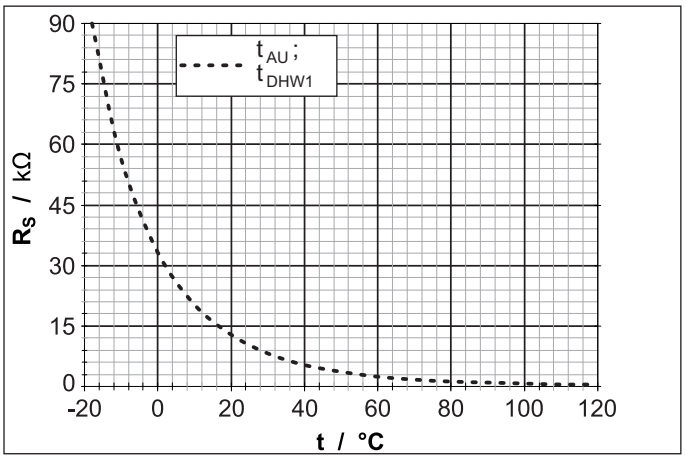
Tab. 9-3 Sensor Table Daikin Altherma EHS(X/H)

⚠ *Maximum tightening torque of sensor =10 Nm.*



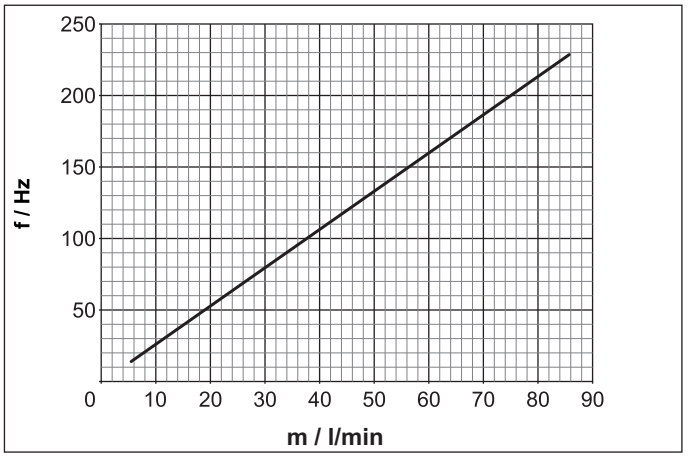
R_S Sensor resistance (NTC)
T Temperature
t_{DHW2} Storage temperature sensor
t_{R2} Return temperature sensor
t_{V1}, t_{V2} Flow temperature sensor
$t_{V, BH}$ Flow temperature sensor backup heater

Fig. 9-1 Characteristics of the NTC temperature sensor Daikin Altherma EHS(X/H) - part 1



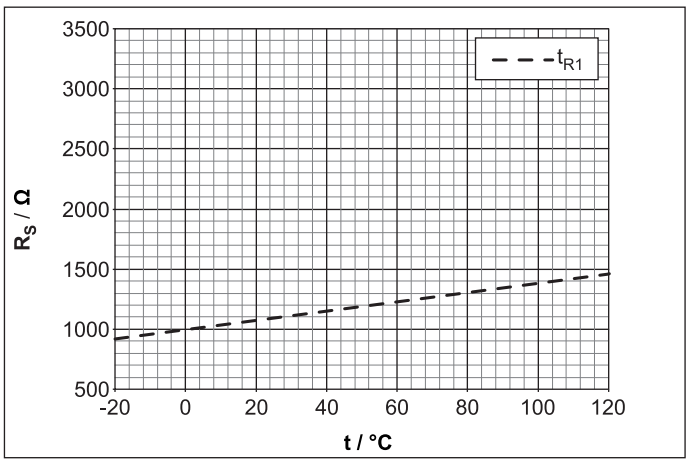
R_S Sensor resistance (NTC)
T Temperature
t_{AU} Outside temperature sensor RoCon OT1
t_{DHW1} Storage temperature sensor

Fig. 9-2 Characteristics of the NTC temperature sensor Daikin Altherma EHS(X/H) - Part 2



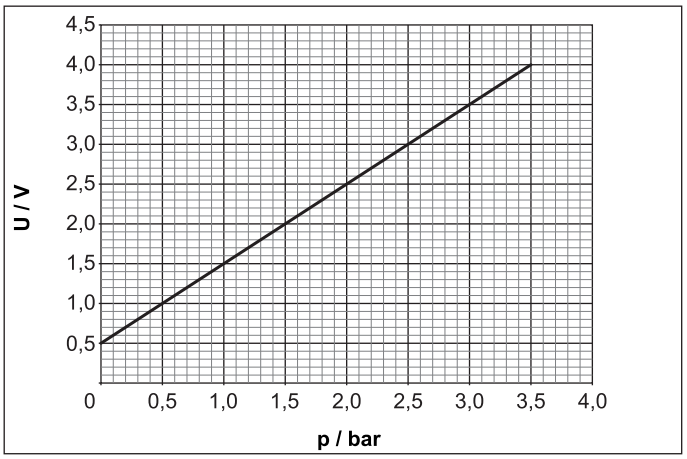
f Frequency
m Flow

Fig. 9-3 Characteristics of the flow sensor FLS (V1) Daikin Altherma EHS(X/H)



R_S Sensor resistance (NTC)
T Temperature
t_{R1} Return flow temperature sensor in the flow meter

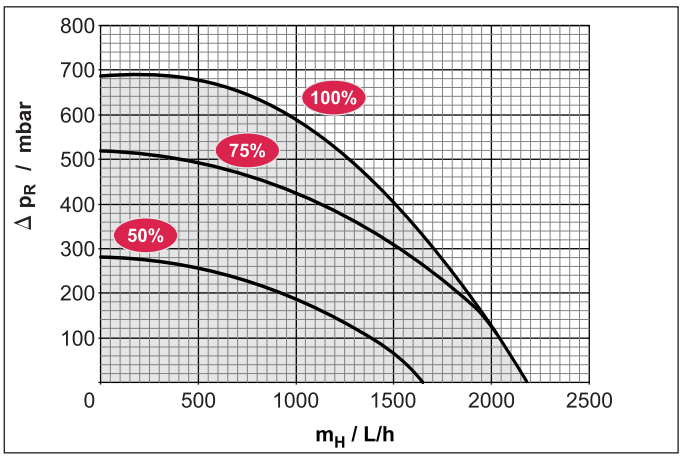
Fig. 9-4 Characteristics of the return flow temperature sensor in the flow sensor FLS (t_{R1}) Daikin Altherma EHS(X/H)



p *Water pressure*
U *Tension*

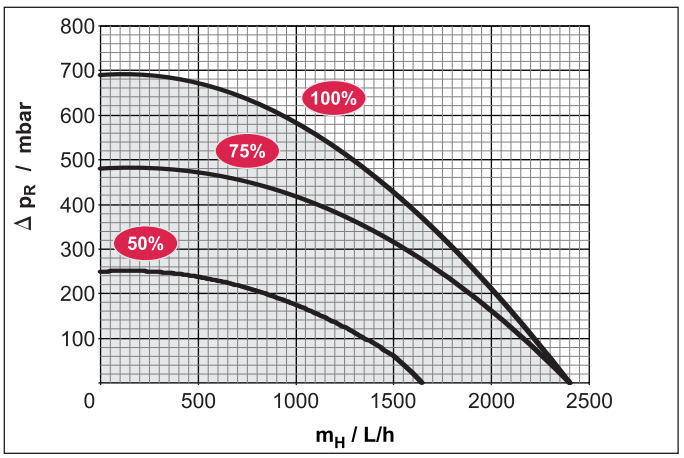
Fig. 9-5 Characteristics of the pressure *sensor (DS) Daikin Altherma EHS(X/H)*

9.2.2 Characteristic curves for pumps



ΔP_R *Residual pumping height of internal heat circulation pump*
m_H *Flow rate of heating system*

Fig. 9-6 Residual pumping height of internal heat circulation pump Daikin Altherma EHS(X/H)...P30A and Daikin Altherma EHS(X/H)(B)08P50A with heating support heat exchabger



ΔP_R *Residual pumping height of internal heat circulation pump*
m_H *Flow rate of heating system*

Fig. 9-7 Residual pumping height of internal heat circulation pump Daikin Altherma EHS(X/H)(B)16P50A with heating support heat exchanger

9.3 Tightening torque

Component	Thread size	Tightening torque
Temperature sensor	all	max. 10 Nm
Hydraulic line connections (water)	1"	25 to 30 Nm
Gas line connections (Coolant)	5/8"	63 to 75 Nm
Liquid line connections (Coolant)	1/4"	15 to 17 Nm
Liquid line connections (Coolant)	3/8"	33 to 40 Nm
Backup heater	1.5"	max. 10 Nm (hand-tight)

Tab. 9-4 Tightening torque

9.4 Circuit diagram Daikin Altherma EHS(X/H)

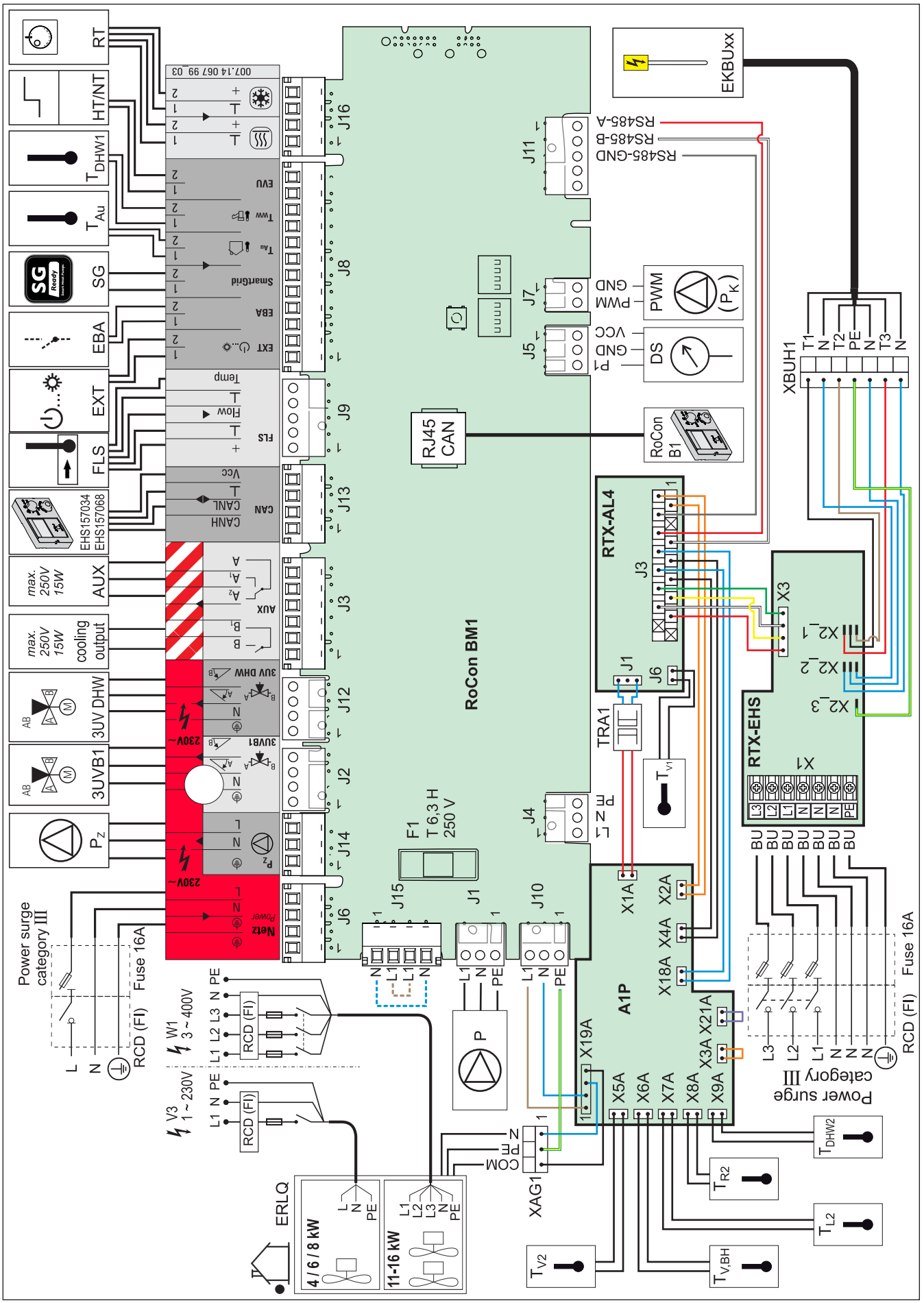


Fig. 9-8 Circuit diagram Daikin Altherma EHS(X/H) - For legend see tab. 3 -3

10 List of keywords

11 Notes

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